

UNIVERSITY OF
NEWCASTLE



SCHOOL OF MANAGEMENT

**The Usage of MIS Applications to Raise the Efficiency and
Performance of the Telecommunications Services in the
Kingdom of Saudi Arabia
(Appendixes)**

BY

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**SUBMITTED TO THE UNIVERSITY OF NEWCASTLE UPON TYNE IN FULFILMENT
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Appendix A

1. Strategic Planning

Input is required from all Deputy Ministries and Departments, as well as Regional and District groups, for the Develop Strategic Plan process. In this process two plans are defined: a five-year Corporate Plan and a two-year Operations Plan.

The O&M five-year Corporate Plan sets out the long-term direction of the O&M Division on the basis of its evaluation of goals, objectives and prospective opportunities. This plan provides the structure used to develop other plans, in particular the two-year Operations Plan, which in turn is intended to encompass short-term goals and implementation tactics to forward strategic directions laid out in the Corporate Plan.

This idea of developing integrated long- and short-term plans has only recently been introduced to the MoPTT (O&M) by a team of external advisors. To date, only two five-year plans have been developed and no two-year Operations Plans. Before the existence of these five-year plans the MoPTT (O&M) had developed annual business plans, and this practice still continues. Progress in achieving the aims of the annual plan is monitored via quarterly operational results reports.

1.1 Budget Process of Strategic Planning

In the Define Yearly Budget process, the MoPTT's annual budget request is submitted to the Ministry of Finance and National Economy (MoFNE). This Ministry receives such requests from all government Ministries and decides the actual budget under which they have to operate. To arrive at the MoPTT's budget request, the budget requests of each Deputy Ministry are combined. Deputy Ministry budget requests are based upon Department, Region and District budget requests. These individual requests are in turn based on the previous year's performance results and current requirements. Most information relating to budgeting matters is manually distributed among the MoFNE, the MoPTT, its Deputy Ministries and Departments in the form of hard copy reports or forms.

Once the MoFNE has made its determination on budgets, the MoPTT's fund allocations are dispersed to the target units in the Distribute Budgets to Departments process. Budget expenditure is monitored throughout the year to ensure that budgeted monies are spent properly, an operation known as the Monitor Proposed versus Actual Budgets process.

1.2 Sub-Processes

Below is a list of sub-processes currently performed by the O&M and the F&A units for each of the processes of Strategic Planning. It is intended to show only principal sub-processes.

1.2.1 Develop Strategic Plan

- Monitor industry trends for incorporation in the plan
- Identify and prioritise the MoPTT goals and objectives
- Monitor market trends for incorporation in the plan
- Accept government policies
- Gather data from individual MoPTT departments
- Produce and distribute the five-year Corporate Plan
- Identify and prioritise short-term implementation projects
- Obtain budget allocations for short-term implementation projects
- Produce and distribute the two-year Operations Plan (which have still to be realised at present).

1.2.2 Define Yearly Budget

- Gather historical expenditure data
- Estimate recurring operational costs
- Identify and prioritise desired future projects
- Estimate costs of desired future projects
- Consolidate budget requests
- Obtain the Minister's approval of the budget request
- Produce the Ministry's budget request
- Submit the request to the MoFNE.

1.2.3 Distribute Budget to Departments

- Receive budget allocation from the MoFNE
- Distribute budgets
- Adjust plans to match allocated budgets.

1.2.4 Monitor Proposed versus Actual Budgets

- Monitor the MoPTT progress against five-year Corporate Plan
- Monitor the MoPTT progress against two-year Operations Plan
- Monitor the MoPTT progress against annual business plan
- Monitor expenditures against annual budget
- Monitor financial performance
- Analyse plan variances
- Issue revised plan
- Alter spending pattern or request additional budget, if needed.

1.3 Data Entities

High-level data entities involved in the Strategic Planning function include:

- the MoPTT goals and strategies
- strategic plans and budgets
- network data
- environmental/demographic data.

1.4 Strategic Planning Function Assessment

It has to be recognised that the processes associated with the MoPTT Strategic Planning function do not, in their present form, provide the drive required for the activities and projects of the Ministry. More importantly, two units within the Ministry produce two different but quite unrelated and unco-ordinated five-year plans.

Finance available to the MoPTT cannot always be counted on, as things are at present. This is because the availability of funds, even if in theory allocated to the Ministry, is

subject to modification depending on the changing national requirements and priorities. The budget allocated by central government each year does not appear to respond to the requirements of either five-year Strategic Plan formulated within the MoPTT, a further indication that Strategic Planning does not have a high profile with those who make decisions.

The researcher's evaluation of the Strategic Planning function was based on:

- comments received from executives of the MoPTT
- discussions with individuals throughout the MoPTT during this phase
- review of the MoPTT (O&M) functional Strategic Plans
- review of the MoPTT (O&M) five-year Corporate Plan for 1995/1996 to 1999/2000
- review of the DM (F&A) five-year Strategic Plan
- other internal documentation.

1.4.1 Relationships to Other Functions

In any organisation Strategic Planning is expected to play a leading role, setting the course for all other business functions to follow. In the MoPTT, however, this is not the case. The Saudi Ministry of Planning produces a five-year National Development Plan for the whole Kingdom, and part of this plan is devoted to the MoPTT. Within the MoPTT, however, this National Plan is used primarily as a contributory aid to the Define Yearly Budget process, and does not receive proper recognition as a set of directives for other activities. The five-year Corporate Plan developed within the MoPTT (O&M) has no effect on other Deputy Ministries.

Within the MoPTT neither of the two five-year Strategic Plans produced appears to set strategic targets for the Ministry. There should be single overall strategic plan for the Ministry with Departmental functional Strategic Plans developed in support of the overall Ministry plan, and driven by goals and objectives should be set by the Minister.

1.4.2 Effectiveness

To measure the effectiveness of Strategic Planning, the following factors have been analysed:

- the acceptance of Strategic Planning

- the usefulness of existing planning documents.

Since Strategic Planning is not yet widely accepted throughout the MoPTT, the plans that have been developed reflect the thinking of a few departments and not that of the Ministry as a whole. This being the case, the plans do not give effective direction to other important operations such as funding allocation. The objective of Strategic Planning is to drive the establishment in a chosen direction, and it is crucial to the success of a plan that it should receive adequate financial and capital backing. In order to receive the funding backing required, it is therefore essential that Strategic Planning should find wide support within the MoPTT as a whole, especially amongst the upper echelons, since they are the ones who can most effectively seek government funding assistance. Further, widely accepted plans can be published and actively shared with an entire organisation, so that all levels can have an involvement in their implementation.

The problem is that the current planning initiatives are emanating from lower levels within the MoPTT, not from top management, with whom the task of setting overall goals and directions within an organisation ought ideally to lie. Plans driven from the bottom up face the danger that they will not be accepted or, which is worse, will come into conflict with the course favoured by the executives.

Within the O&M Division of the MoPTT a start has been made in the development of functional Strategic Plans and a five-year Corporate Plan, although it has to be acknowledged that these plans have so far been used more as a training exercise in learning how to develop Strategic Plans than as actual plans to be carried out. Only two five-year Corporate Plans have been produced, both by the O&M Division of the MoPTT, and they have received the approval of the Minister. While MoPTT personnel are still have still to appreciate fully the worth of Strategic Planning, they are beginning to see how Strategic Planning can help them deal with budget shortages. Strategic. Details and data drawn from Strategic Plans can be used to settle on reasonable budget requests and to present them effectively to the MoFNE.

The budget allocated to the MoPTT is not related to money that comes in from by the Ministry's operations, whether actual telephone revenues or investment (or potential investment) income. Monies from telephone operations go directly to the MoFNE and SAMA (Saudi Arabian Monetary Agency), bypassing the MoPTT entirely and income

which is generated by the MoPTT can be disbursed to other Ministries by the MoFNE. In this situation, it is no surprise that the Operations Plan and annual budget for the MoPTT may not reflect actual operational needs or the possible income-generating prospects of the Ministry.

Decisions about the amount of the MoPTT budget are effectively made by the MoFNE, and decisions about distribution and spending by the F&A Division of the MoPTT, and both these types of decisions do not always meet with the agreement or the understanding of the managers that they affect. The general feeling among the MoPTT managers consulted was that budget decisions are based primarily on cost considerations with little regard for how these decisions may affect the operational plans of the rest of the MoPTT. Many managers in the O&M Division of the MoPTT expressed the opinion that the F&A Division does not have the technical telecommunications background to make reliable cost/benefit evaluations for budget allocations.

Those allocations which are approved are made chiefly to maintain the existing network, not to put into network expansion. For example, the F&A Division of the MoPTT has requested that more income should be raised through the use of pay-phones. However, the F&A Division has not approved sufficient budget to support the maintenance and operations of existing pay-phones, and no money for new pay-phones have been approved. There are some expansion schemes underway, but these telephone expansion projects (TEPs) result from accumulated, rejected smaller network expansion projects. By rejecting funds for smaller projects and for new services, the MoPTT is risking the loss of revenue and prejudicing the execution of larger expansion projects.

1.4.3 Efficiency

As we have mentioned in Section 1.1, information about plans, whether internal or external, is distributed manually, so that there is no effective communication about the Strategic Plans that do exist. Indeed many managers and executives consulted were not aware of them.

It is worth pointing out that the MoFNE and the F&A Division of the MoPTT rely on paper records because of a historical distrust of computer-held data. Paper documents are

also kept for legal reasons, as well as to provide the owner of a document with a guarantee of data integrity. Unfortunately, similar data is recorded in many departments, so that the sought-after integrity is not actually maintained.

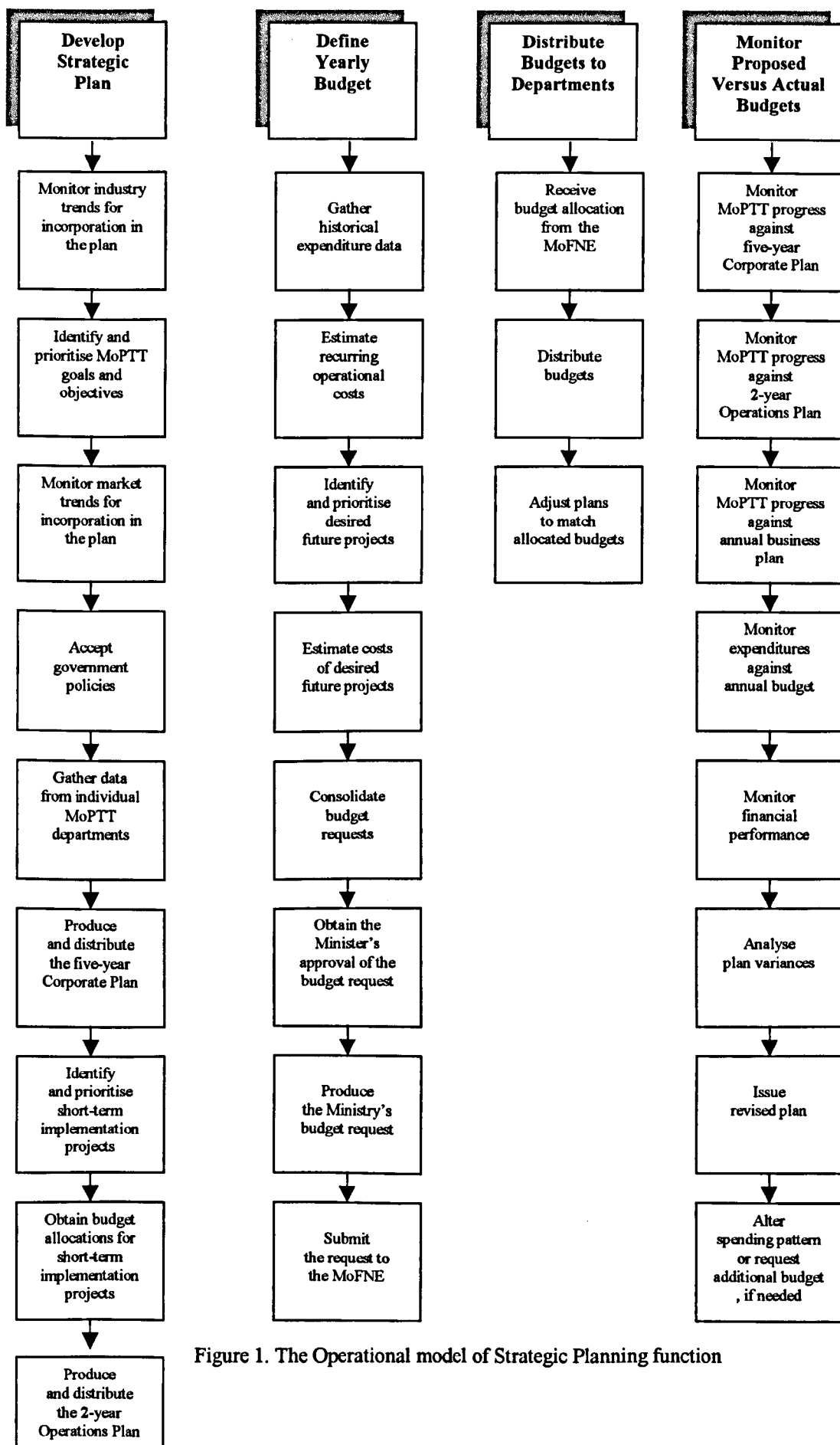


Figure 1. The Operational model of Strategic Planning function

2. Marketing

2.1 Sub-Processes

Below is a list of sub-processes currently carried out by the MoPTT in connection with the Marketing function. Only principal sub-processes are listed.

2.1.1 Market Research

- Gather Data
- Forecast Product and Service Demand.

2.1.2 Develop Publicity and Advertising

- Determine Advertising Venues
- Develop Product and Service Brochures
- Promote Products and Services
- Inform the Public of Network Availability.

2.2 Data Entities

The Marketing function accesses few data entities. The principal entities are listed below:

- product information
- customer information.

2.3 Marketing Function Assessment

In a modern telecommunications service, marketing operations such as market research, product and service development, and advertising are crucial to the success of the organisation. While basic marketing is carried out within the Commercial Services and Public Network Services Departments of the O&M Division of the MoPTT, these tasks have little influence on the sale of products and services, and no influence at all on network development plans.

Our assessment of the Marketing function is based on discussions with marketing staff. Outputs of the Marketing function are not used by other units as inputs to other processes and are, therefore, not assessed.

2.3.1 Relationships to Other Functions

Within the MoPTT the Marketing function does not influence any other functions, and indeed it is not thought to be important to units responsible for these other functions. This may be contrasted with profit-driven organisations or companies operating in a competitive environment, where Marketing functions are vital in forecasting demand and anticipating revenue levels from products and services. Information gathered by the Ministry's Marketing personnel should help to shape network and organisational development plans.

2.3.2 Effectiveness

To assess the effectiveness of the current MoPTT Marketing function, the following factors were analysed:

- Usefulness of marketing data to the MoPTT
- Ability to attract new customers
- Ability to promote products and services.

We have already commented that, in the MoPTT, Marketing is not regarded as an important function. Projections developed by the Marketing Communications Division are by and large ignored, even though they are often accurate, and network development plans created by other units do not take into account information provided by Marketing. The consequences for the Ministry have been that revenue has been lost and the planning process has been repeated unnecessarily.

Although budget requests have repeatedly been made for funds to support advertising and promotions, such operations currently receive no funding, and those who run the small amount of advertising that does take place have to make do with money intended for use in other areas. This lack of funds makes the advertising and promotions process very ineffective.

In a way, however, it may be argued that it is at present to the MoPTT's advantage to have ineffective advertising. More successful advertising and promotional campaigns would only increase the number of held orders, and this would cause difficulties because of the fundamental lack of network infrastructure. This shortcoming would have to be corrected before large-scale advertising campaigns to attract new customers were implemented. In a quality organisation spare network capacity is assumed to exist and advertising is used to attract customers, who, in turn, reduce excess capacity.

2.3.3 Efficiency

The current MoPTT Marketing efforts are small and unambitious, and they suffer from lack of accessible relevant information, which has to be formally requested from various departments. Without this information Marketing units within the Ministry do not have the weight to present complete business plans. Thus, the process of developing demand projections is difficult and inefficient. The Marketing function could be made more efficient, and complete business plans could be developed, if units involved in Marketing were given easy access to all information needed to support their role.

Sub-Process: MANAGE TRAFFIC

This sub-process analyses the traffic load, which is placed on the switch and trunk, in order to measure traffic congestion and dimension the capacity that is required to handle existing traffic load. It initiates traffic load data, which is then used to rearrange transport network provision network path when measurements exceed acceptable traffic levels. This sub- process is contained in the CHANGE NETWORK CONFIGURATION process.

Sub-Process: PROVISION NETWORK PATH

This sub-process performs the activities that are necessary to expand switch and trunk capacity, when performance measurements exceed acceptable traffic service levels. Such activities Include ordering of equipment, installing of equipment and testing of transport path. This sub-process is contained in the CHANGE NETWORK CONFIGURATION process.

Sub-Process: REARRANGE TRANSPORT NETWORK

This sub-process eliminates/minimises traffic congestion and restores service by rearranging the transport network to balance line load. It is contained in the CHANGE NETWORK CONFIGURATION process.

Data Store: NETWORK RECONFIGURATION DATA

This data store contains information on how individual network elements are connected together, and how messages will pass through those connections. It is scoped within the information usage model for the process CHANGE NETWORK CONFIGURATION.

Data Store: NETWORK EQUIPMENT ORDER INFORMATION

This data store contains the details of a requisition for new network equipment that will be passed onto the Materials Management function. It is scoped within the information usage model for the process CHANGE NETWORK CONFIGURATION.

3. Customer Services

Operator-assisted services are managed by several units, each having different responsibilities. Operator-assisted services are more commonly known as '900 services' within the MoPTT, because a customer can reach the services by dialling the appropriate 900 number: for example, dialling 905 connects the customer with directory inquiry services. Operators in Jeddah, Riyadh and Dammam answer all 905 calls. Contractors call 906 to report accidental cable cuts and to request cable locations. Dialling 904 connects the customer with a Regional operator who is trained to handle fault reports, while for faults with special services, a customer dials 909. 907 will bring connection to a District operator who can answer questions about the status of service orders and make changes to limited billing information, and 908 will connect the customer with an operator who can answer billing inquiries. Policies and procedures to be followed by operators in the different 900 number groups are centrally determined.

Another Support Customer Service sub-process is maintaining held service orders. Currently, if a customer wishes to apply for service but the MoPTT knows it cannot service the customer within seven days, the customer order is usually placed in the CSHOR system. The CSHOR orders are accessed to help inform customers about any progress made towards removing the held order and issuing an actual service order. District Engineering and Construction Divisions or Exchange Maintenance Divisions may be involved in clearing held orders. These units are notified of the need to perform work by means of a form known as FIM. Once an FIM is complete, the related held order can be released and the normal process for handling orders can get underway.

3.1 Sub-Processes

Below is a list of sub-processes currently performed by the MoPTT for each of the processes of Customer Service. It is intended to show only principal sub-processes.

3.1.1 Provide Service

- Accept a customer application
- Perform site survey
- Negotiate service due date

- Check customer credit
- Create a service order
- Assign telephone number to order, if necessary
- Assign facilities to the order
- Schedule necessary work orders
- Dispatch work to be done for the order and track technical progress
- Complete field installation work for the order
- Program exchanges, if necessary
- Close the order (flow of control passes to billing).

3.1.2 Bill Customer

- Gather call detail information from exchanges
- Calculate, print and distribute customer invoices
- Administer bill payment and final account collections
- Settle bill disputes.

3.1.3 Support Customer Service

- Set and enforce tariffs
- Administer international accounts
- Administer public relations
- Provide operator-assisted services (900 services)
- Administer held orders
- Administer customer-reported faults
- Set service policies and procedures
- Monitor customer satisfaction
- Maintain held service orders.

3.2 Data Entities

The Customer Service function accesses several data entities. The principal entities are listed below:

- customer information

- service order information
- facility information
- technician information
- customer invoice information
- operator service information
- installation order information.

3.3 Customer Service Function Assessment

The current MoPTT Customer Service function is neither efficient nor effective, when compared to that of a quality operation. Of all the functions in the Value Chain, the Customer Service function has the most public exposure, and it is criticised daily by the public and media because of the MoPTT's inability to provide quality service in a good time. The Customer Service function is also one of the least mechanised MoPTT functions.

The Customer Service function was assessed based on:

- discussions with several departments involved with customer service
- tours of *Olaya* Subscription Office, *Mursalat* Exchange Building, and Riyadh City District Offices
- internal MoPTT documents
- consultations with experienced people in the MoPTT services.

3.3.1 Relationships to Other Functions

The Customer Services function is affected by a tremendous service backlog, which has resulted from the following Network Development problems:

- Most exchanges are critically full with no further telephone numbers available for allocation.
- Insufficient outside plant exists.

Through accepting applications, which become for the most part held orders, the Customer Service function greatly influences the current MoPTT Network Development

function. As the number of held orders in a given area increases, the chances grow that network expansion will occur in the area too.

The Customer Service function influences the Network Management function when customers report faults with their service. 904, 906 and 909 operators take customer or contractor fault reports by phone. The actual repair of the network is part of the Network Management function.

3.3.2 Effectiveness

The following factors have been analysed to assess effectiveness of the Customer Service function:

- Service Provision time
- Number of held orders
- Method of contacting the MoPTT
- Number of service faults
- Fault Clearing cycle time.

The MoPTT standards for providing service are seven days for basic telephone installation service and within four weeks for other services. Unfortunately, the MoPTT has trouble meeting these standards. Most applications for new telephone service immediately become held orders, and we have noted already that these can take months, or years, to clear. Provision times for quality organisations are one day for basic telephone service, and within three days for other services. Held orders are usually cleared within seven days.

Held orders represent demands that the MoPTT cannot meet with the existing network. There are more than 500,000 held orders in the Ministry, and the number of increases by around 10,000 per month. In fact the actual demand for service is greater than the demand indicated by the number of held orders, since in many cases customers are told not to submit applications, because the MoPTT will not service the area in which the customer wants service for several years. In a good telecommunications operation held orders are exceptional, not commonplace as in the MoPTT.

Most first-rate telecommunications organisations make things easier for their customers by providing a single point of contact, or at least they greatly limit the number of contact points, through which a customer may request services, and they have trained customer service representatives to handle service requests. The operations and activities of service provision also tend to be centralised. By contrast, six different MoPTT Departments are involved with the Service Provision process, depending on the product or service desired. Some Departments are divided into smaller units, each of which has a part in the Service Provision process. A customer must contact the right unit in order to request service, and finding the correct contact can be a frustrating experience, especially for customers looking for the less common services.

Another problem some non-Arabic speaking customers have with contacting the MoPTT is finding a representative who speaks English. Operators of the 900-service have regular contact with external customers and business representatives who speak no Arabic, English having become the global business language. The current English language abilities of 900-service operators are low enough to create a major barrier to conducting effective business transactions.

The current MoPTT fault management statistics also point to an ineffective Customer Service. For the basic telephone service the number of customer-reported faults is acceptable: reports show that the MoPTT averages around two faults per 100 working lines (although the Southern Region averages over three). For non-basic services, however, the MoPTT does not shape so well averaging around five faults per 100 circuits, whereas first-rate providers, such as MCI or BT, average less than two.

Industry-accepted times for clearing faults are within eight working hours for basic telephone services and within four working hours for business services. According to operational results reports the MoPTT clears only 80% to 85% of all faults within eight hours. This represents another area where the MoPTT's Customer Service function is ineffective.

3.3.3 Efficiency

The following factors have been analysed to assess the efficiency of the Customer Service function:

- duplication of efforts
- amount of automation involved
- amount of integration
- number of people involved.

A major observation related to almost all Customer Service processes was that the processes were broken down into many tasks, with each task manned by different people, resulting in an unnecessary and inefficient number of persons involved to do something that could be much less complicated. Data verification is performed at the start of each assignment, and usually at the end also. Data is usually transferred from one form to another, as control responsibility passes from one individual or unit to another. These efforts are a tremendous, and unnecessary, duplication.

Modern telecommunications providers have automated service provision procedures, making use of the one information system to process orders for all types of service. Order management systems include, or are integrated with, automated facilities assignment subsystems. Accepting a customer's request, verifying credit history, creating a service order, and assigning facilities to the order are all completed in the time it takes the customer to provide information over the phone. No paper record of the transaction is generated unless it is required for legal reasons.

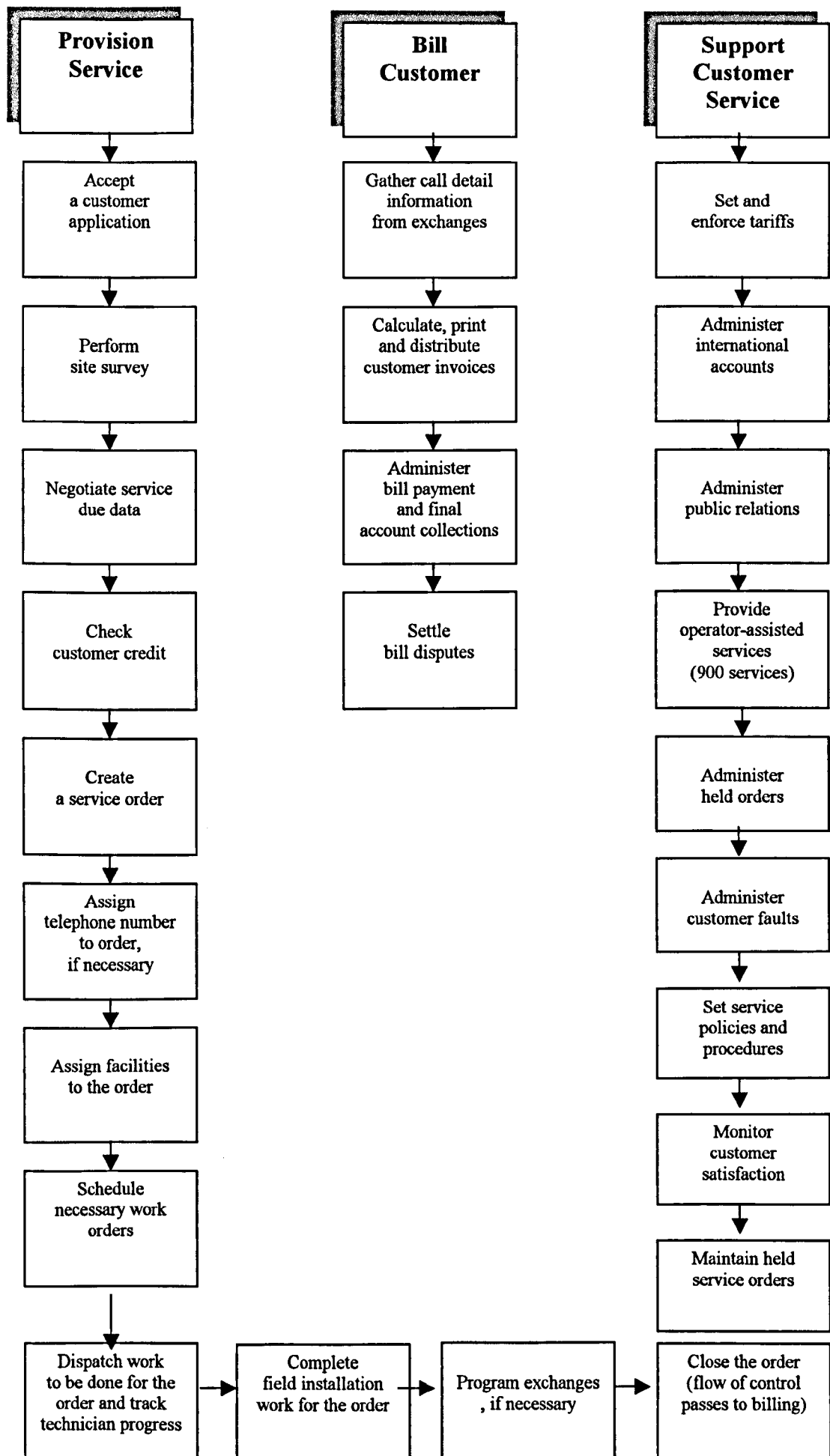
By contrast, most of the MoPTT service provision process is manual and separate information systems are used to administer it. Information is conveyed from one step of the process to the next on paper forms, and paper reports and forms are used to allocate input to orders and schedule and dispatch installation work. Separate information systems administer workable service orders (SASOS), held orders (CSHOR), and facilities availability (SLEAS).

The service order system also acts as a customer service information file, where the last service order completed does duty as the current customer service profile. From the time a customer submits the initial application to the time facilities have been assigned to the order, information has been transferred, and in many instance duplicated, onto at least four forms. Yet more forms are involved in the assignment and installation tasks of Service Provision. This intense dependence on manual methods and non-integrated systems is labour-intensive, leads to data and service errors, and should be dispensed

with. One individual adequately supported by an information system could handle the work of over ten members of staff in the current MoPTT process.

Another Customer Service process that can be improved is billing. The MoPTT billing is slow, inefficient, and, at times, not cost-effective. The entire catalogue of procedures involved is labour-intensive and tedious, with scarcely an acknowledgement of the possibility of using modern information technology. Call details are primarily transferred from exchange to the billing system on magnetic tapes sent via post or delivered by truck. Bills are supposed to appear quarterly but this can sometimes depend on exchange location, and invoices are produced 30 days, at the earliest, after the end of the billing cycle. Rate plans are relatively inflexible, and payments are generally collected only at banks. Records of payments, which are transferred from bank offices to the MoPTT offices manually via lists, are entered into one information system only to be transferred on magnetic tape to a central accounts updating system. Manually-intensive collection measures are taken for the sake of amounts of even a few SR. The current MoPTT billing process could benefit from both immediate improvements and the introduction of an integrated billing and payments system.

Two developments in relation to customer payments are worth noting here. The MoPTT is experimenting with placing cash payment systems directly in bank offices, and customers are allowed to pay bills at some district offices. Both practices should make the billing process more efficient. If current tests are successful, both processes should be adopted over the whole country.



4. *Materials Management*

4.1 Sub-Processes

Below is a list of sub-processes currently carried out by the MoPTT for each of the processes of Materials Management. It is intended to list only principal sub-processes.

4.1.1 Acquire Equipment and Facilities

- Receive internal material request
- Conduct vendor search
- Issue material purchase order
- Monitor material needs
- Produce requirements forecast.

4.1.2 Monitor Inventory (Stock)

- Maintain depot information
- Receive inventory
- Maintain vendor list
- Evaluate vendor performance
- Authorise payments to vendors
- Monitor inventory levels
- Conduct inventory inspection
- Maintain shipper information
- Select materials for shipping
- Ship materials to depots
- Receive returns
- Manage material returns
- Repair returns.

4.2 Data Entities

The Materials Management function accesses several data entities. The principal entities are listed below:

- material item
- material purchase order
- material usage
- vendor contract
- vendor products
- material vendor
- request for quote
- material procedures
- material requisition.

4.3 Materials Management Function Assessment

The current MoPTT Materials Management function is neither efficient nor effective, and responsibilities for the Materials Management function do not appear to be clearly defined within the Ministry.

The assessment of this function is based on consultations with individuals who claim responsibility for material management, the Materials Management Functional Strategic Plan for 1995/1996, and other internal MoPTT documents.

4.3.1 Relationships to Other Functions

Materials Management is a key support function. Almost all primary functions and many support functions depend on the efficiency and effectiveness with which this function is carried out. The lack of materials prevents the completion of major projects and the implementation of new services. An excessive reliance on obsolete materials can have a major negative effect on the cost structure of the MoPTT.

Materials Management is greatly affected by the budgeting processes of Strategic Planning and these directly influence the purchase and availability of stocks. If stocks are unavailable this has an impact on the capacity to implement expansion plans in the Network Development function. The Buildings and Land Management function is also

affected by the Materials Management function, especially when furnishing a new office space. In addition the Network Management and Vehicle Management functions are influenced by Materials Management. Just as the Network Management function will be affected if sufficient levels of spare parts of the network are not maintained so Vehicle Management, and ultimately Customer Services, will suffer if no spare parts for vehicles are maintained.

The Materials Management function relies heavily on accurate forecasts of material needs from the other functions and the plans of Materials Management are closely linked to the plans of other functions. These Material plans and projections govern whether the Material function correctly sets inventory levels for each type of material and ensures that neither over-stocking nor under-stocking occurs.

Materials Management is thus is very dependent on accurate record keeping. Many modern computer tools are available for maintaining stock levels and carrying out inventory projections, all of them relying on accurate data in a form that can be used for stock calculations. These modern inventory and material control systems stand in sharp contrast to obsolete manual stock control techniques.

The tendency in many modern companies is to maintain stock on a 'just-in-time' basis, whereby suppliers deliver particular stock items as the need for them occurs. In such cases it is the supplier who maintains the warehouse and stocking levels, allowing the company to keep its inventory costs down. Such types of Materials Management approaches not only require the co-ordination of all of the company's stock plans, but also the sharing of those plans electronically with the suppliers. The company benefits from the reduced cost of carrying supplies, and the supplier benefits from being able to project and minimise the amount of material which he must hold for supply.

4.3.2 Effectiveness

The following factors have been analysed when assessing the Materials Management function:

- Record keeping methods
- Number of groups involved
- Availability of materials.

Manual record keeping makes it difficult for the MoPTT to maintain accurate records of stock. It is not possible to provide a precise assessment of stock levels currently held in the MoPTT warehouses. The Buildings and Security Department within the O&M Division of the MoPTT also tries to maintain records of contractor stock. There is no electronic sharing of stock records between the MoPTT and contractors.

Three groups have claimed some responsibility for the Materials Management function and the boundaries of responsibility between them are not clear. With information about stock levels and the location of materials not mutually shared, the records maintained by each group vary, which makes the Materials Management function ineffective for the MoPTT as a whole. This means it is impossible to carry out cost-effective material management.

Due to the mismanagement of limited funds many items of stock are not available when required in any location within MoPTT premises. The Ministry also holds large amounts of obsolete materials, which have been purchased in the past because adequate stock information was not available to determine reorder amounts properly. Again, the use of manual record systems aggravates this problem.

4.3.3 Efficiency

The efficiency of the Materials Management function was assessed by analysing the same factors as were used to assess effectiveness in Section 4.3.2 above.

Inventory record keeping is the responsibility of the Buildings and Security Department, of the Stock Control Division of Strategic Resources, and of the Construction Department. Each group follows an individual agenda on stock management priorities with no single set of guidelines followed by all three units. Record keeping is primarily manual, as we have noted. The Stock Control Division maintains some information on mainframe information systems, but the data within the systems is said to be inaccurate. Because boundaries of responsibility are indistinct, there is an amount of duplication of stock records. An automated inventory system, with access granted to all necessary departments, would eliminate the need for manual records and the duplication of record keeping.

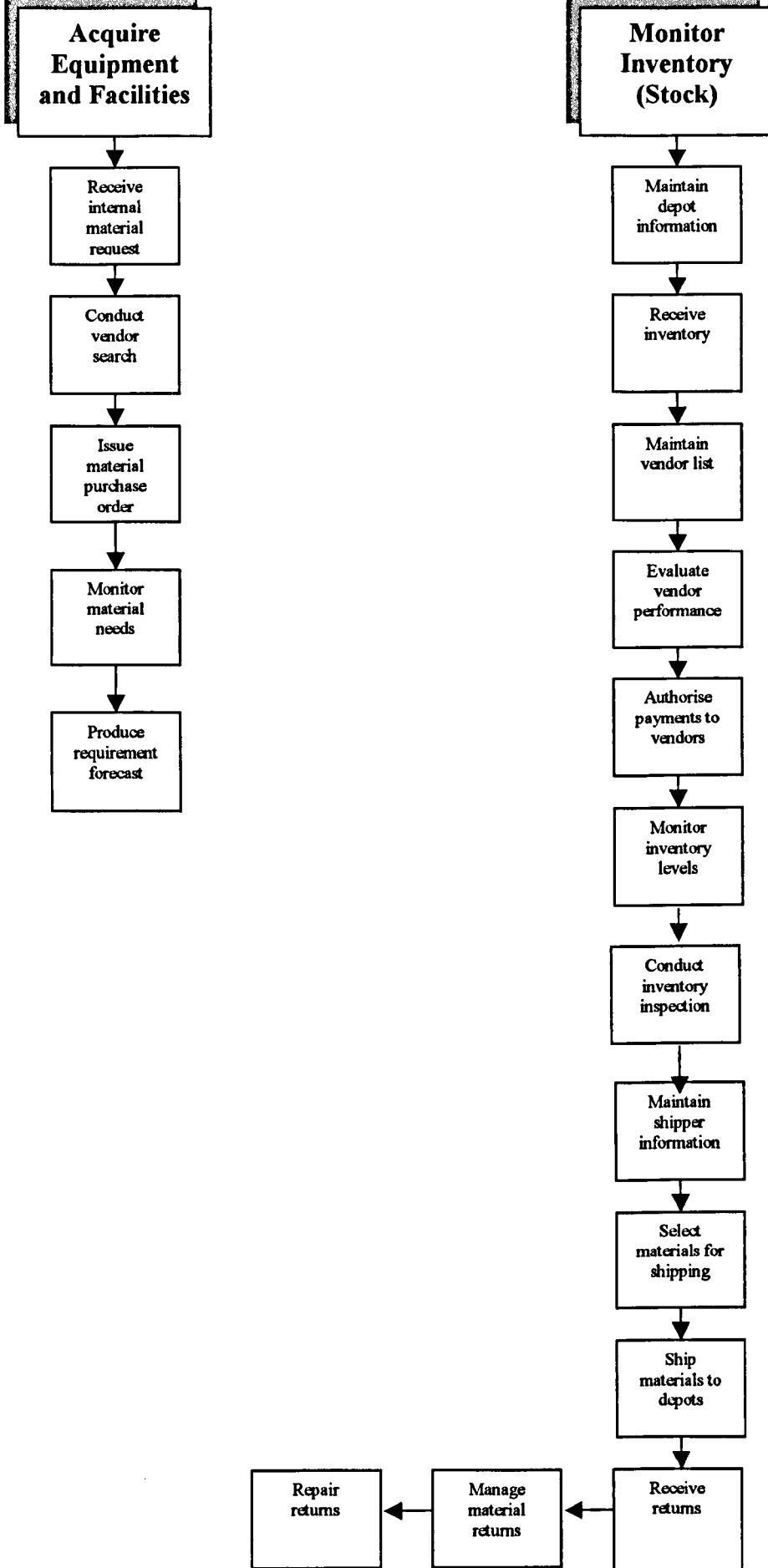


Figure 4. The Operational model of Materials Management function

5. Network Development

Depending on the funding required, a small project can be approved by anyone from a District engineering manager to the F&A Division of the MoPTT. If a project requires the approval of the Deputy Ministry, the information is conveyed to the F&A Division. Funding for small projects is taken from pools set aside in the annual MoPTT budget. So as long as there is some money in these pools small projects can be approved.

This means that an essential difference between small projects and major projects is that detailed design of network expansion for small projects is usually done before formal project approval, since funds for small projects are reserved. This risk cannot be taken with larger expansion projects, since not all of these receive approval, and in the case of such projects detailed design has to wait until formal approval has been granted. A large project requires gathering a considerable amount of information and making cost estimations in order to be able to justify the need for it.

There are laid-down procedures for the inspection and acceptance of any project work, often involving personnel from many Ministry units. The unit which produced the original plan is responsible for reconciling actual expenditure to allocated funds.

Follow up sub-processes to network expansion projects include paying the contractor and updating 'as built' plans. If a contractor has been involved and work has been accepted, the contractor is paid. Finally 'as built' plans are returned to the appropriate engineering unit, who then update network records.

There are some exceptional circumstances of network expansion taking place for some reason other than the normal flow of work in the Network Development function. These cases do not influence the effectiveness or efficiency of the function, but are worth noting. Some projects are either supported by private funding or carried out for the MoPTT by a contractor as compensation for other obligations that have not been met. There are occasions when, if funding for an expansion project is not approved internally, a party in the private sector may be prepared to underwrite it. In such a case the contractor, although retained by the MoPTT to do the expansion work, is paid directly by the private group; the work, however, is still inspected by the appropriate MoPTT staff.

5.1 Sub-Processes

Below is a list of sub-processes currently performed by the MoPTT for each of the processes of Network Development.

5.1.1 Plan Network

- Gather demand data
- Develop short-term and long-term plans
- Identify expansion projects
- Design expansion projects
- Obtain project approval
- Obtain funding for larger projects
- Develop detail project specifications, including cost estimates
- Develop generic specifications for larger projects
- Tender bids for large contracts
- Secure contractor, if needed
- Conduct field survey
- Prepare drawings
- Release job to Construction.

5.1.2 Implement Network

- Prepare and distribute job orders
- Allocate materials
- Perform necessary work
- Interact with contractor
- Reconcile expenditures to cost estimates
- Test and accept work
- Authorise payment to contractor
- Record expenditures for historical purposes
- Update Plant Location records with as-built plans.

5.1.3 Support Network Development

- Set policies and standards for network planning
- Maintain network inventory and assignment records
- Provide additional assistance to construction
- Resolve network issues
- Produce reports
- Evaluate new technologies.

5.2 Data Entities

The Network Development function accesses several data entities. The principal entities are listed below:

- product information
- service order information
- network information
- work force information
- customer billing information
- exchange information.

5.3 Network Development Function Assessment

The MoPTT's Network Development function suffers from several problems, the most serious of which relate to the Plan Network process:

- Too many groups, at too many levels, are involved with developing expansion plans.
- Network planning is not integrated.
- Network planning tends to be a reaction to the high number of held orders, not a proactive planning effort.
- Budgets for expansion plans are not approved with consistency nor with respect to balanced network development.

To aspire to be a quality telecommunications provider, the MoPTT should:

- embrace a proactive approach to network planning

- consolidate the currently independent planning of international, long-distance, inter-exchange, exchange, and outside plant networks into an integrated planning organisation and process
- make strategic network expansion decisions from an integrated network perspective
- eliminate excessive approval levels and drive tactical decision-making to the lowest possible level.

The current MoPTT Network Development function is not effective, in particular in respect of the Plan Network process is particularly ineffective. The Network Development function is not efficient when compared to that of top organisations.

Discussions have been arranged by the researcher with several groups from the Engineering and International Telecommunications departments of the O&M Division of the MoPTT, as well as individuals from the Deputy Ministries of Telephone and Telegraph Affairs. In addition, internal MoPTT documents have been reviewed to assess the Network Development function.

5.3.1 Relationships to Other Functions

The Network Development function is strongly related to many other functions including:

- Strategic Planning
- Customer Service
- Network Management
- Materials Management.

Normally Strategic Planning should provide a lead to Network Development, but we have seen that true Strategic Planning is not a current feature of the MoPTT, and within the MoPTT at present the Develop Strategic Plan process does not influence Network Development.

However, budgeting processes profoundly influence the Network Development function. The pattern set by the F&A Division of the MoPTT for the past eight to ten years has been to turn down network expansion plans. When approval is granted, it is not done in an even-handed way: long-distance network expansion plans are not approved with the same regularity as CAN expansion plans. International circuit expansion plans are

approved with even less frequently. This leads to an imbalance between the capacity of the long-distance network, the international network and the CAN.

Network Development, particularly related to the CAN, fundamentally affects Customer Service. In the Ministry the lack of network expansion has limited the effectiveness of the Customer Service function. Insufficient network capacity means that much income potential is not being achieved, and the public impression of the MoPTT has suffered. Old and incorrectly installed outside plant has led to a decline in the quality of service provided to customers.

Network Development also affects the Network Management function in that most of the MoPTT networks are reaching the end of their useful life and have not been modernised. This makes it difficult for Network Management to maintain a high level of service availability.

Finally, the Network Development function affects, and is influenced by, the Materials Management function. Since the implementation of expansion projects requires the purchase and the use of network materials and supporting equipment, the accessibility of materials has an impact upon the efficiency of network expansion project execution.

5.3.2 Effectiveness

To evaluate the effectiveness of the function, the following factors were analysed:

- number of groups involved
- the Corporate Plan developed by the O&M Division of the MoPTT
- integration of network planning
- accuracy of data used in planning
- the reactive nature of the MoPTT Network Development
- the current MoPTT implementation strategies.

At least six groups are involved in the Plan Network process. Departments within the MoPTT Deputy Ministry for Telephone Affairs plan long-distance networks. Units within the Engineering Section of the O&M Division of the MoPTT at the Headquarters, Region, and District level plan CAN expansions. The Network Operations Department of the O&M Division of the MoPTT is involved with planning the exchange network. The

International Tele-traffic Department of the O&M Division plans expansion of international circuit capacity. Each group develops plans with minimal consideration of the plans of other units. There is no overall co-ordination, with no single responsible for consolidating all plans in a balanced manner. Information sharing between groups is also minimal and carried out in a formal and bureaucratic manner. Not surprisingly lines of responsibility become unclear as the number of groups involved in a project grows.

The O&M Division of the MoPTT Engineering Department produces an annual basic plan. However, this plan does not emphasise the role of advancing technology in the MoPTT network development, and tends to be a summary of the known expansion needs of the O&M Division network. The plan identifies specific expansion projects going into the sort of detail not normally found in a broad fundamental plan. The basic plan does not account for all networks and services provided by the MoPTT. Input from, and impact on, other planning groups (i.e. the MoPTT Telephone Affairs) is minimal. Units other than the Engineering Department of the O&M Division do not produce fundamental plans and different planning groups follow different policies and procedures when producing plans. It is apparent, then, that the MoPTT does not perform any integrated, fundamental, long-range planning.

This problem of the fact that network planning and development within the MoPTT is not integrated is compounded by the budget approval process, which can drastically reduce the benefits of network expansion. Not only that, but some expansion projects have been executed only to be of no use because related network expansion was not carried out. In the recent 190K expansion project part of the junction network was expanded to handle additional access lines, but the corresponding primary-to-primary network was not, which limited the number of working lines provided. The project cost approximately SR 280 million (£ 46.7 million) and was intended to bring in additional revenues to fund a 500K expansion project, but little additional revenue has resulted.

In smaller expansion projects, exchanges have been expanded without corresponding increases in available outside plant, which has resulted in line blocks on the exchanges. Conversely, outside plant expansion projects have been completed, but to no avail because exchanges were not expanded. This kind of lack of integrated planning is intolerable in a quality telecommunications company. Given the limited funds available

for network expansion, the MoPTT needs to integrate its network planning efforts to ensure that blunders such as these are not repeated.

Ideally projects ought to be identified by each responsible District unit and submitted to the Department level for review and integration into a network plan. This ensures that each proposed plan:

- makes optimum use of the department's budget
- reduces conflicts of interests among the Districts
- consolidates individual District needs into a co-ordinated Department plan
- contributes to common organisation goals and objectives.

Manual data collection is too labour-intensive and results in untimely and imprecise data being provided for planning purposes. Basic telephone service usage data is usually collected only every five years for rural areas and every two years for urban areas, even though policies exist that call for a yearly collection.

What is really the driving force behind network expansion, especially in the CAN, is the number of held orders in the MoPTT. As the number of held orders increases in any given area, the likelihood of network expansion plans being implemented there increases, so that projects which will service the largest number of customers at the lowest cost will generally be approved over other projects. Thus, even although attempts are made to collect and examine data relevant to network utilisation and demand forecasting this leads to a piecemeal, uneven approach to network development. Instead of a proactive attempt to satisfy anticipated demand network planning, if it can be called such a thing, is a reaction to unsatisfied demand. Though it will take a long time to get rid of the held order backlog, adopting proactive planning policies is something the Ministry should begin now.

There is no expansion taking place in the telegraph network and minimal development activities are carried out to maintain that network and its services.

Other factors that influence the effectiveness of Network Development have been noted. One positive thing to note is that the Engineering Department currently staffs a Modifications (Mod) Squad to install and rearrange exchange equipment in urgent cases. With the introduction of digital transmission and fibre optic facilities in the network, a

greater need will exist for a centralised group of such highly skilled technicians to deal with incremental network upgrades or expansions. One less welcome factor is the use of in-house engineering laboratories to develop network transmission standards, evaluate network element characteristics, and supply field assistance. In view of the MoPTT's strong dependence on outside contractors to deliver and support large sections of the telecommunications network, these laboratories seem unnecessary.

5.3.3 Efficiency

To evaluate efficiency, the following factors were analysed:

- the tasks of collecting and sharing utilisation data
- the number of groups involved in planning.

Information about the extent to which the network is currently used by customers, to monitor existing demand, as well as basic forecasting data are provided by many Engineering, Customer Service, and Commercial Service groups at the District, Region, and Headquarters level within the O&M Division of the MoPTT. Data is shared manually among the departments and is slowed by bureaucratic internal MoPTT policies. Most data collection should be automated, originating either directly from network elements or from information systems designed to track and forecast demand. Information should be shared freely among all planning groups.

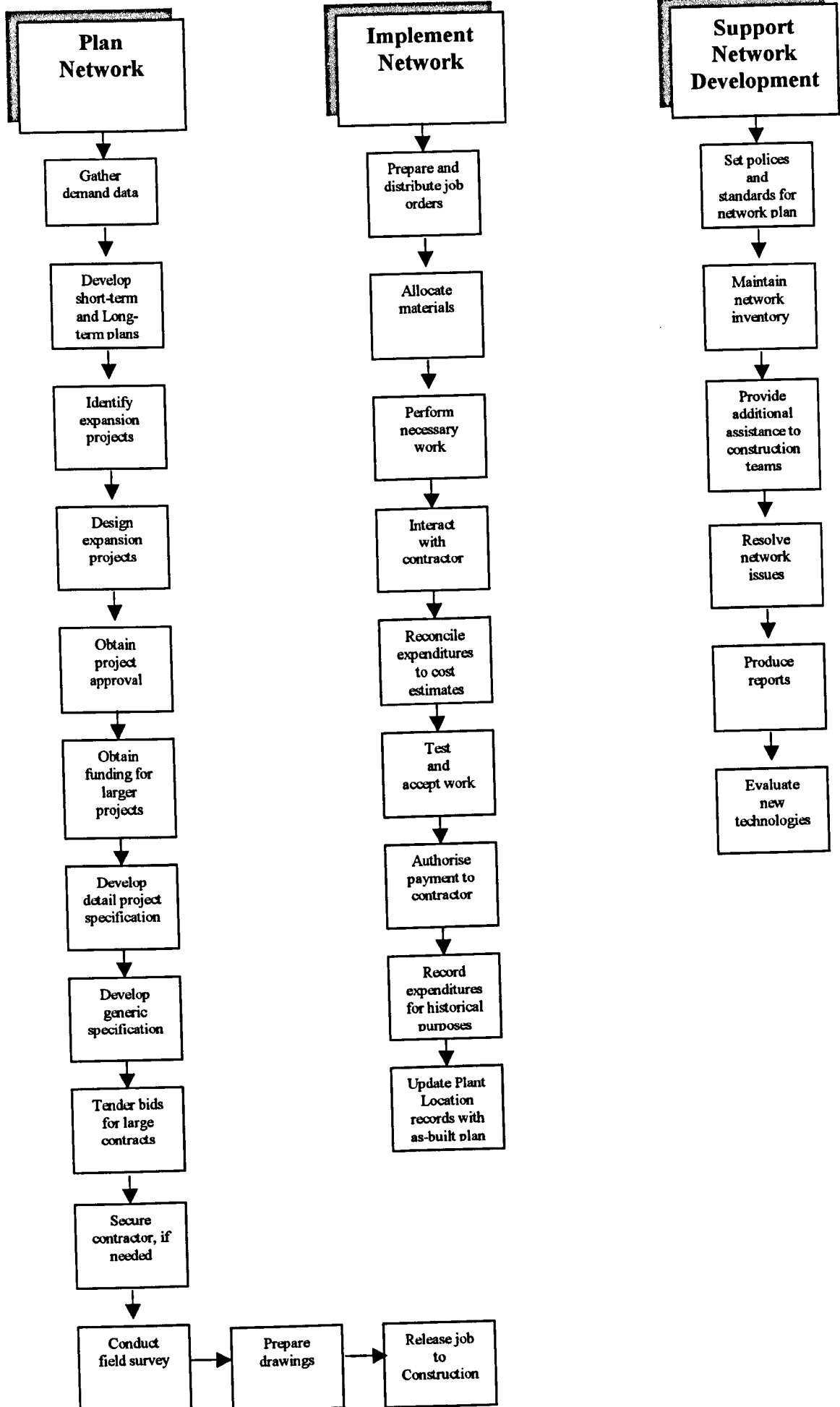
Besides the six groups identified in Section 5.3.2, more groups are involved in obtaining and approving funding for projects. Depending on the extent of a project, budgetary approval from the O&M Division of the MoPTT Strategic Planning Department, the Strategic Resources Department, the F&A Division of the MoPTT, or even the MoFNE may be required. Attempting to gain project approval is a time-consuming and unpredictable exercise because of the limited funds available for expansion.

Other problems with efficiency relate to the Support Network Development process.

Separate groups maintain inventory and assignment records for data service equipment, transmission equipment, exchanges, long distance trunks, local junction facilities, outside plant facilities, and telegraph facilities. As in so many units of the MoPTT, the maintenance of this information is primarily a manual process which practice leads to

duplicate efforts in maintaining data and to discrepancies between versions of the data. Modern telecommunications companies have automated the maintenance of inventory and assignment records, and this information can then be used to support Customer Service, Network Development, and Network Management functions.

Figure 5. The Operational model of the Network Development function



6. Network Management

6.1 Sub-Processes

Below is a list of sub-processes currently performed by the MoPTT for each of the processes of Network Management.

6.1.1 Maintain Network

- Monitor network elements
- Track and analyse network utilisation statistics
- Evaluate network performance
- Report and distribute utilisation and performance results
- Balance network load
- Identify network or service involved with maintenance
- Schedule and complete network preventive maintenance.

6.1.2 Repair Network

- Identify network and service faults
- Test network and isolate fault
- Schedule and complete network fault repair work
- Test repaired network
- Administer fault reports
- Monitor faults reports.

6.1.3 Support Network Management

- Work with contractors who run transmission networks
- Administer contracts
- Pay contractors
- Repair network components
- Maintain trunk assignments for Kingdom-wide network
- Administer telephone numbering plan
- Control availability of telephone numbers

- Set policies and standards for network operation.

6.2 Data Entities

The Network Management function accesses several data entities. The principal entities are listed below:

- customer
- plant information
- faults
- work force
- contractors.

6.3 Network Management Function Assessment

The current MoPTT Network Management function suffers from several problems, two of them being particularly significant: functional responsibilities are dispersed and uncoordinated, and network infrastructure is aging. The current MoPTT Network Management function is not effective when compared to top telecommunications companies. The MoPTT function is much more resource-intensive and complicated than would be expected from a quality organisation.

Discussions have been arranged with several groups in Network Operations Departments within the O&M Division of the MoPTT. In addition, internal MoPTT documents concerning Network Management have been reviewed by the researcher.

6.3.1 Relationships to Other Functions

The Network Management and Customer Service functions are strongly related. Effective network management helps in maintaining the quality of customer service. Through the Customer Service function, customers report faults that are cleared by the Network Management function. The Network Development function influences how a network is managed. As new technology is introduced, Network Management procedures must change.

6.3.2 Effectiveness

To assess the effectiveness of the function, the following factors have been analysed:

- Number of groups involved
- Problem analysis and correction practices
- Quality of service provided
- Current state of the network.

Network monitoring and control functions are too fragmented and cannot effectively support the technology of the MoPTT, and out-of-date technology and equipment tend to frustrate any endeavours to deal with the situation by re-allocating responsibilities.

Many units are involved in monitoring and controlling various sections of the current MoPTT telecommunications network. The National Network Control Centre (NNCC) monitors the transit and local exchanges, Kingdom-wide, for traffic congestion to facilitate traffic control measures. The Regional Maintenance Centres (RMC) monitor the exchanges and PCM local transmission systems in their respective areas for equipment conditions so as to manage maintenance and repairs. O&M contractors monitor the international and national transmission networks. Their Control Centres are split into several technological units, which cover the Satellite Earth Stations (ITMCs) and Coaxial Cable Systems (TIC). Not counting the Undersea Cable Systems based in Jeddah, the others each have two Regional control centres located in Jeddah and Riyadh.

This large number of groups involved in the control of the network militates against efficiency, and there is a need to streamline the system.

An integration effort, begun in 1988, brought the Riyadh TASC functions together with the NNCC and with the Riyadh TIC in 1994. This resulted in improved operational interfaces but still obsolete system technologies limit to a great extent the degree of potential integration.

The packet switching network is monitored by the Network Maintenance Centre (NMC). A small amount of outside plant monitoring is carried out by District Installation and Maintenance Centres. Co-ordinating network monitoring and control efforts across these groups requires more MoPTT resources than if many of the functions were centralised.

Analysis and correction activities of network alarms and conditions are performed manually, with RMCs responsible for traces and correcting faults in exchanges, and contractors responsible for maintaining transmission systems. Portions of the transmission network do not have any surveillance or alarm systems. Contractors and the MoPTT staff responsible for maintaining the network are, for the most part, located in separate facilities, though some contractors have staff and equipment located in the NNCC. Network status information is shared via phone or fax.

The current MoPTT network suffers from many problems that inhibit effective network management. Network utilisation is high: according to monthly operational results reports, 12 out of 19 districts have exchange utilisation rates of 100%, and recently trunk congestion has been increasing rapidly. This leaves network management staff with little room to manage network alarms and conditions effectively.

To assess the efficiency of the function, the following factors have been analysed:

- number of groups involved
- current state of network
- time required to clear faults
- extent of automation involved.

The groups involved with the national Network Management function were identified in the assessment of effectiveness section of this part (Section 6.3.2). Co-ordinating communication and work among all of these groups increases the efficiency of the Network Management functions. The need for two TSCs, TICs and ITMCs for each part of the transmission network is dubious. Centralisation within the NNCC would facilitate an integrated fault and configuration management system and increase efficiency. In quality telecommunications companies central units, who can benefit from access to customer and network databases, are able more effectively to carry out remote monitoring and control of network elements. Locally-based staff is still required for installation and maintenance work, but their operations are co-ordinated by the central group.

The current state of the MoPTT network decreases the efficiency of Network Management activities. Many parts of the network are aging, or have reached the limit of their useful life, and now require constant attention to keep them operational. The MoPTT's piece-meal approach to Network Development and the continual use of old and

out-dated equipment has also led to in many different types of equipment being used throughout the network, something which clearly complicates the tasks of isolating and correcting faults.

As we have noted already in Chapter 5, industry-accepted times for clearing faults are within eight working hours for basic telephone service and within four working hours for business services. Almost all faults are cleared within these times in an efficient and modern telecommunications organisation.

However, according to Operational Results, the MoPTT clears only 80% to 85% of all its faults within eight hours, a statistic which highlights the inefficiency of the current Network Management function. However, the widely dispersed nature of the MoPTT network greatly affects this statistic: clearing a fault may often mean sending a technician deep into the desert to some isolated spot. The type of environment met in the desert of Saudi Arabia is greatly different from the urban settings presented to most telecommunications suppliers.

Additional staff in the O&M Administration Department are needed to reconcile paper reports of network performance provided by contractors with paper reports of network performance provided by the MoPTT staff. This reconciliation task would not be needed, if network monitoring and control were centralised.

Administrative tasks, equipment testing, and other support tasks are not automated. For example, scheduling and completing maintenance and repair operations are currently administered manually in the RMCs and the District Dispatch Centres (DDCs), testing of equipment and tracking of test results is done manually, and the Network Operations Department tracks transmission equipment and facilities assignments manually. These practices increase the time required to perform maintenance and to attend to network faults.

The Electronic Maintenance Centre (EMC) repairs 92% of all of the network's defective boards, with the remaining 8% being sent to manufacturers or local suppliers. The EMC has stated that the current turn-around time for repairs is approximately two days. Plug-in based, digital technologies are critical in a modern telecommunications environment. They represent tremendous capital investments and demand proper mechanised support.

Despite the good work done in this area by the EMC, the MoPTT should review the cost-effectiveness of using the EMC in comparison with exchanging parts with manufacturers. Finding a supplier who is willing to participate in a Total Quality Management (TQM) approach to continuous improvement of the supply process could be more cost effective.

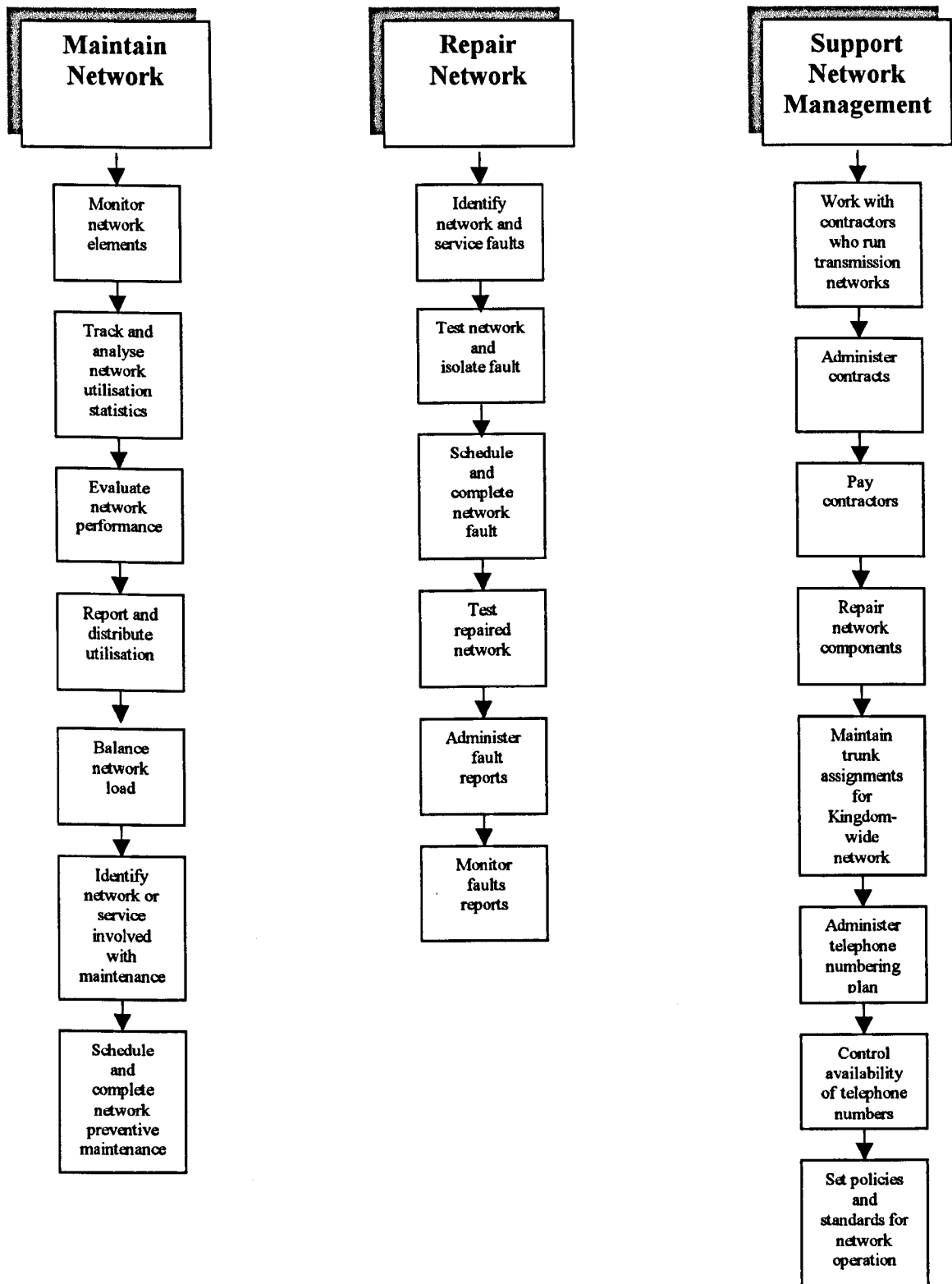


Figure 6. The Operational model of the Network Management function

7. Buildings and Land Management

7.1 Sub-Processes

Below is a list of sub-processes currently performed by the MoPTT for each process.

7.1.1 Design Buildings

- Prepare practices and procedures for planning design and construction sub-processes related to building
- Participate in the planning for all building projects throughout the Kingdom
- Participate in the technical design for all building projects throughout the Kingdom
- Participate in the costing and scheduling of all building projects throughout the Kingdom
- Develop and monitor space plans for HQ.

7.1.2 Acquire and Dispose of Buildings and Land

- Generate plans for building and land acquisition based on forecasts
- Prepare land and building specifications.

7.1.3 Maintain Buildings and Land

- Maintain contractor list
- Select maintenance contractor
- Administer all aspects of contracts, e.g. electrical and mechanical contracts, for HQ, the Regions and the Districts
- Supervise and monitor the performance of contracts throughout the Kingdom
- Prepare practices and procedures related to all aspects of contracts.

7.1.4 Provide Security

- Develop practices and procedures related to security operations for the MoPTT
- Develop standards and practices for the design and construction of physical security and surveillance
- Undertake security investigations.

7.2 Data Entities

The Buildings and Land Management function accesses several data entities. The principal entities are listed below:

- buildings information
- buildings project information
- contractor information
- property maintenance information
- stock information
- buildings and land requirement information.

7.3 Buildings and Land Management Function Assessment

Because of manual record keeping and unclear lines of responsibility the Buildings and Land Management function is not efficient. The effectiveness of the function can be improved by using an automated, centralised database of relevant information.

In order to assess the Buildings and Land Management function the researcher conducted consultations with individuals within the O&M Division of the MoPTT, the Buildings and Security Department and the MoPTT Telegraph Affairs Department. Internal MoPTT documents were also reviewed.

7.3.1 Relationships to Other Functions

The Buildings and Land Management function is strongly related to the Network Development and Network Management functions. Network expansion plans identify additional necessary buildings and structures, as well as modifications to those that already exist. Expansion plans are modified if necessary buildings or land are not available. The location of equipment and network facilities directly impacts the procedures followed for network management.

The Buildings and Land Management function is related to the Financial Management function. Investments in buildings, land and rental agreements all affect the accounting processes of the Financial Management function.

In addition, the Buildings and Land Management function touches to some extent all other functions of the MoPTT, because the task of space planning affects the entire MoPTT.

7.3.2 Effectiveness

To evaluate the effectiveness of the Buildings and Land Management function, the following factors were analysed:

- number of groups involved
- use of standardised plans.

Currently, information regarding space utilisation is recorded manually by several groups, including:

- the Buildings and Security Department of the O&M Division of the MoPTT
- the Engineering Department of the O&M Division of the MoPTT
- the MoPTT Telegraph Affairs Building Department.

When one unit makes changes to its copy of information, the updated information is not always shared with other units. This has led to situations where one group thinks space is available in a building, and plans to use the space, but discovers too late that the space is already used by another group. An automated buildings database which can be accessed and updated by groups needing information about buildings and building space is needed, as this would allow more effective planning of building space and more efficient use of existing buildings.

One useful feature of the Buildings and Land Management function is the library of standard building and structure plans maintained by the Buildings and Security Department. These plans are shared with Regions and Districts whenever new construction or modification to existing structures is needed. This saves the Region or District the time and money that would otherwise be spent on designing the structure or modifications independently.

7.3.3 Efficiency

The Buildings and Security Department is responsible for space planning, but at least two other groups also perform this task. As far as keeping accurate and useful records of what goes on in this area are concerned the situation is piss-poor. The groups which make modifications to buildings do not always share information with other groups, and often units do not record the changes that are made when installing or removing network equipment from a building, nor co-ordinate planning efforts with other groups. This means that building records do not always indicate the true state of a building's contents, and facilities planning becomes more difficult. At times plans have to be revised when it is discovered that building space is not available.

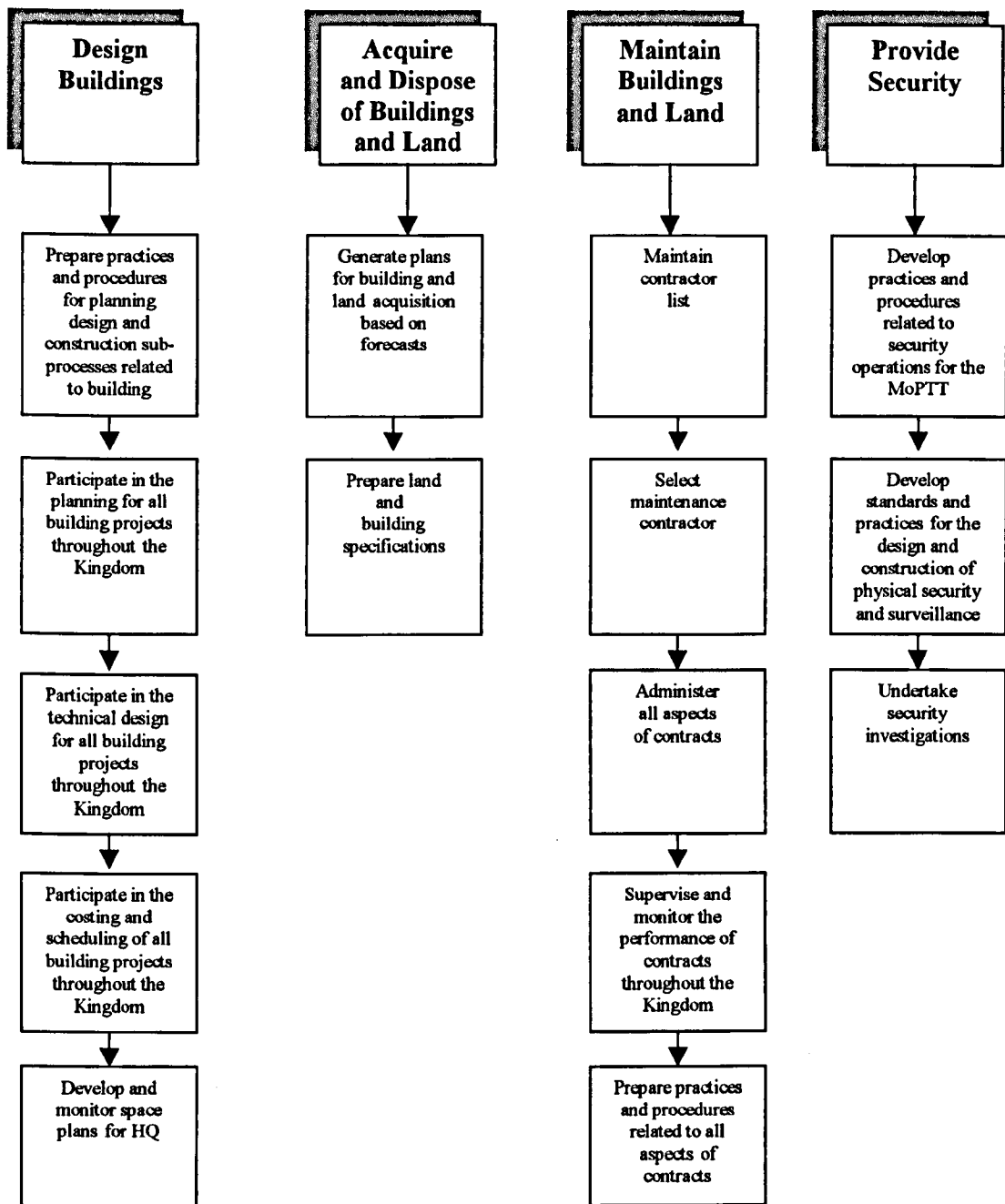


Figure 7. The operational model of Buildings and Land Management function

8. *Vehicles Management*

8.1 Sub-Processes

Below is a list of sub-processes currently performed by the MoPTT for each of the processes of Vehicles Management.

8.1.1 Acquire and Assign Vehicles

- Receive internal orders
- Consult budget
- Examine vendors
- Issue purchase order
- Receive vehicle from vendor
- Inspect vehicle
- Authorise payment to vendor
- Add vehicle to inventory
- Assign vehicle to Division.

8.1.2 Maintain Vehicles

- Repair damaged vehicles
- Conduct scheduled maintenance
- Determine disposal methods
- Adjust inventory.

8.2 Data Entities

The Vehicles Management function accesses several data entities. The principal entities are listed below:

- vehicle
- vehicle vendor
- vehicle inventory
- vehicle maintenance history

- vehicle maintenance schedule
- vehicle purchase order.

8.3 Vehicles Management Function Assessment

The efficiency of the Motor Vehicles Management function could be improved through the introduction of a satisfactory information system and a rearrangement of the responsibility for enforcing vehicle management policies. It is important to note the inefficiency introduced to other functions because of the lack of properly maintained vehicles. The current MoPTT Motor Vehicles Management function is not particularly effective and handicaps the primary functions in the Value Chain.

In the course of his fieldwork the researcher spoke to individuals within the District and Headquarters Departments of the O&M Division of the MoPTT responsible for vehicles management tasks; in addition, internal MoPTT documentation has been reviewed.

8.3.1 Relationships to Other Functions

The Vehicle Management function is critical to the success of the Customer Service function. Installation and repair technicians must have dependable transport at their disposal in order to ensure timely completion of their Customer Service duties.

Through the purchase and storage of spare parts, the Vehicle Management function is related to the Materials Management function.

8.3.2 Effectiveness

The following factors have been analysed to assess the function's effectiveness:

- status of the current MoPTT fleet
- administrative procedures
- impact on the Customer Service function
- impact on the Network Management function
- balance between administrative and work vehicles.

Most vehicles used directly for working on the network are in excess of six years old and have not received regular servicing during their life; the MoPTT simply does not have

sufficient skilled staff to maintain the fleet properly. Vehicles are unreliable, and many do not run at all. In past years funds have not been approved to purchase more vehicles for the work fleet. This has led to a continual decline in the effectiveness of the Motor Vehicles Management function.

Several administrative procedures inhibit the effectiveness of the Motor Vehicles Management function. A functionally ineffective computer system is used to attempt to record vehicle data, but still the data is unreliable. No central group has the authority to dictate and enforce vehicle management policies throughout the Ministry; indeed as far as vehicles are concerned District personnel carry as much weight as Headquarters staff, able to influence purchase and management policies as much as central staff. Costs might be controlled better: a recent functional strategic plan states that the MoPTT is paying twice the prevailing market rate for vehicle insurance.

The quality of customer and network services would be greatly improved by newer and properly maintained vehicles for field technicians. Furthermore, even if they were in well maintained, the existing fleet is not properly fitted-out to deal with new operational requirements. Network modernisation will require vehicles fitted with more up-to-the-minute equipment to deal with the repair and maintenance jobs that arise, and this in effect means new vehicles.

An imbalance exists between the purchasing of vehicles used by management personnel and vehicles used directly to support the network. Limited funds are approved for purchasing new vehicles, and purchasing vehicles for management personnel has taken priority over purchasing vehicles for field technicians.

8.3.3 Efficiency

Current installation and repair procedures call for several employees to share the use of one vehicle. Each employee is dropped at a given location to complete a specific piece of work. The vehicle returns later to gather each employee and move them to new locations, where the procedure is repeated. This practice increases the time spent performing work and leads to cases where technicians are stranded without access to the tools and equipment needed to perform a task.

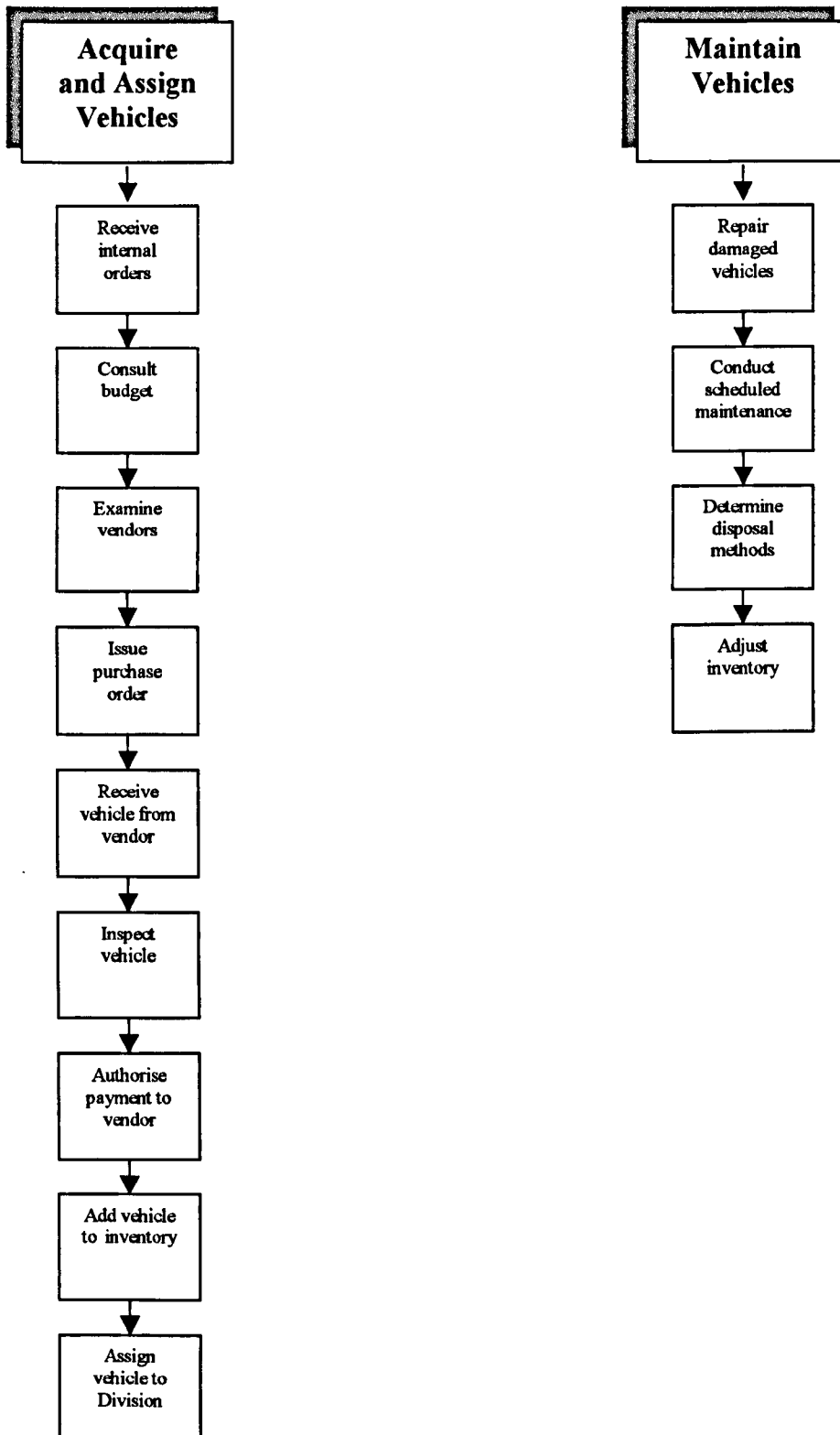


Figure 8. The Operational model of Vehicles Management function

9. *Human Resources Management*

9.1 Sub-Processes

Below is a list of sub-processes currently performed in the MoPTT for each of the processes of Human Resources Management.

9.1.1 Plan Manpower

- Forecast manpower demand for both long term and short term
- Develop salary and employment policies
- Undertake manpower budgeting
- Undertake manpower utilisation planning.

9.1.2 Recruit Personnel

- Develop policies and programmes for national and international recruiting
- Conduct international hiring
- Develop and monitor Saudisation policies and programmes.

9.1.3 Develop Manpower

- Develop programs which support and motivate the MoPTT's management and staff
- Set all policies related to remuneration
- Identify and develop policies related to training, retraining and personal development needs
- Develop and review organisation structure for the MoPTT.

9.1.4 Manage Compensation

- Issue employee remuneration.

9.2 Data Entities

The Human Resources Management function accesses several data entities. The principal entities are listed below:

- employee
- employment category
- staffing requirement
- payroll detail
- remuneration policy and strategy
- remuneration and benefits budget
- employment research data.

9.3 Human Resources Management Function Assessment

The efficiency with which the Human Resources Management function is performed is open to improvement, and as it operates at present is of limited benefit to the MoPTT. This function plays a supporting role to the primary functions of the Value Chain, but it fails adequately to sustain them.

Consultations, conducted by the researcher, were arranged with individuals in the O&M and the F&A Divisions of the MoPTT responsible for Human Resources Management. In addition, internal MoPTT documents relating to the function have been examined.

9.3.1 Relationships to other Functions

The Human Resources Management function is closely related to the Training Management function; there is an obvious connection between developing manpower and identifying training needs.

Indirectly, the Human Resources Management function affects all other functions, because Human Resources Management attempts to set policies that affect employee remuneration and morale.

9.3.2 Effectiveness

The following factors have been analysed when assessing the effectiveness of this function:

- external factors
- internal policies

- available human resource statistics.

There are government regulations which inhibit the MoPTT's capacity to carry out human resources tasks which would benefit the Ministry. The hiring and firing of staff is a very carefully controlled process and requires approval at several levels in the MoPTT. Government measures also make it hard to retain skilled employees because of wage and pay increase policies, and the management is further restricted by external regulations in granting promotions, pay increases, and service bonuses.

Internal policy decisions have also decreased the effectiveness of the Human Resources Management function. Human Resources senior personnel have been very restricted by the MoPTT's own senior management in what they can do to reward employees for outstanding service, because most salary increases are linked with years of service or educational qualification.

9.3.3 Efficiency

The following two factors have been analysed to assess the Human Resources Management function's efficiency:

- duplicate efforts involved
- lack of automation.

The existence of two Departments, one in the F&A Division of the MoPTT and one in the O&M Division, to manage human resources means much duplication of effort on the part of the Departments. Neither department uses an automated personnel management system, and indeed payroll information is thought to be the only dependable data available on automated systems. If two Departments must exist to administer human resources, an integrated information system, shared by the Departments, will greatly increase the efficiency and effectiveness of the Human Resources Management function.

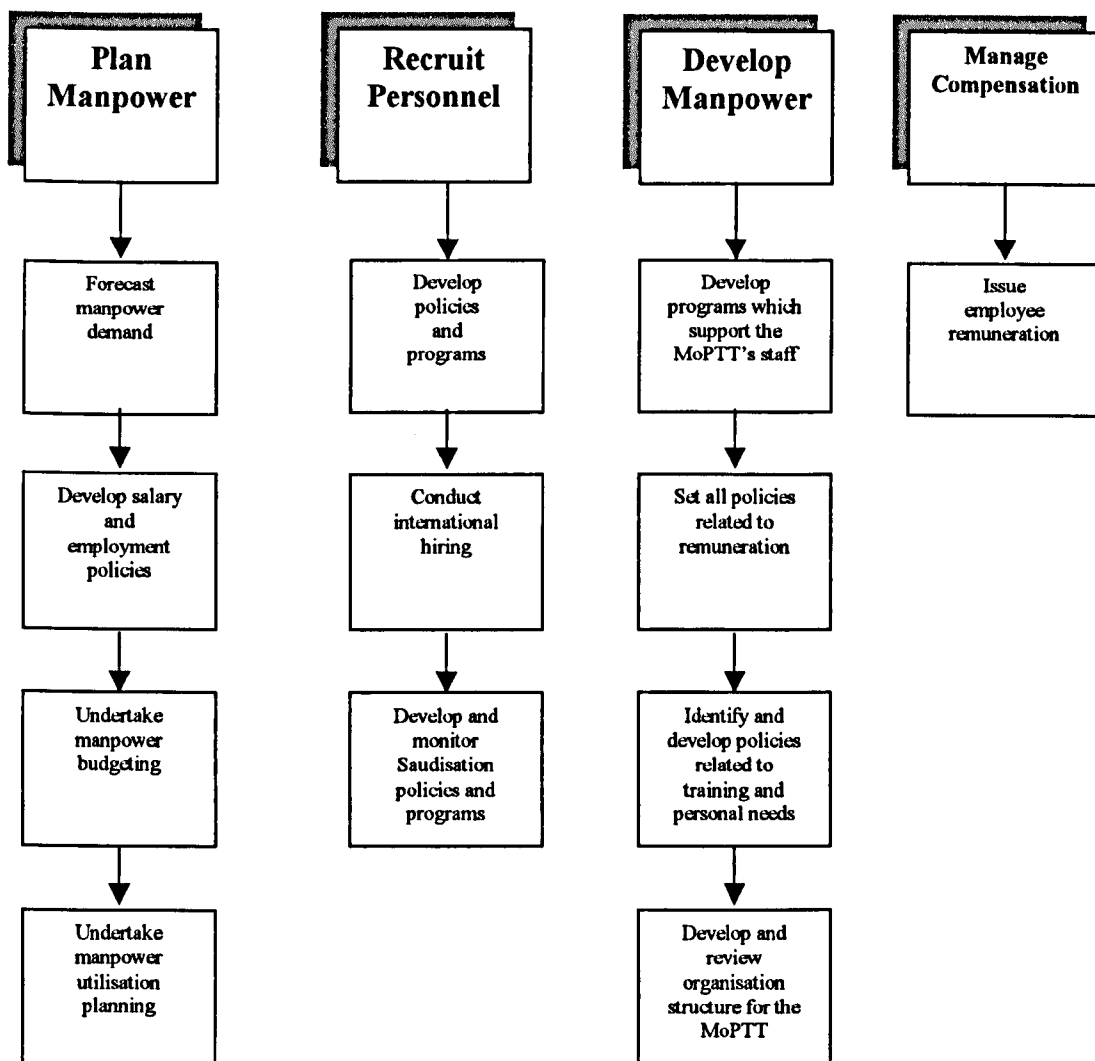


Figure 9. The operational model of the Human Resources Management function

10. Training Management

10.1 Sub-Processes

Below is a list of sub-processes currently performed in the MoPTT for each of the processes of Training Management.

10.1.1 Develop Training Programmes

- Determine training requirements
- Determine courses to be offered based on budget allocations
- Develop course catalogue
- Determine course schedules
- Develop or review course materials
- Determine course venue and equipment requirements.

10.1.2 Deliver Training Programmes

- Distribute course catalogues and announce course schedules
- Determine course attendees
- Determine and arrange course venue
- Make travel and lodging arrangements, if necessary
- Determine course instructors
- Prepare course material
- Conduct course
- Issue certificates, if necessary.

10.1.3 Monitor Training Programmes

- Track attendance
- Elicit student and instructor feedback.

10.2 Data Entities

High-level data entities that are involved in the Training Management function include:

- employee information
- course information
- budget information
- user training requirements.

10.3 Training Management Function Assessment

The current MoPTT Training function is neither efficient nor effective, and does not adequately support the other primary functions of the Value Chain.

The researcher has held discussions with several individuals within the Riyadh Training Centre, and internal MoPTT documents regarding training have been studied. In addition, during meetings with individuals throughout the MoPTT, the value of training was discussed.

10.3.1 Relationships to Other Functions

The Training Management and Human Resources functions are closely related. The Human Resources function sets the goals of manpower development that the Training Function needs to achieve.

The Training Management function is intended to support all functions within the MoPTT. Investments in training, especially technical training, hold the greatest potential benefit for the Ministry. The staff of the MoPTT often have received a good formal education, but lack specific, technical skills. Increasing the technical abilities of the staff should therefore result in more effective and efficient processes throughout the organisation. Unfortunately in the MoPTT's case inadequate training is provided to support the other functions properly.

10.3.2 Effectiveness

The following factors have been analysed when assessing this function's effectiveness, including:

- types of training available
- user satisfaction

- policies and attitudes towards training.

The Training Department within the O&M Division of the MoPTT offers two types of training, the Assistant Engineer Programme (AEP) and in-house training. Yet it is clear that individuals with an AEP qualification, though they may become Ministry staff, do not yield productive work for the MoPTT immediately upon completing the curriculum. They speak little English, which is in reality an almost essential requirement, and have little hands-on experience with network technologies. Many managers who are forced to use AEP-qualified personnel complain of the lack of skills they demonstrate. Expanding the role of the AEP to include accredited courses, where attendees would not necessarily work for the MoPTT after completion, is currently being promoted by the Training Department. However, in view of the need for the efficient use of limited resources for the foreseeable future, and the existence of a public university system, this idea seems a waste of resources and unlikely to be of any value in achieving the MoPTT's objectives.

In-house training is attended by the current MoPTT personnel and develops management, technical and other skills. Courses usually last from one day to one week.

In-house training also seems ineffective. After a visit by the researcher to the Training Centre, the following problems were found:

- Departmental training programs are not adequately planned
- Inadequate budgets are provided to send employees to training
- Large amounts of budgeted funds are spent on unproductive overseas training
- Training needs are reactions to skills deficits, not proactive training plans
- Instructors are ineffective
- Course material is out-of-date.

In general user satisfaction with both AEP and in-house training is low. Past results and consultations with potential client groups emphasise the need for better training in specific emerging technologies and network operation systems. In addition to the problems mentioned above, only Saudi nationals are permitted to attend training courses, although most technical positions in the MoPTT are held by non-Saudis. This creates a dilemma for the MoPTT management, since training technical staff would provide the most benefit to the Ministry, but most technical staff are not allowed to attend training.

There is also some training provided by contractors responsible for maintaining the network. Contractual obligations stipulate the technical training to be provided and which personnel from the MoPTT should attend. Contractors supply their own training staff, but use the MoPTT's facilities to host courses. In general, the instructors provided by contractors are better qualified than the Ministry training staff.

10.3.3 Efficiency

To assess the efficiency of the current MoPTT Training Management function, the researcher concentrated on the methods and endeavours used to deliver training programmes.

Within the MoPTT little use is made of remote training techniques or computer-based instruction. The rapidly evolving technology used in modern telecommunications networks requires the use automated training methods in support of classroom instruction. Many companies are moving to what might be termed 'just-in-time' training, where a technician or engineer can get the appropriate training on a piece of equipment when he needs the training. In such a case, computer-assisted instructional techniques or specialised video tapes are generally used rather than traditional classroom methods. The Training Management function of the future needs to explore what just-in-time techniques would be suitable for MoPTT personnel and to begin moving its training emphasis from classroom education to computer-aided instruction and video training.

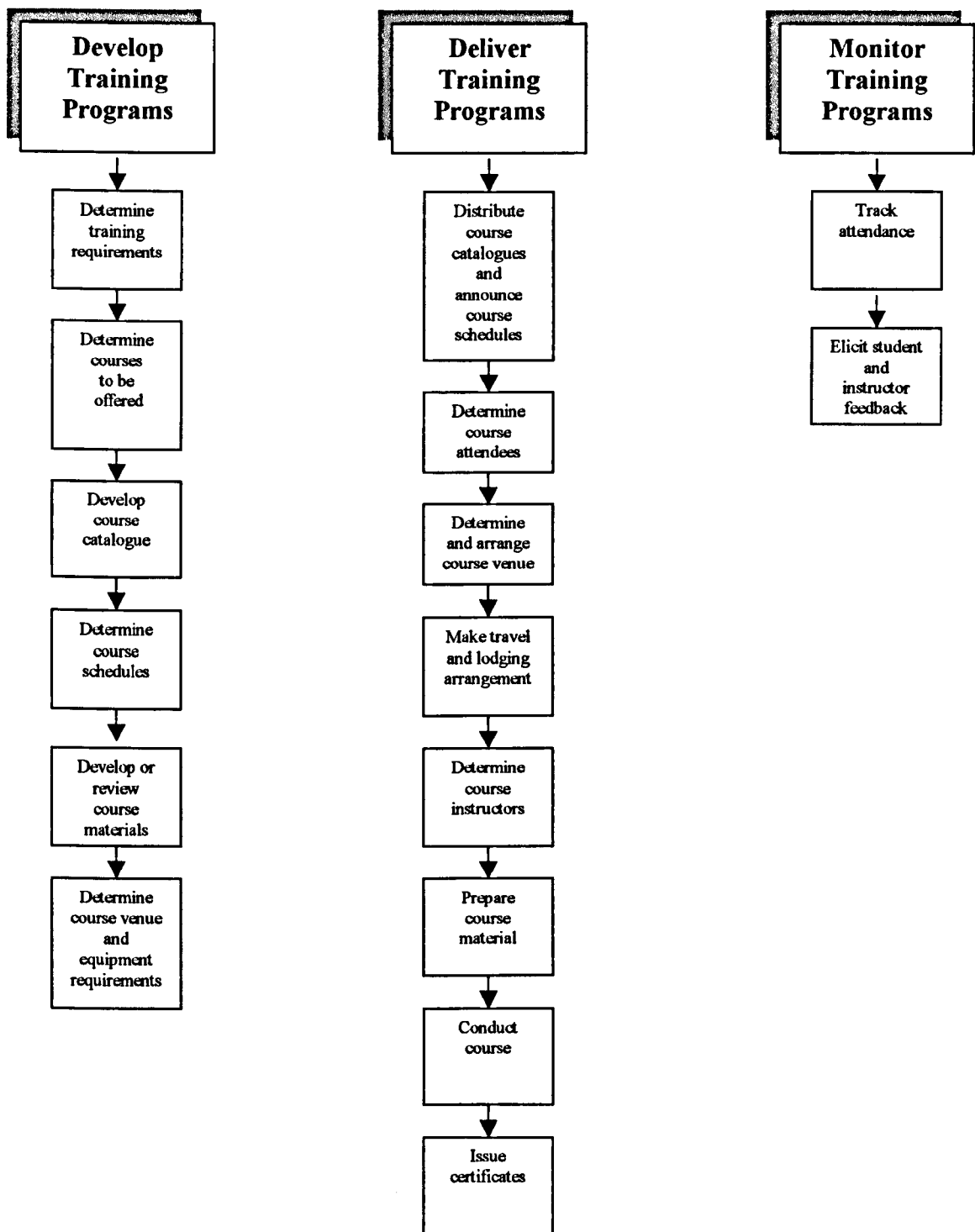


Figure 10. The Operational model of Training Management function

11. Financial Management

11.1 Sub-Processes

Below is a list of sub-processes currently performed by the MoPTT for each of the processes of Financial Management.

11.1.1 Develop Financial Control Policies

- Commit funds
- Develop accounting policies and procedures
- Develop performance measurements
- Monitor effectiveness of policies and procedures
- Carry out international and liaison.

11.1.2 Perform Financial Accounting

- Track all MoPTT revenues
- Track all MoPTT expenses
- Manage MoPTT assets
- Maintain the General Ledger
- Satisfy payment obligations related to contractor and supplier agreements
- Administer settlements
- Make HQ employee payment obligations
- Maintain payroll system
- Administer international accounts.

11.1.3 Monitor Financial Performance

- Prepare expense related financial reports
- Prepare revenue related financial reports
- Prepare employee reports
- Develop statistical reports.

11.2 Data Entities

The Financial Management function accesses several data entities. The principal entities are listed below:

- accounts payable
- general ledger
- accounts receivable
- payment received
- employee
- expense account
- payroll account
- asset
- liability
- revenue account
- vendor.

11.3 Financial Management Function Assessment

The current Financial Management function is the most effective function within the MoPTT. However, that does not mean that the function's effectiveness cannot be improved. And although it is effective, the Financial Management function cannot be regarded as efficient. The function is effective because the MoPTT is able to track revenues and expenditures with accuracy, but it is inefficient in that most record-keeping is paper-based and involves several departments. The timely availability of data is also an area which could do with much improvement.

In order to make an assessment of this function meetings were held by the researcher with several groups responsible for Financial Management in the MoPTT. Additionally, internal MoPTT documents were reviewed.

11.3.1 Relationships to Other Functions

In most organisations, the Financial Management function would be expected to make a contribution to the Strategic Planning function. Financial Management may also affect the

Human Resources Management function, as employee bonuses are usually linked to financial performance.

In the MoPTT this is not the case. Financial Management is the fundamental function that the rest of the MoPTT has to depend upon, because budgetary decisions dictate what can be accomplished by any given function within a year. Budget requests within the MoPTT, however, are not all fulfilled. Estimates made during consultations ranged from just under 70% to fewer than 20% of the requests being successful. Ensuring that allocated funds are spent appropriately, and fully, is a major concern to the MoPTT. Funds that are not spent may be reclaimed by the government in order to be used by other ministries, or future budget allocations in a given category may be even less than the current year's allocation.

11.3.2 Effectiveness

The following factors have been analysed when assessing this function's effectiveness:

- external influences
- internal policies
- data integrity.

As in the case of the Human Resources Management function the MoPTT Financial Management function is restricted by Government rules and regulations. These regulations stipulate that a cash-based accounting method should be used for financial management.

The use of cash-based accounting in a government organisation is normal. However, the MoPTT is supposed to be a profit-making organisation, not a government-subsidised service. Consequently, two accounting methods are used in the MoPTT: the O&M Division of the MoPTT follows accrual-based accounting methods, while the F&A Division follows government-regulated, cash-based methods. Accrual-based accounting is a globally accepted method for companies which are business in the attempt to make a profit. Both the O&M Division and the F&A Division have qualified accounting staff to perform accounting tasks effectively.

Internal policies regarding financial management within the MoPTT are fairly effective. For example, policies on expenditure authorisation are well understood throughout the

Ministry, and reconciliation responsibilities are distributed to appropriate levels. Given the current budget allocations granted by the MoFNE and the F&A Division of the MoPTT, some managers have been able to spend funds allocated for one budget item on other types of items. These deviations are not reckoned as abuse, and some have benefited the MoPTT.

One area where the current MoPTT Financial Management function is not so effective is in recording data. Revenue and payment data is recorded accurately, but some other data is not. It is difficult to determine accurate values of the current MoPTT assets based on information kept in the MoPTT financial systems.

11.3.3 Efficiency

The following factors have been analysed when assessing the function's efficiency:

- external regulations
- number of groups involved
- internal policies
- methods of communication.

Government regulations require that financial records should be held on paper. This statutory reliance on paper is one of the leading causes of inefficiencies in the Financial Management function because of the time-consuming and labour-intensive procedures involved. A further problem exists in the F&A Division of the MoPTT with document storage. Paper documents (contracts, budgets, etc.) require a huge amount of space for storage and, by regulation, some of these documents must be kept for more than 20 years. The storage of these documents could be greatly improved with a relaxation of regulations and a move to other storage media, such as microfiche.

Two primary groups are responsible for financial management in the MoPTT; these are the F&A Division of the MoPTT, and the Strategic Resources Department within the O&M Division of the MoPTT. As we have noted above, the Strategic Resources Department uses accrual-based accounting methods and the F&A Division uses cash-based methods. Separate information systems support each group. The F&A Division is currently exploring the use of accrual-based methods, but although this might appear to

solve some problems it would mean a duplication of efforts in the F&A Division of the MoPTT and in the Strategic Resources unit of the O&M Division.

Having two Departments following different accounting methods, as at present, is not uncommon in one organisation, but the situation poses problems to other groups. For example, when a District requests that payment be made to a contractor, the District must notify both the Strategic Resources Department (O&M) and the F&A Division of the MoPTT. The District must follow two procedures, one for each group. When payment is made by the F&A Division of the MoPTT, they send notification to the Strategic Resources Department. The Strategic Resources Department can only then balance its books correctly.

Procedures in both groups are manual and not well integrated, incompatible account codes existing, for example, between the two systems. Data is shared via printed reports and paper forms. Consequently, a great deal of time is spent re-keying information, which leads to data discrepancies. Furthermore, such data as is shared between the two accounting groups suffers from lack of co-ordination. Consequently, one group's figures may not balance without information needed from the other unit.

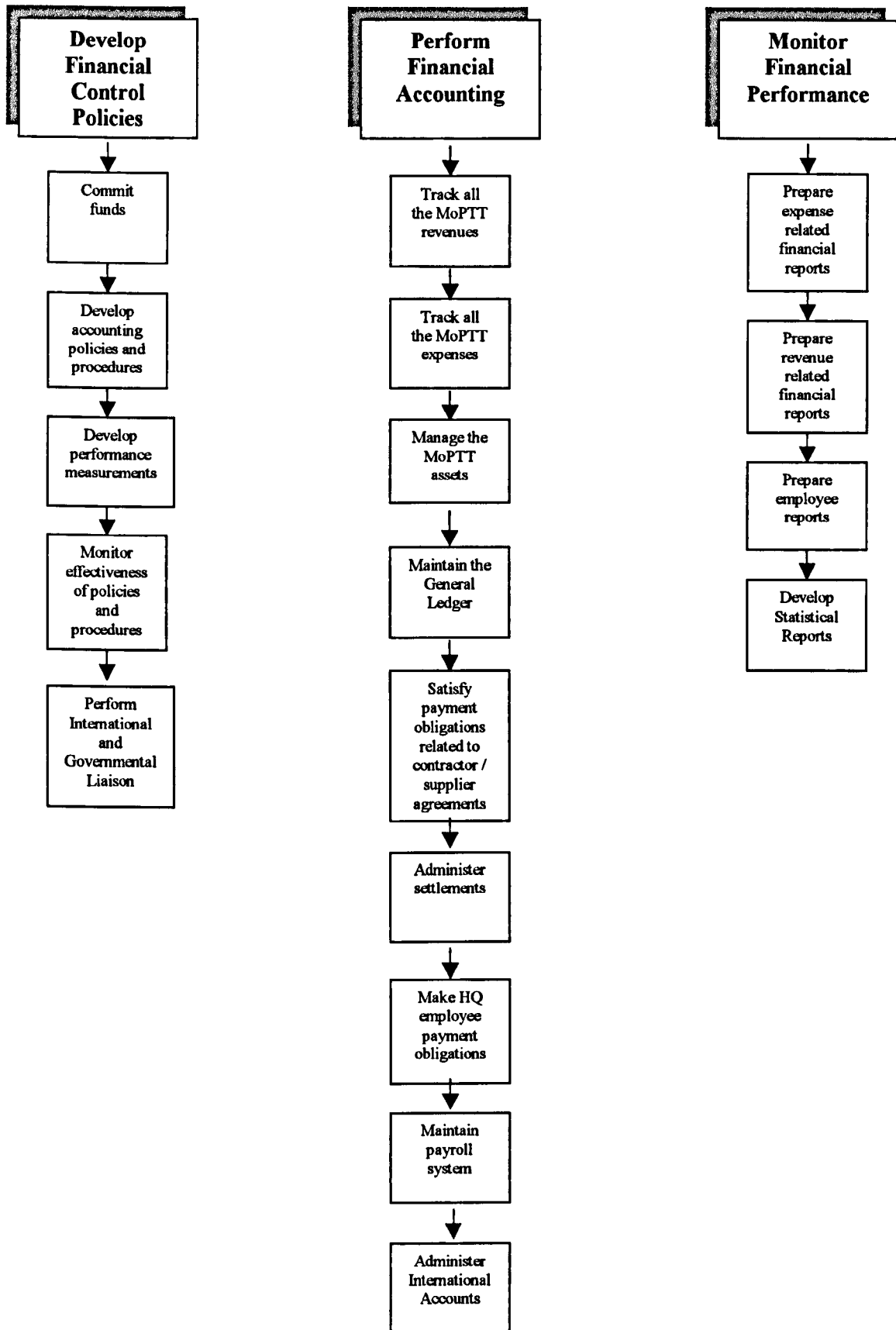


Figure 11. The Operational model of Financial Management function

12. Relationships among MoPTT Functions (Business Areas)

This section shows the relationships among the various functions of the MoPTT, as they were identified by Mr. Al-Ghamdi (Director of IT Department).

Figure 12 indicates the change that has taken place, in that the subject database and subject area drums (passive containers of information) are now replaced by business areas and IS (active drivers of information). The ten business areas that have been identified in this section are Strategic Planning, Network Operations, Marketing, Customer Service, Land and Buildings Management, Vehicles Management, Materials Management, Financial Management, Human Resources, and Training, as shown in the relationship diagram below.

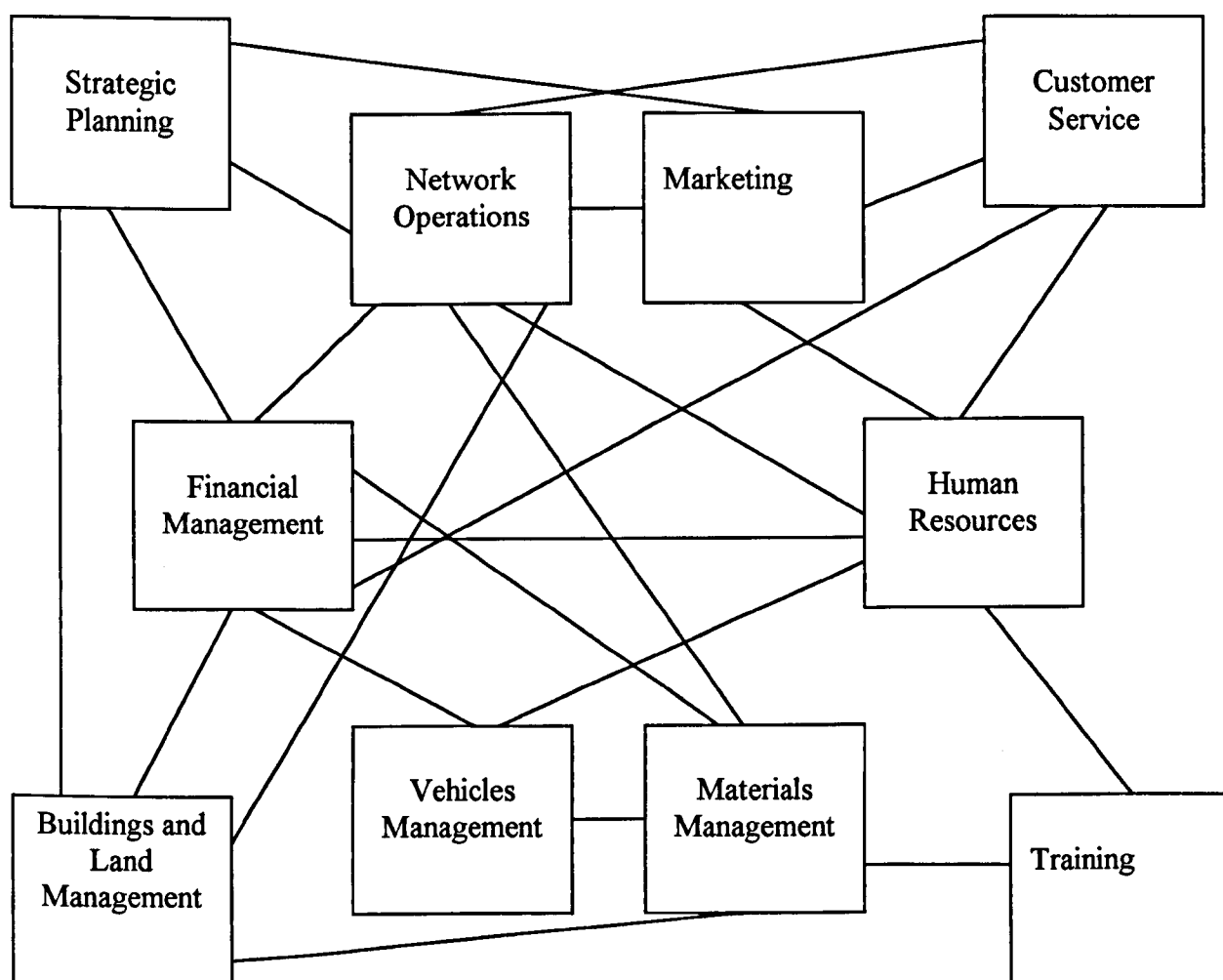


Figure 12. Relationships Among Business Areas

Figure 12 sets the context and high-level partitions for the MoPTT data modelling work performed. The diagram does not reflect all relationships between databases, but rather major interfaces. Chapter 8 discusses information needs in great detail. At the next level, Figure 13 reveals the specific information systems within those business areas, as they were also identified by Mr. Al-Ghamdi.

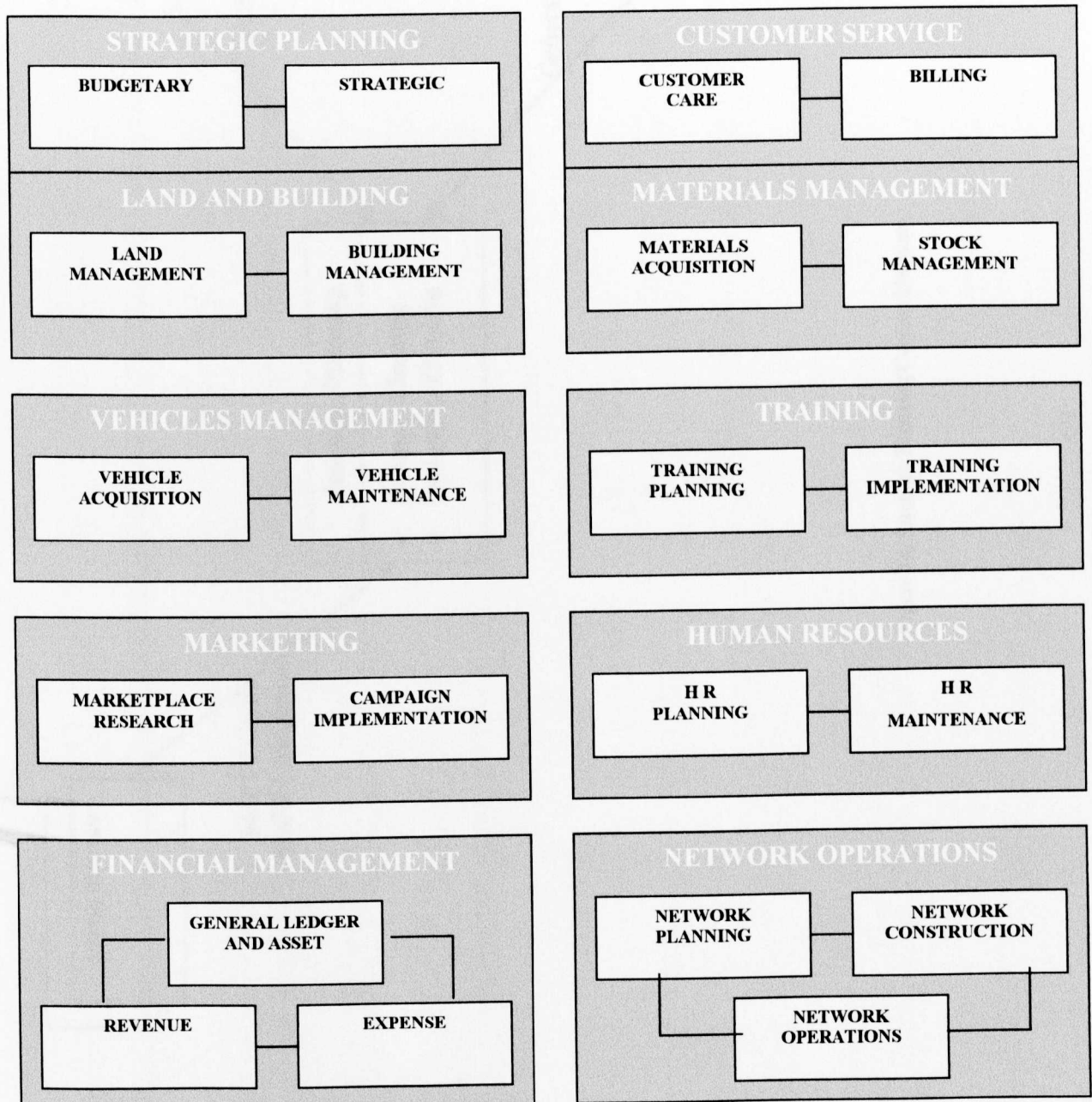


Figure 13. IS within Business Areas

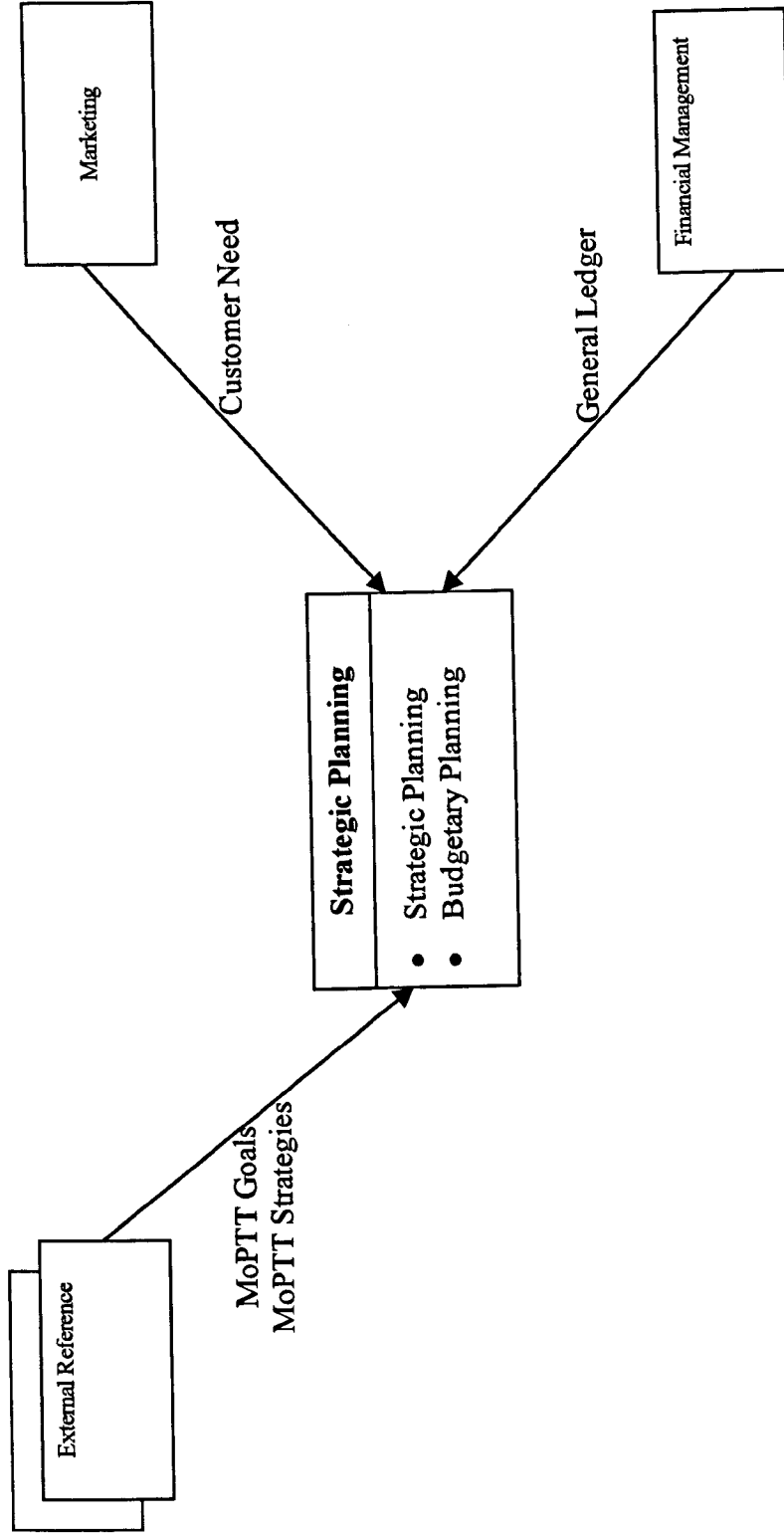


Figure 14. Strategic Planning Context Diagram

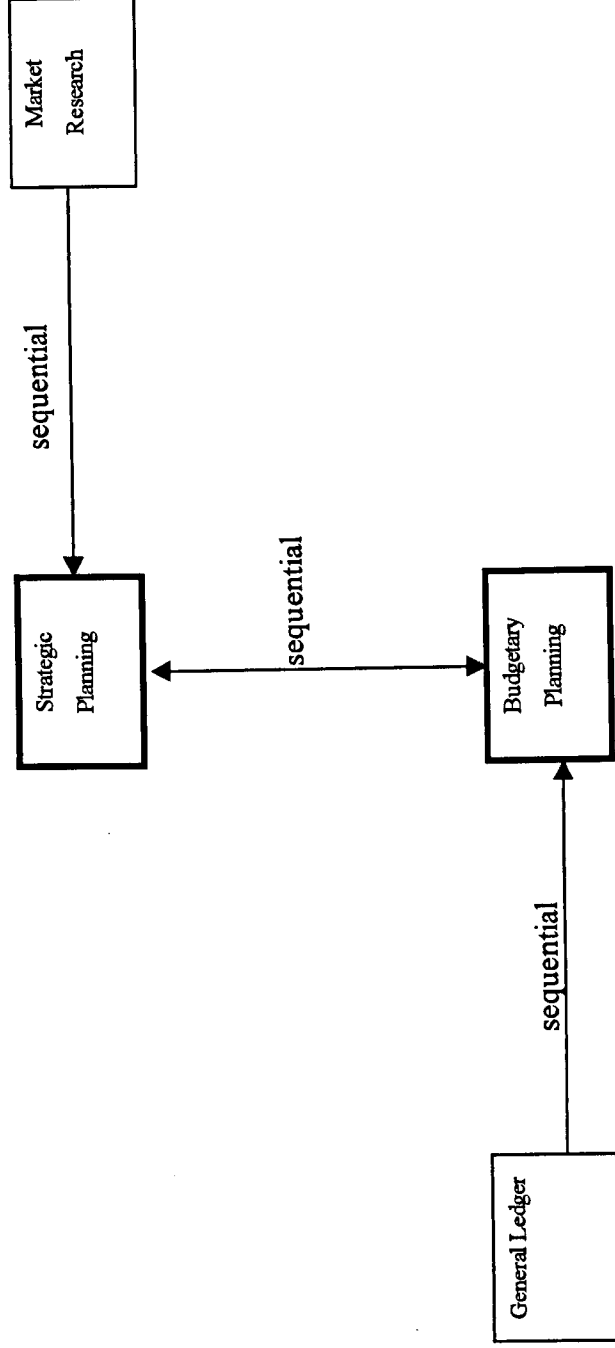


Figure 15. Strategic Planning Information System Dependency Diagram

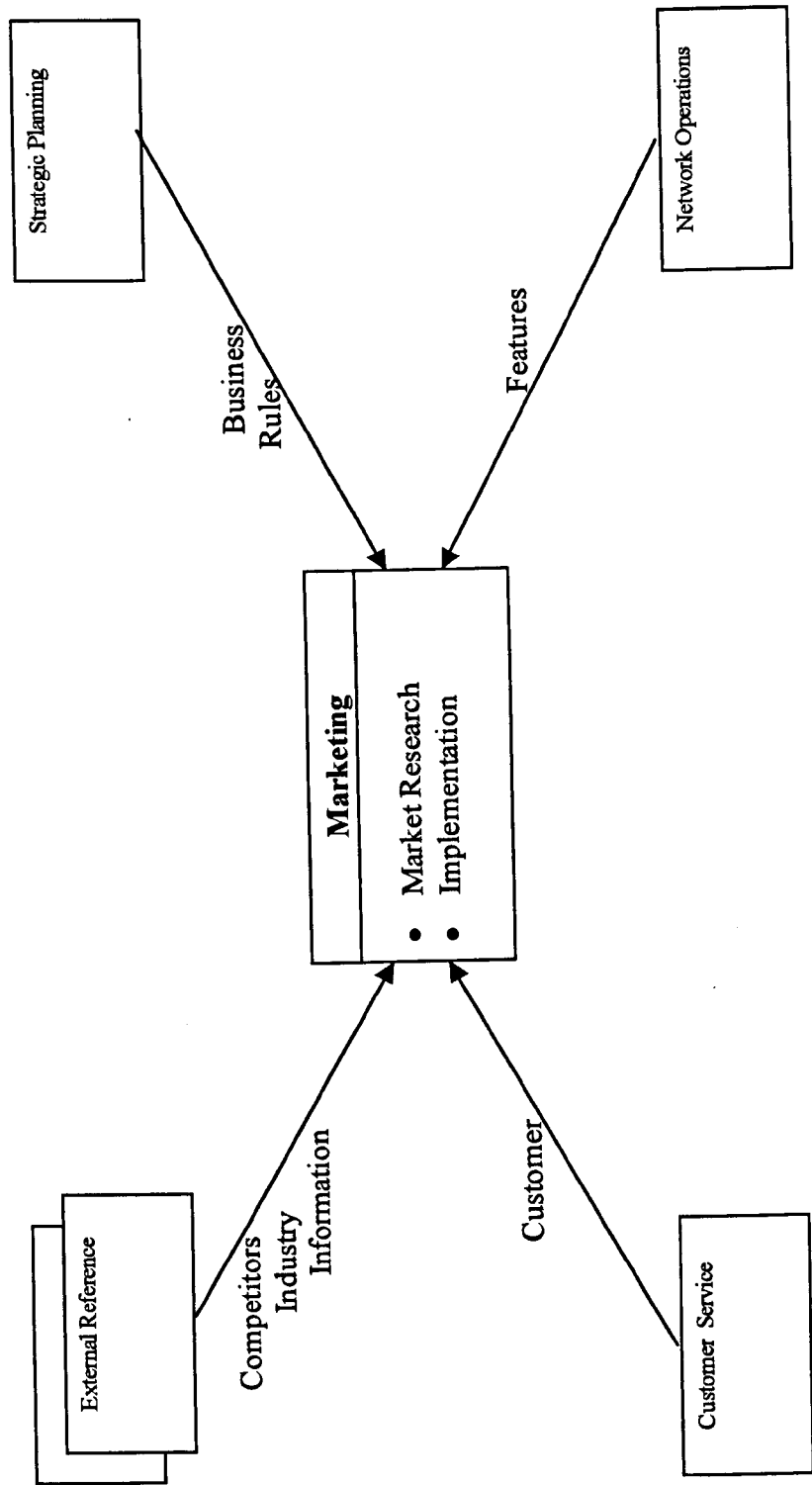


Figure 16. Marketing Context Diagram

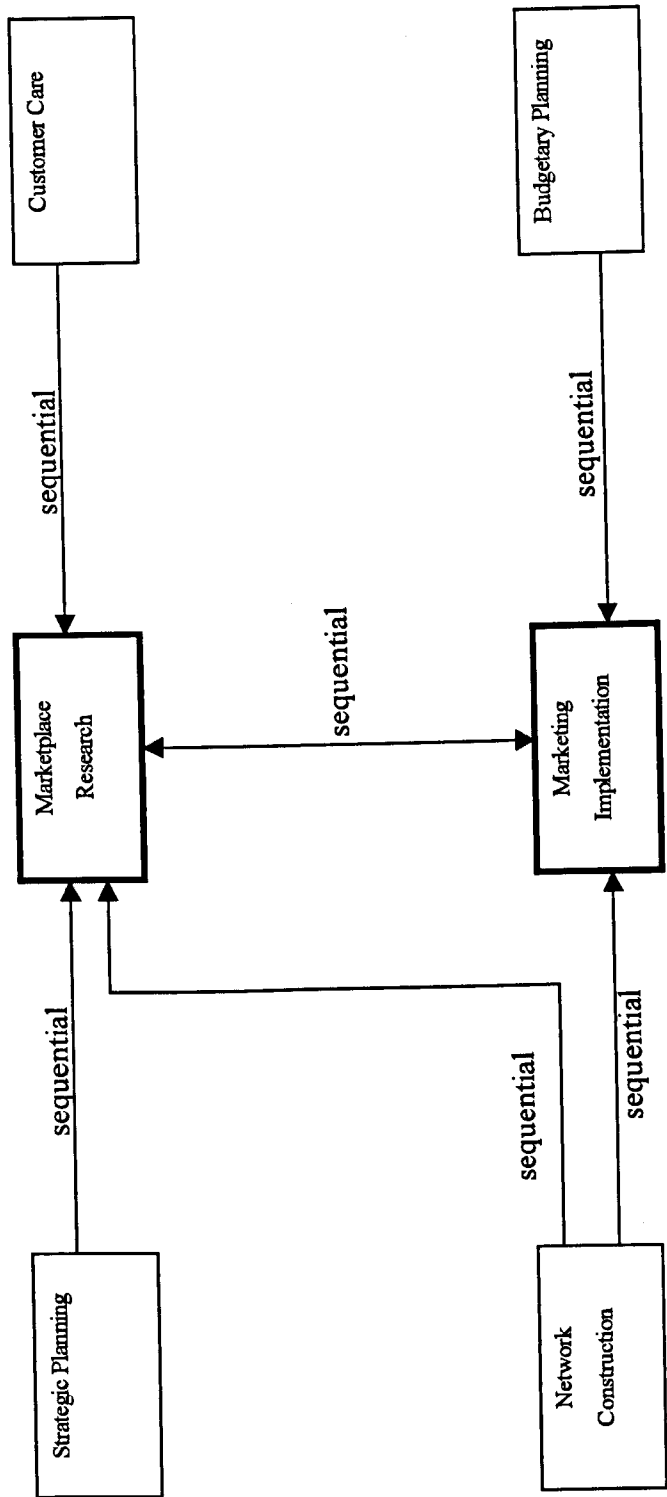


Figure 17. Marketing Information System Dependency Diagram

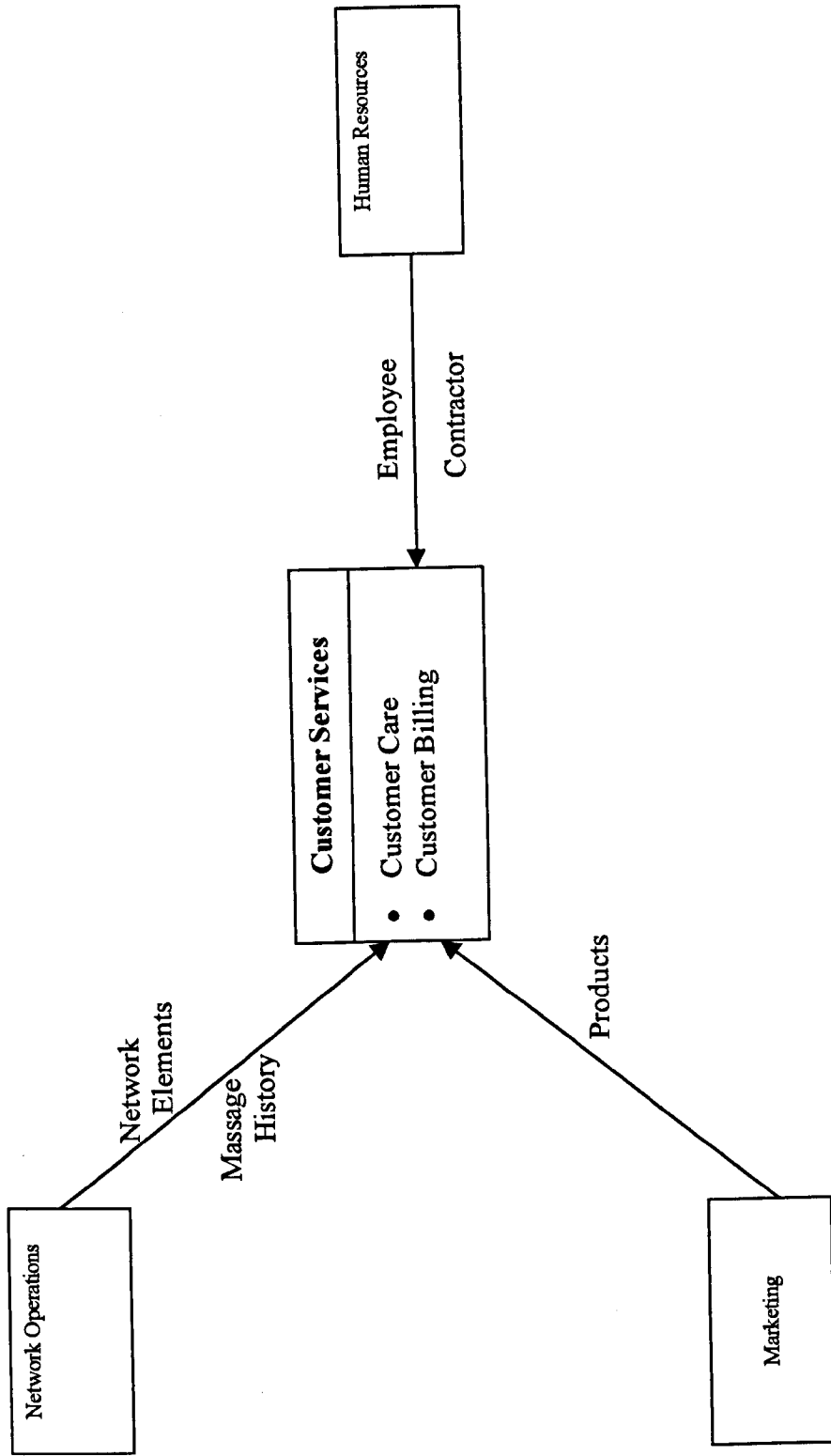


Figure 18. Customer Services Context Diagram

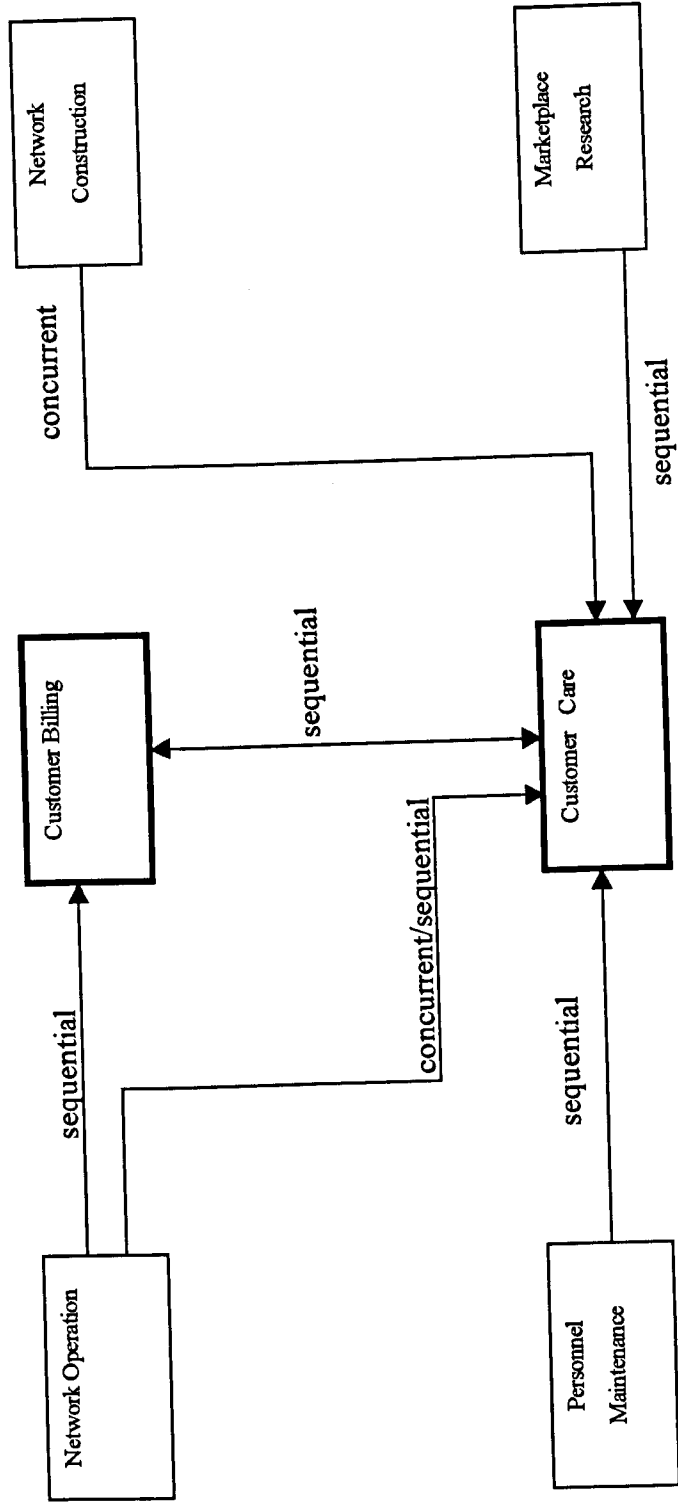


Figure 19. Customer Services Information System Dependency Diagram

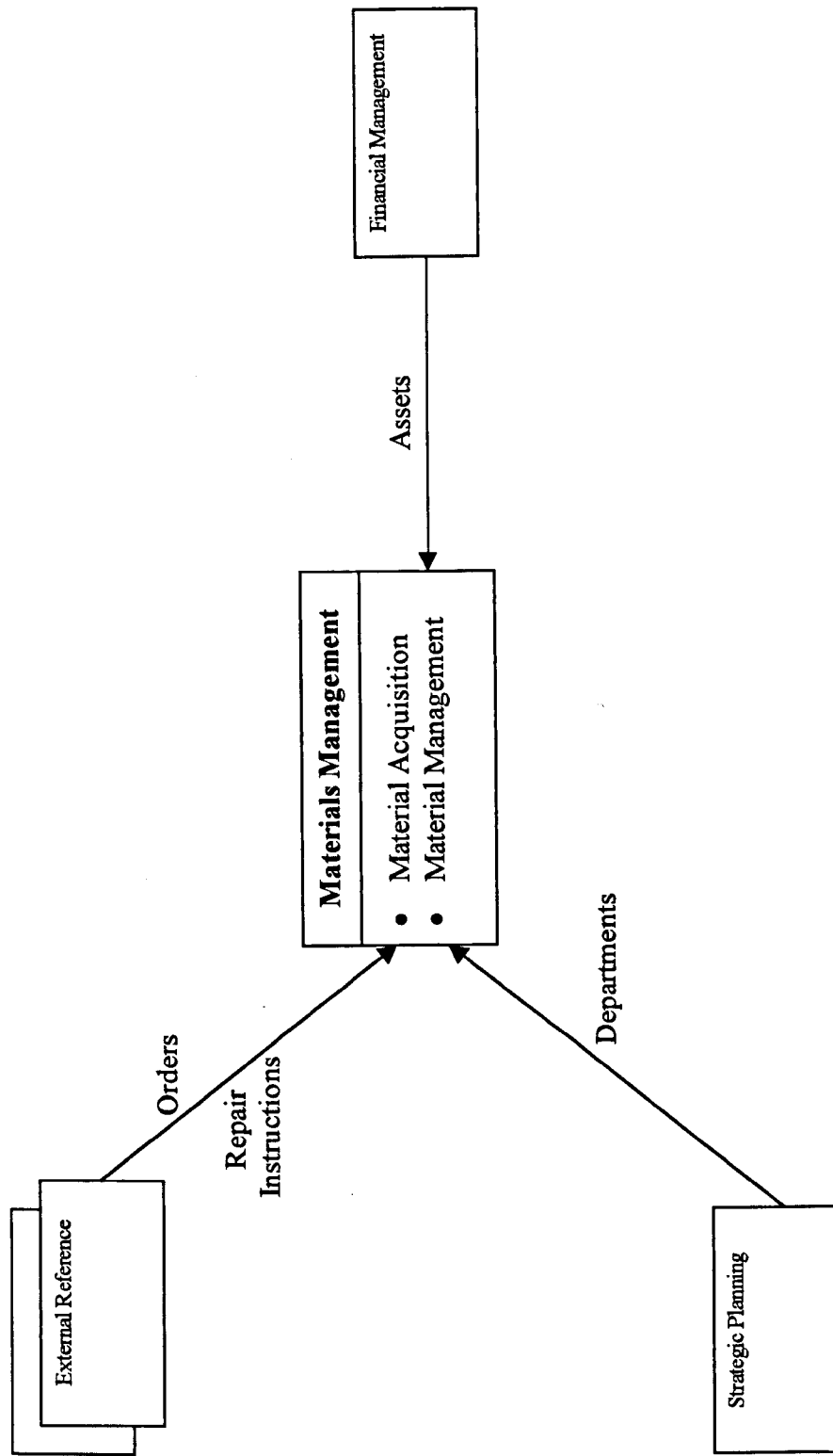


Figure 20. Materials Management Context Diagram

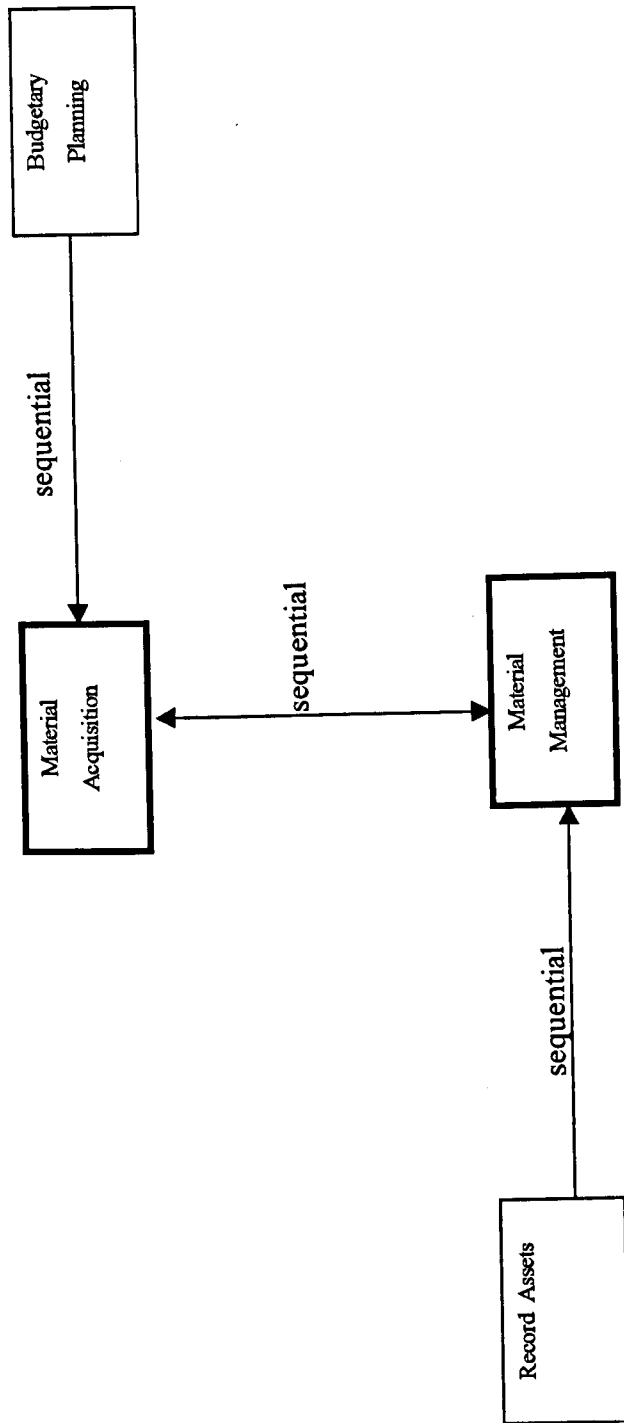


Figure 21. Materials Management Information System Dependency Diagram

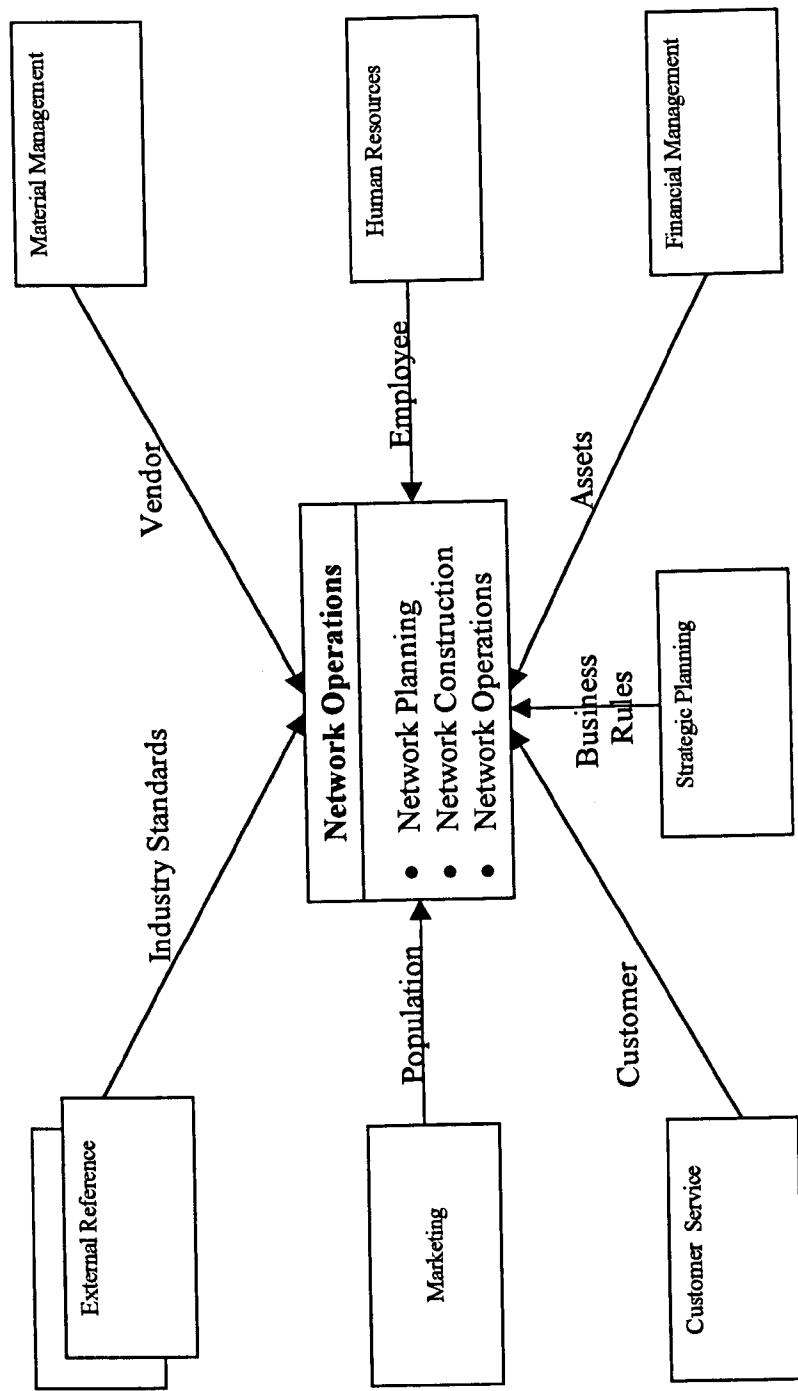


Figure 22. Network Context Diagram

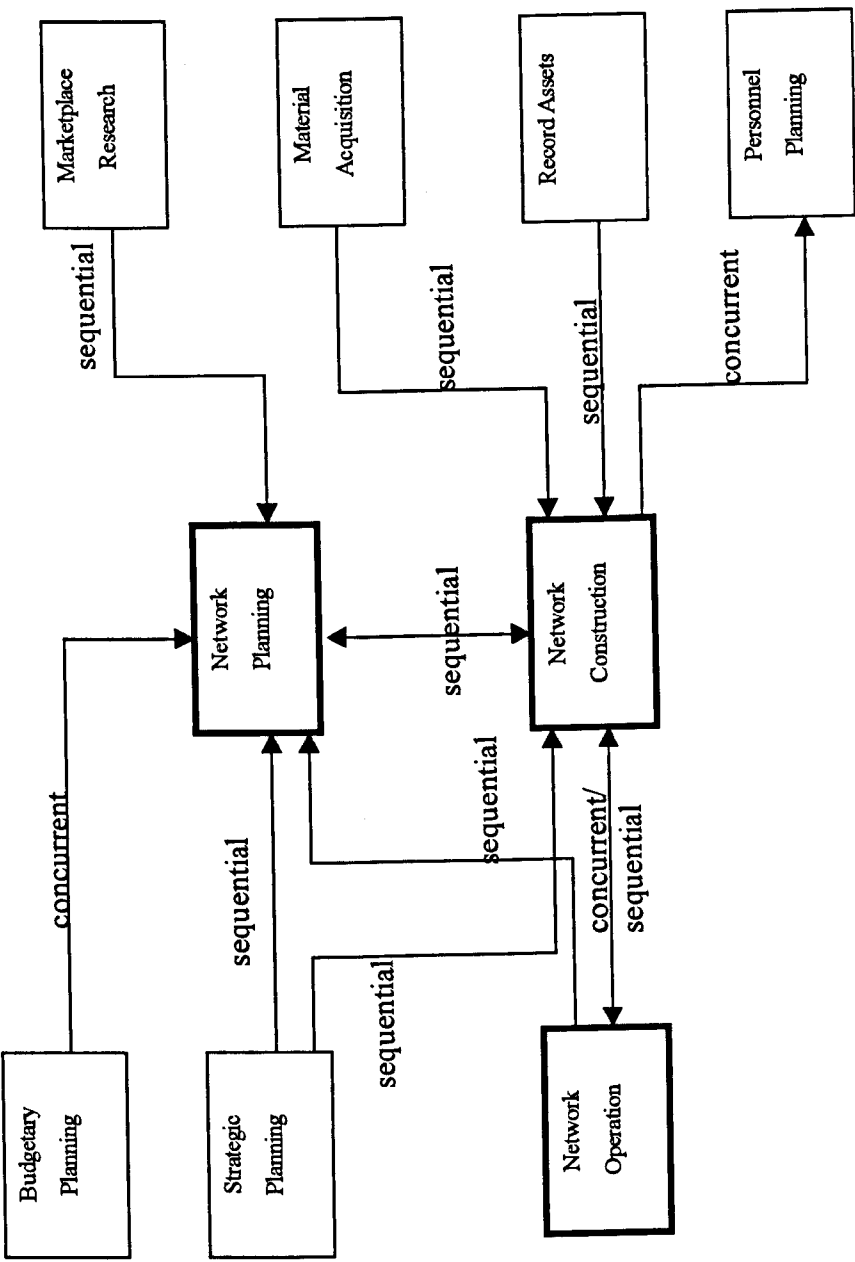


Figure 23. Network Information System Dependency Diagram

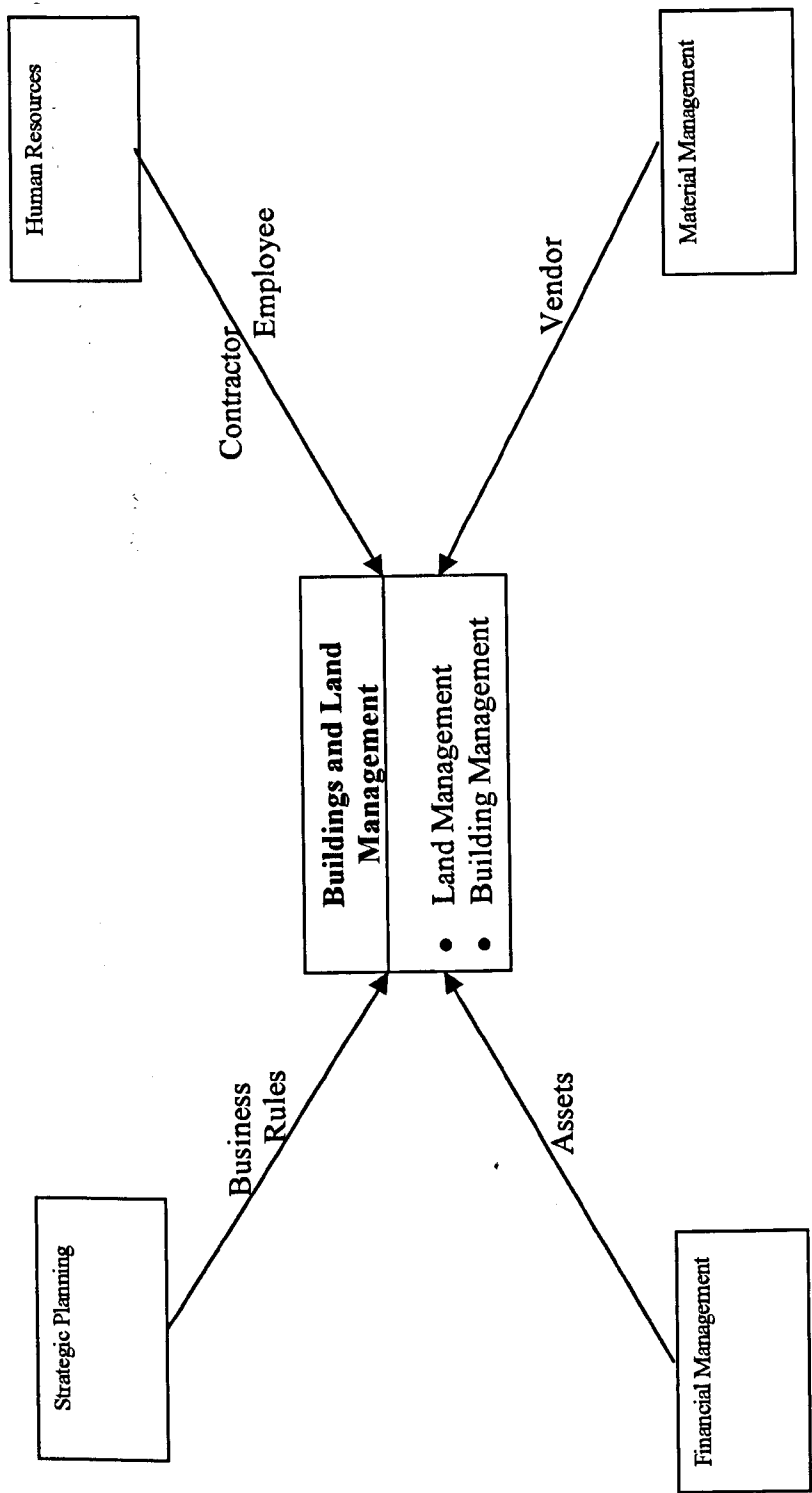


Figure 24. Buildings and Land Management Context Diagram

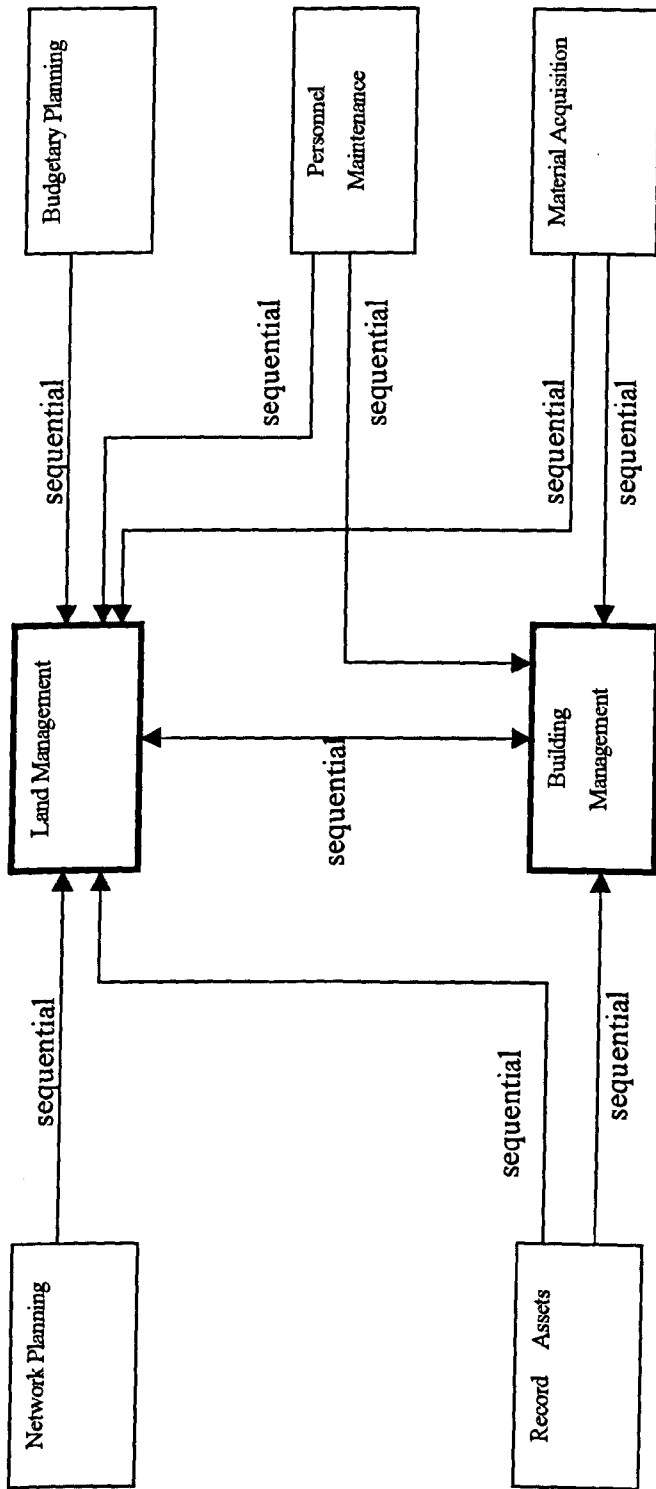


Figure 25. Buildings and Land Management Information System Dependency Diagram

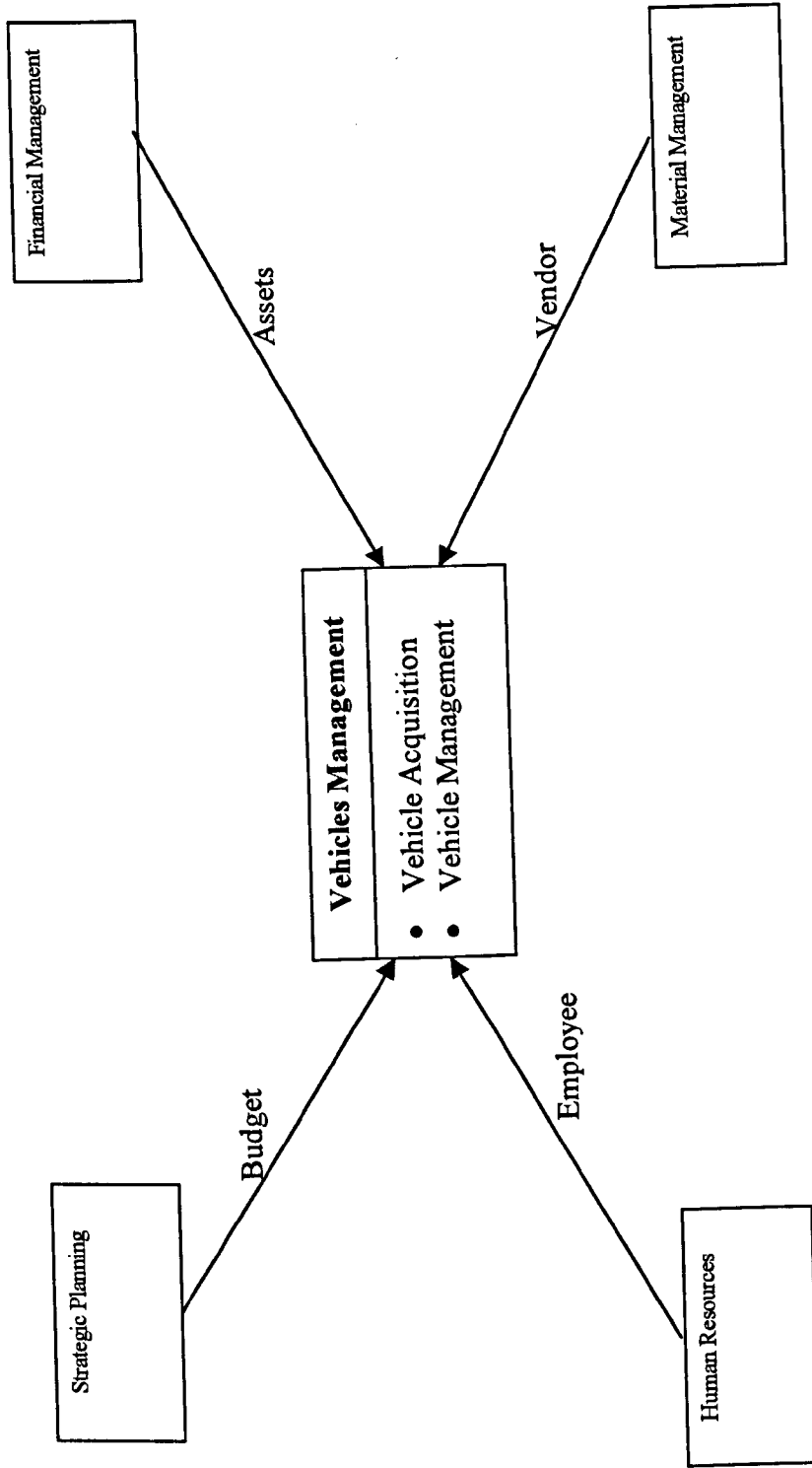


Figure 26. Vehicles Management Context Diagram

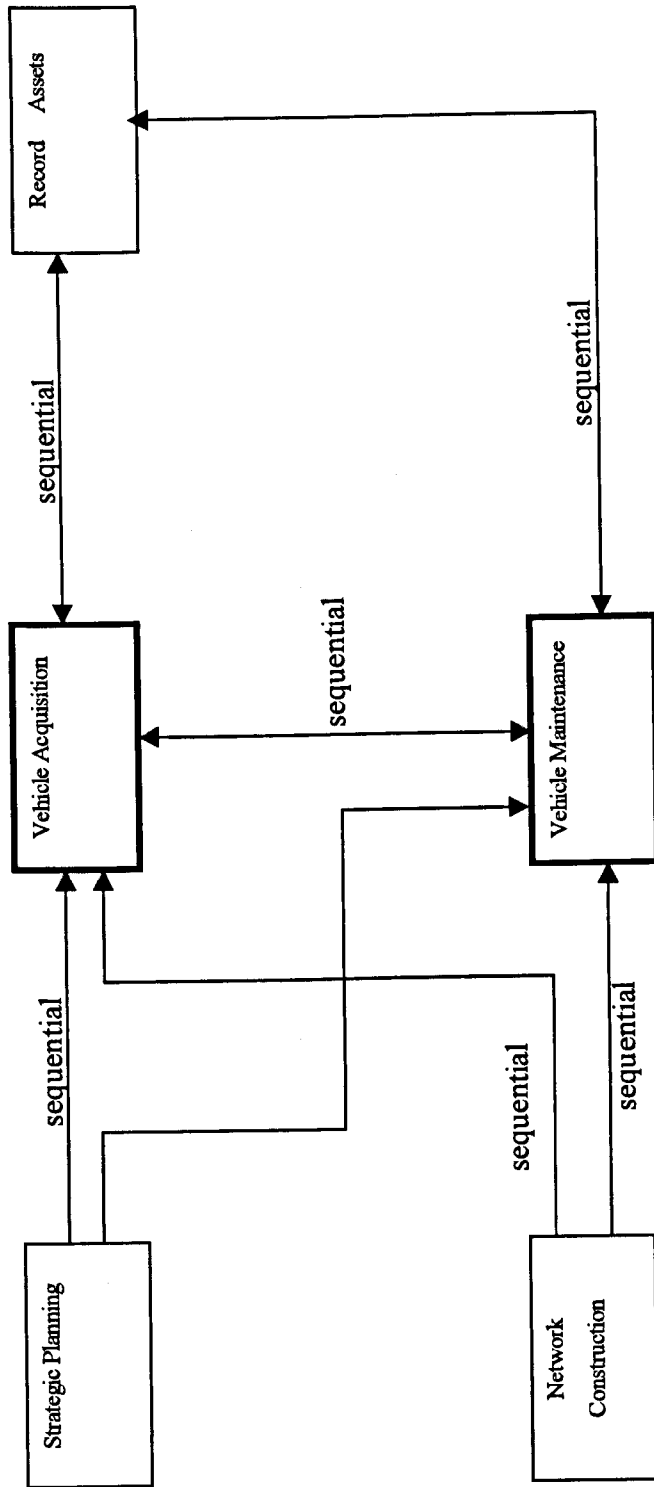


Figure 27. Vehicles Management Information System Dependency Diagram

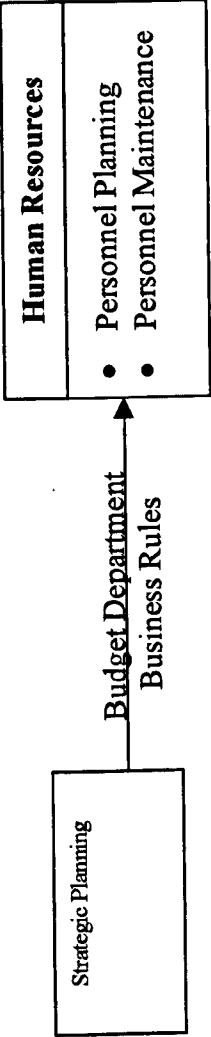


Figure 28. Human Resources Context Diagram

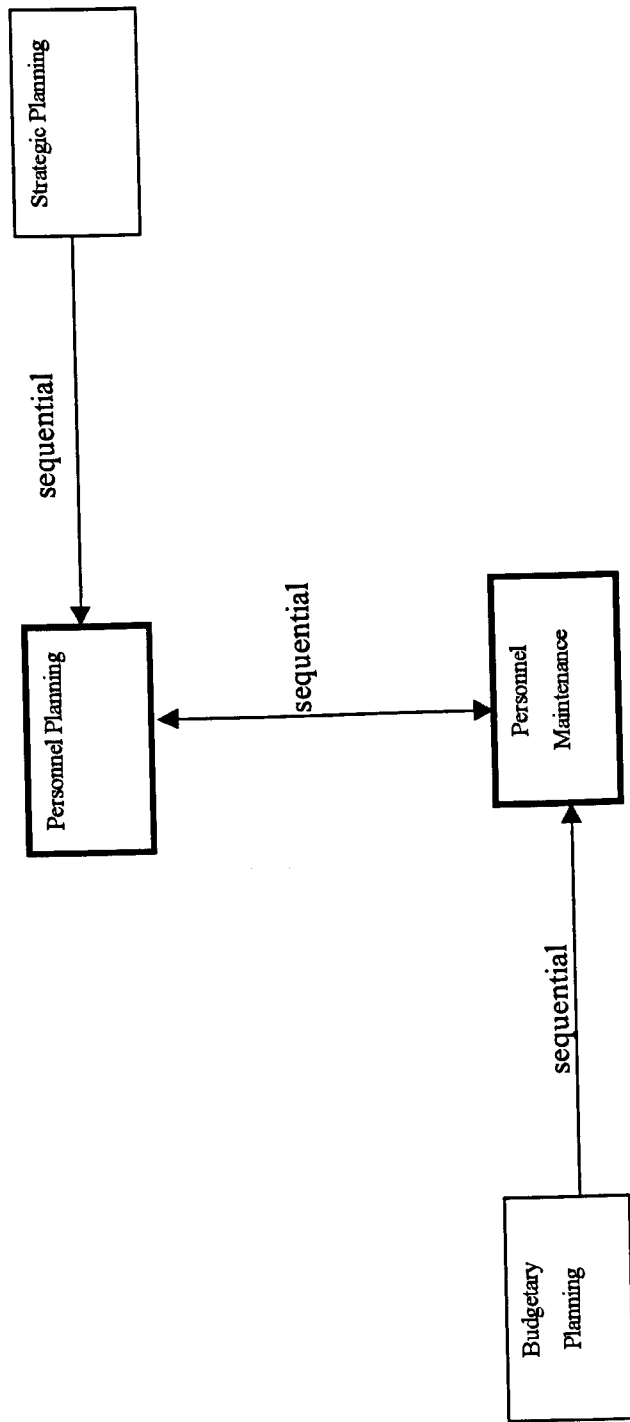


Figure 29. Human Resources Information System Dependency Diagram

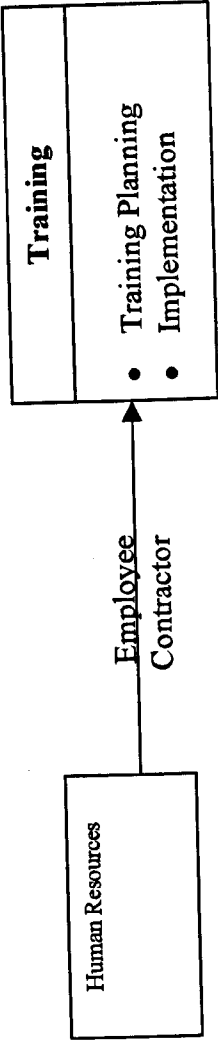


Figure 30. Training Context Diagram

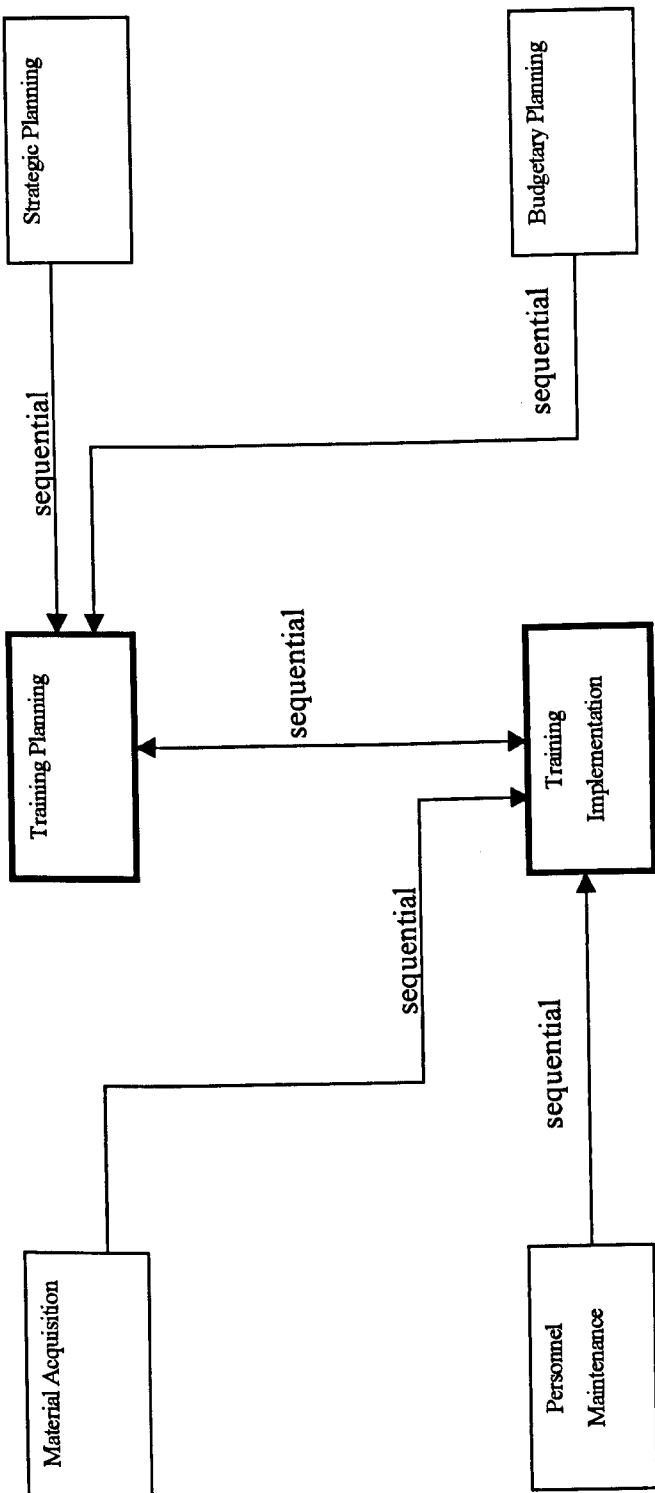


Figure 31. Training Information System Dependency Diagram

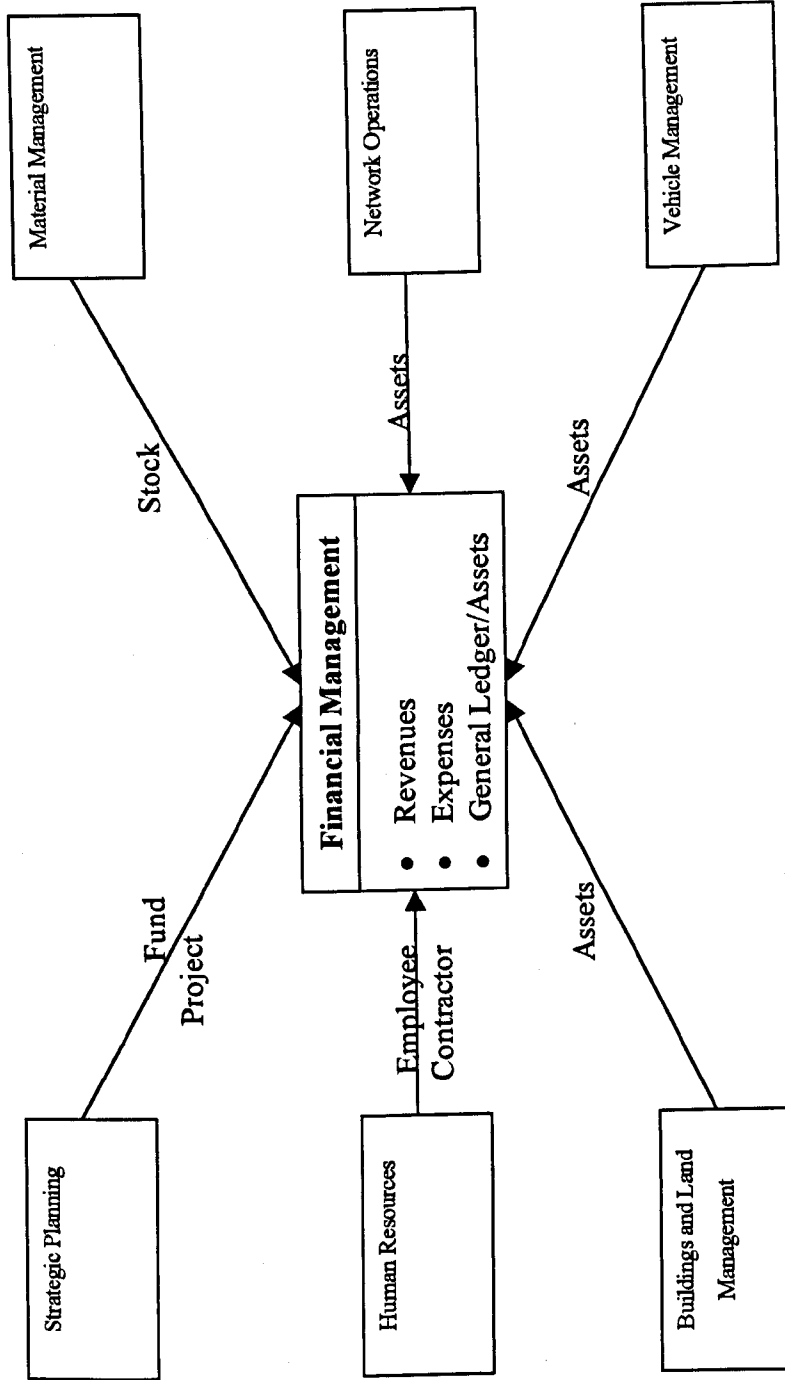


Figure 32. Financial Management Context Diagram

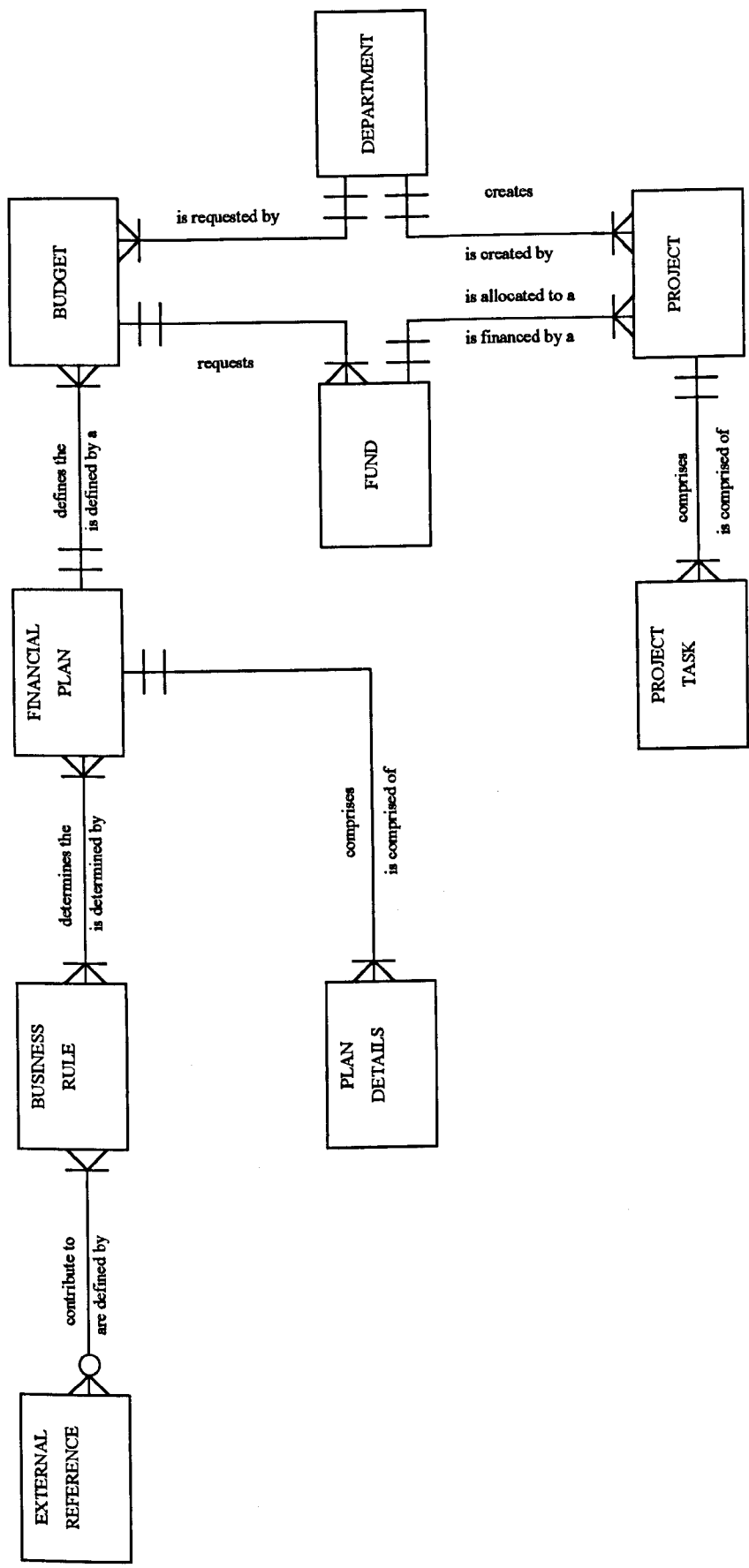
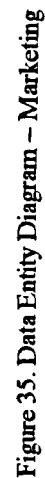


Figure 34. Data Entity Diagram – Strategic Planning



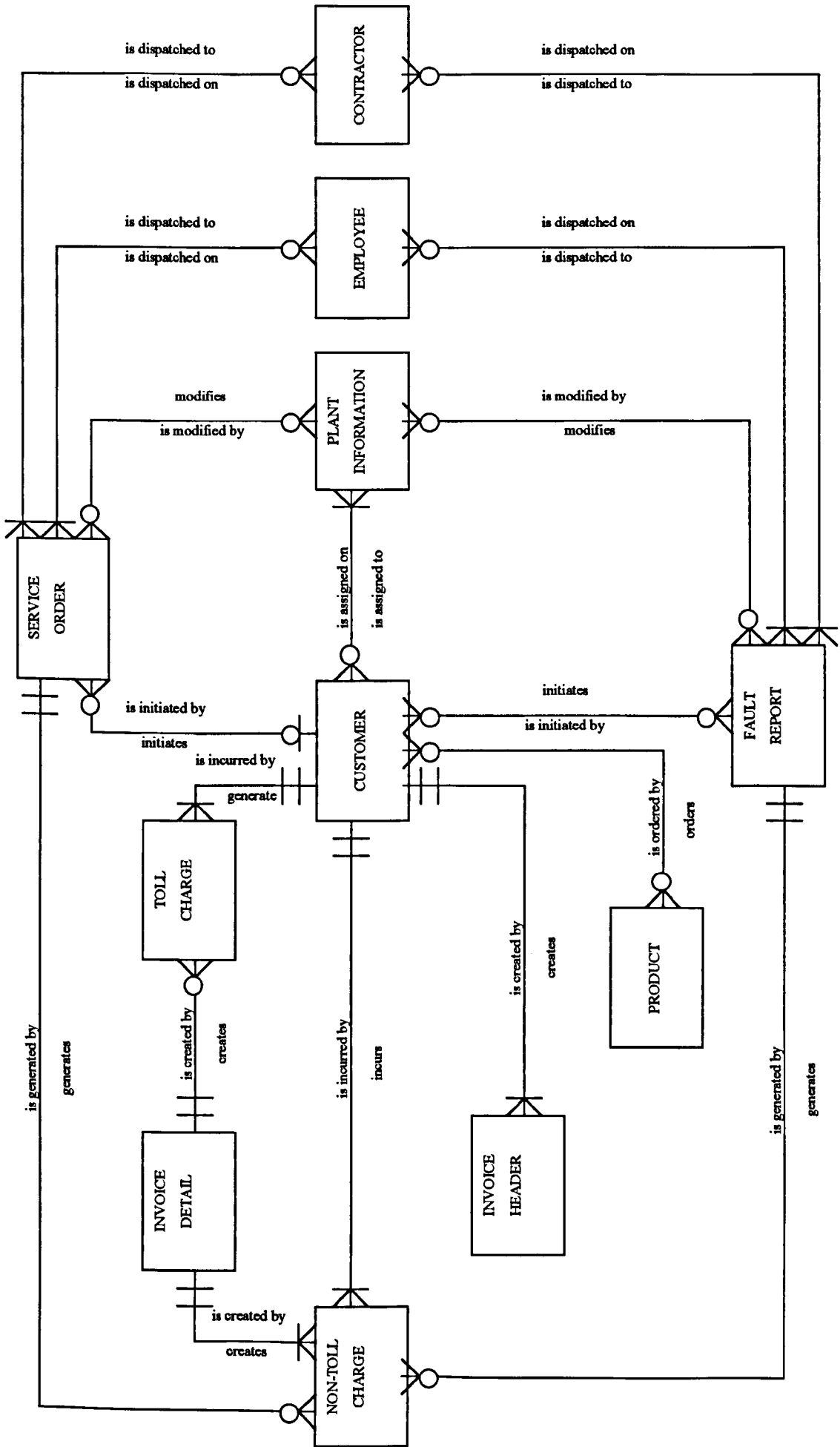


Figure 36. Data Entity Diagram -- Customer Services

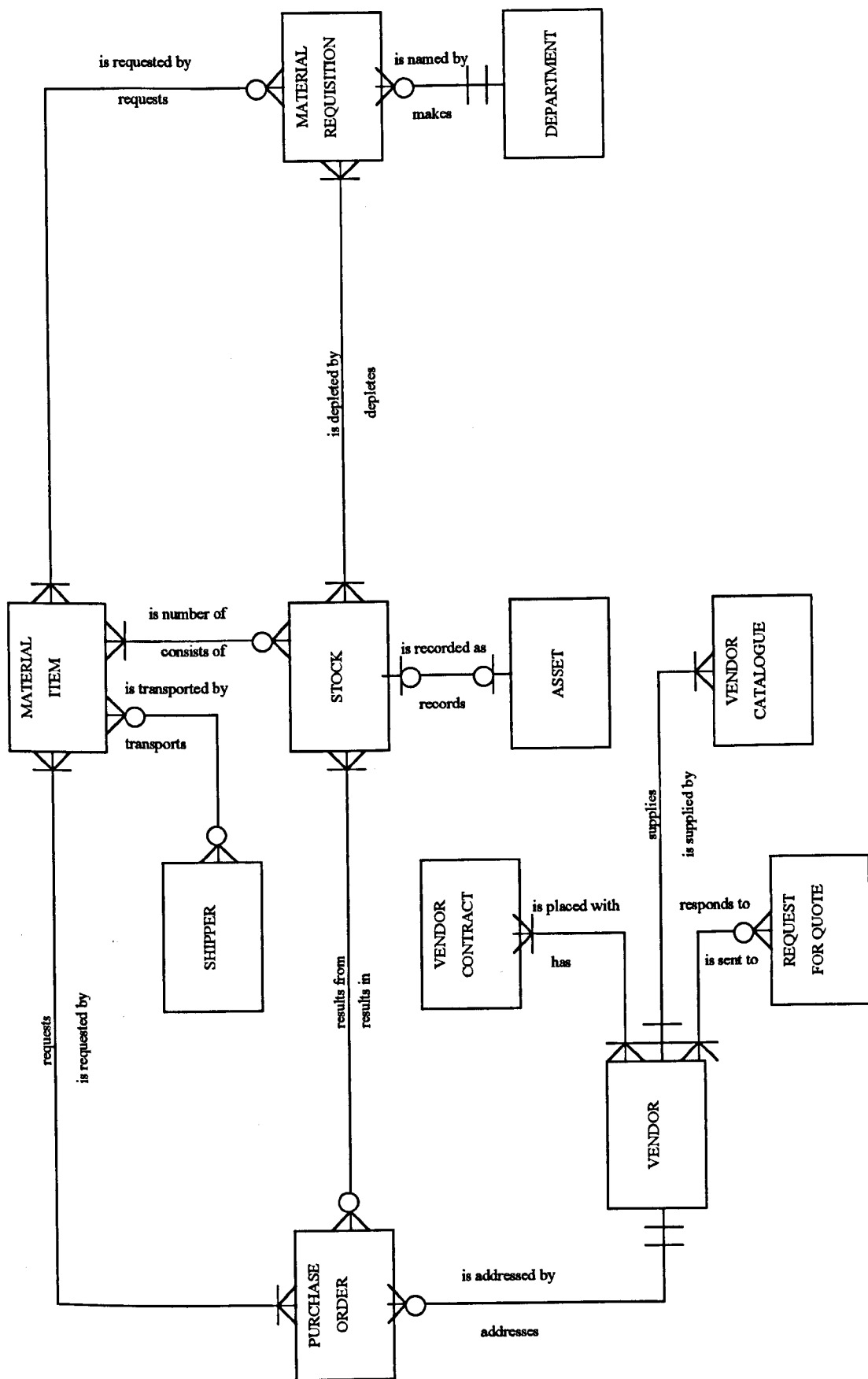


Figure 37. Data Entity Diagram – Materials Management

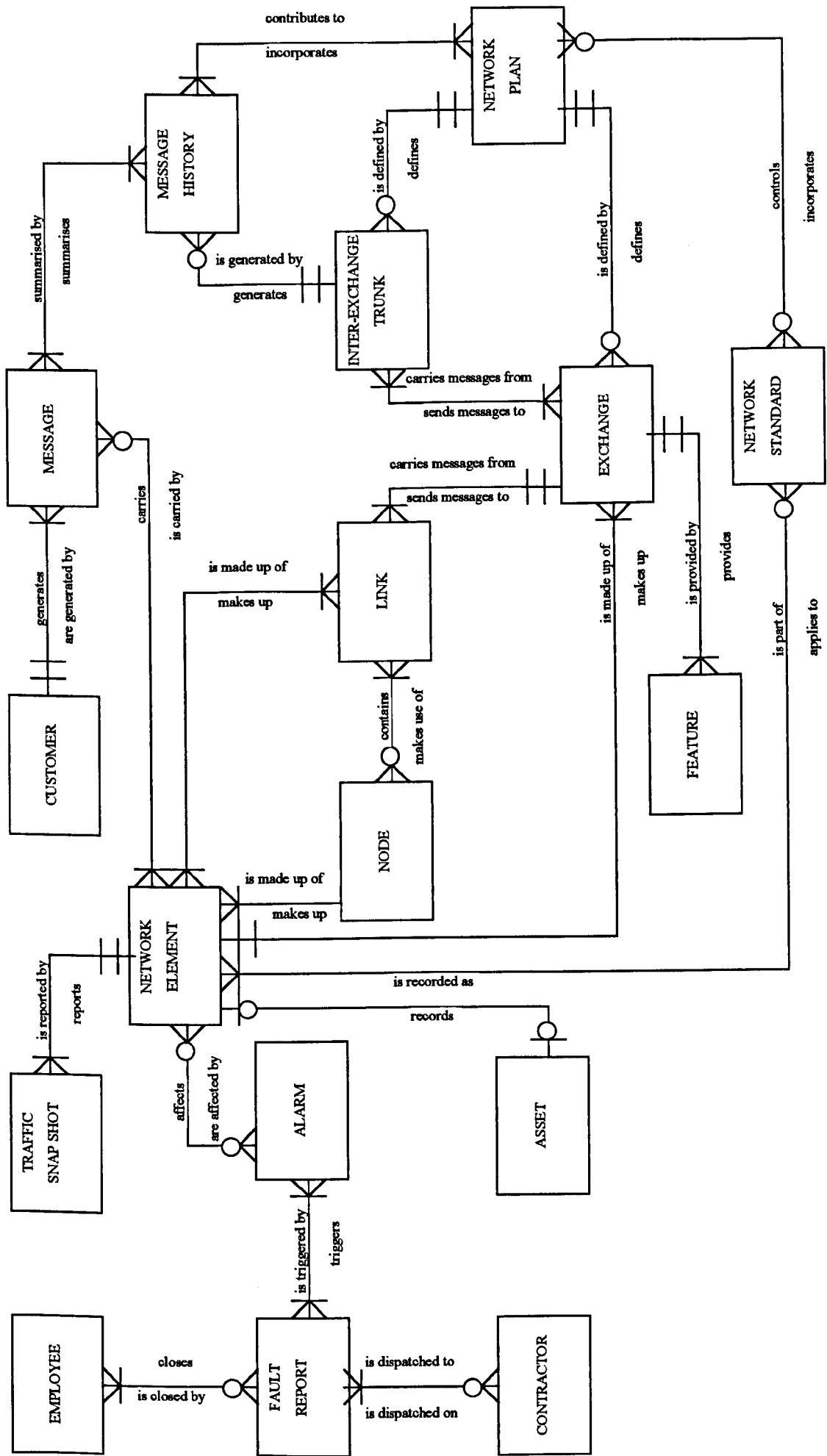


Figure 38. Data Entity Diagram – Network Operations

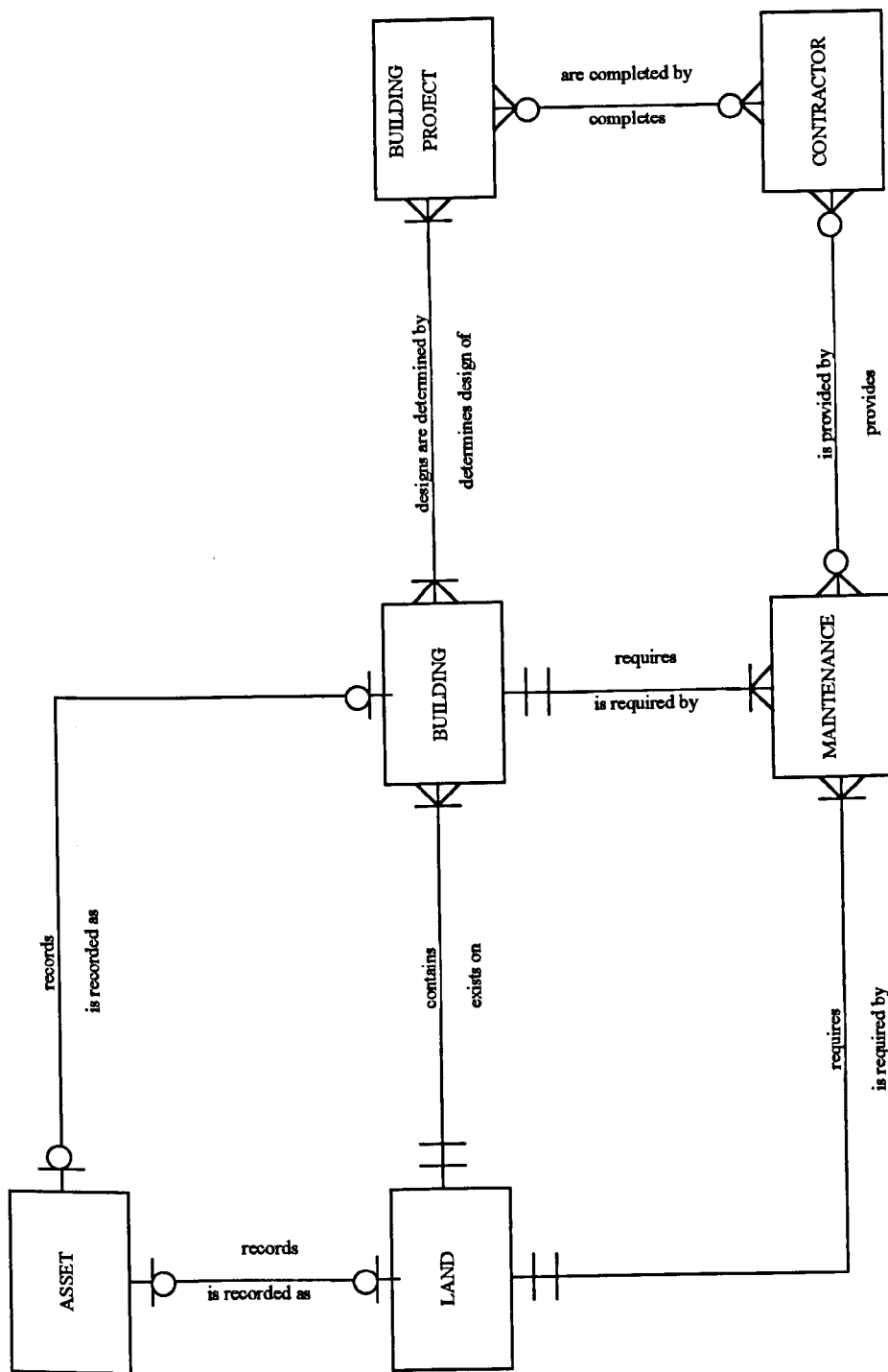


Figure 39. Data Entity Diagram – Buildings and Land Management

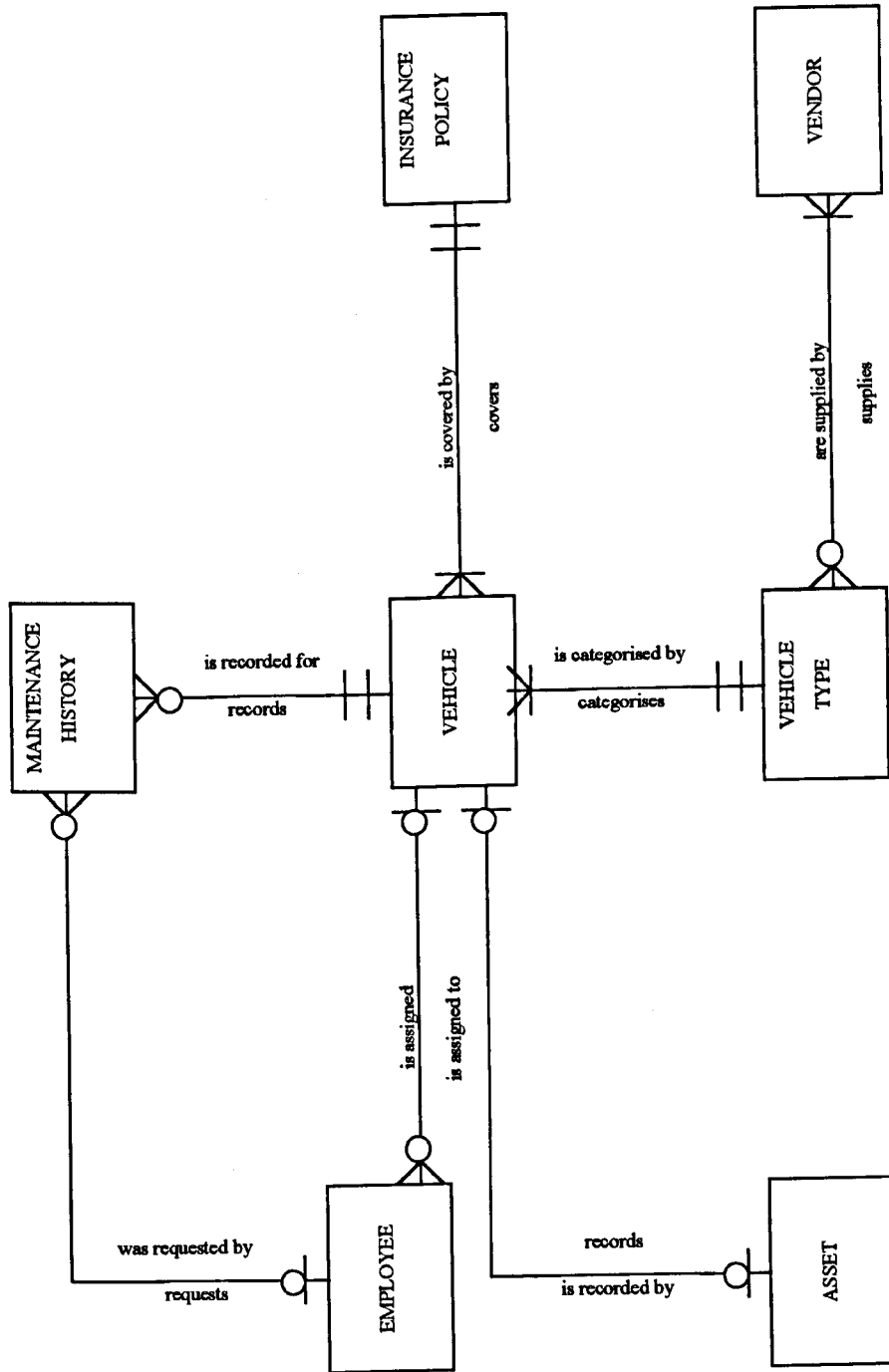


Figure 40. Data Entity Diagram – Vehicles Management

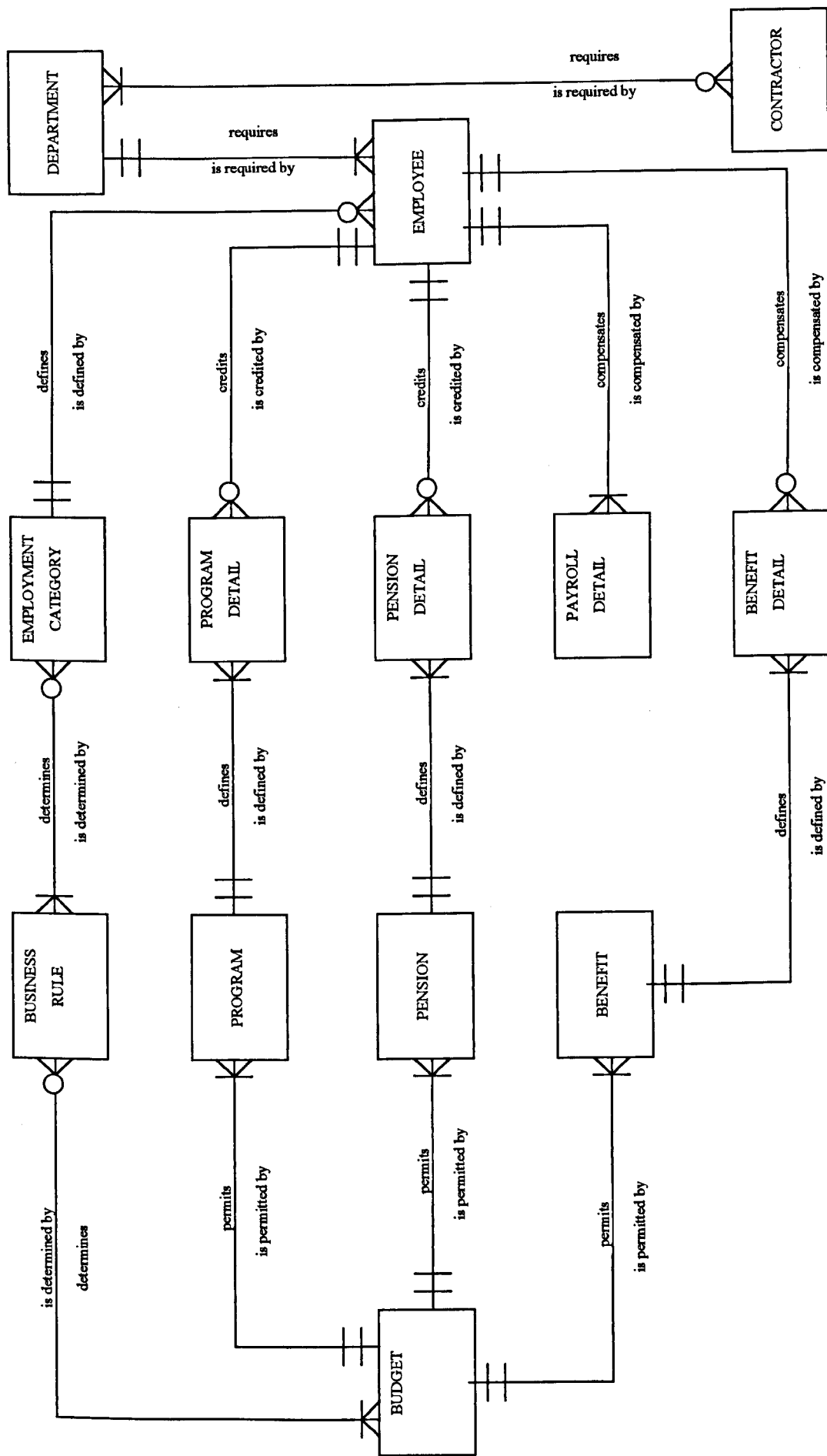


Figure 41. Data Entity Diagram – Human Resources

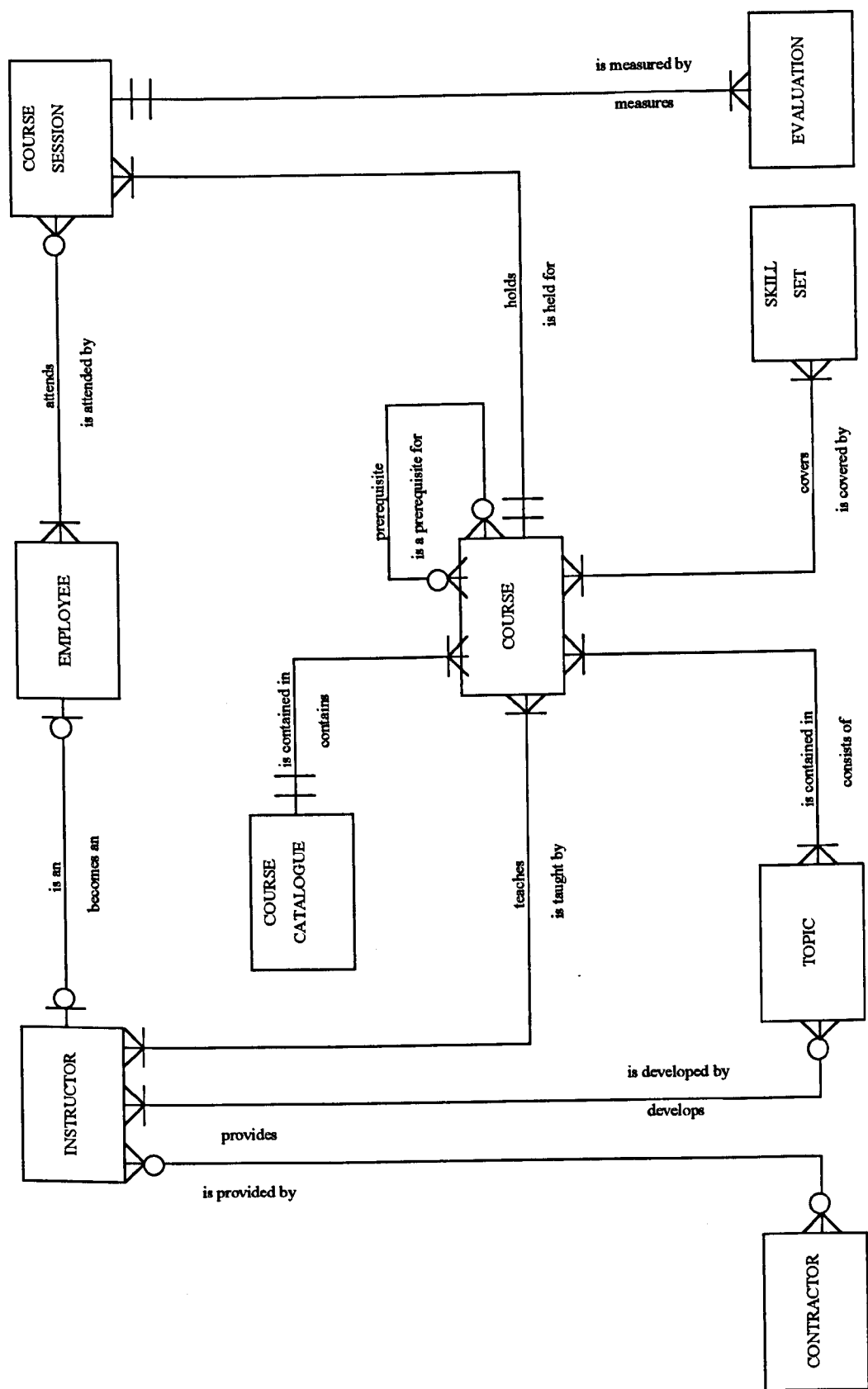


Figure 42. Data Entity Diagram – Training

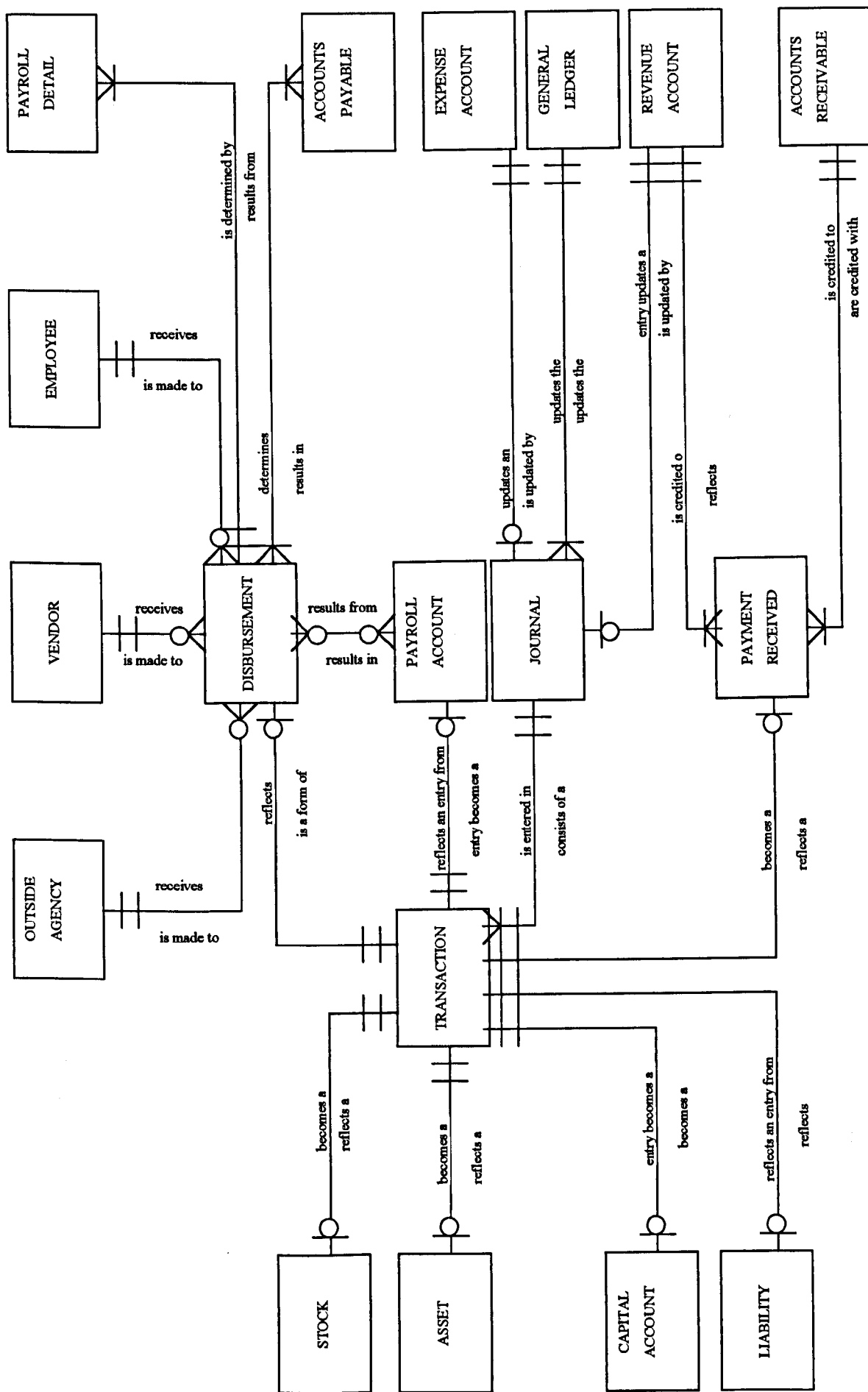


Figure 43. Data Entity Diagram – Financial Management

Appendix B

1. Network Development Function

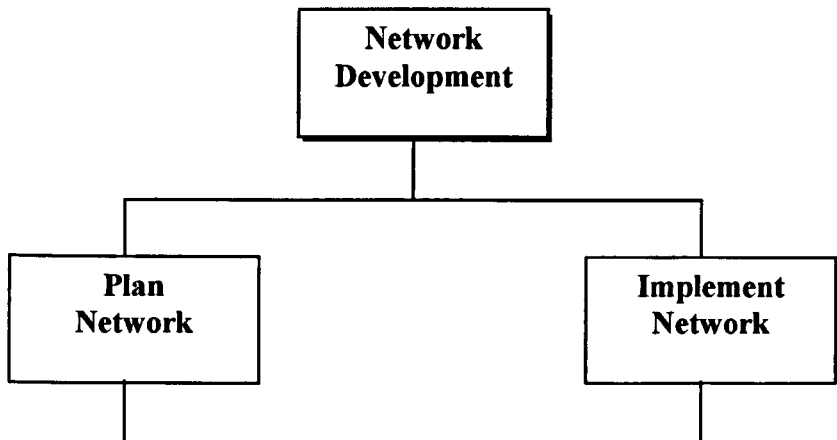
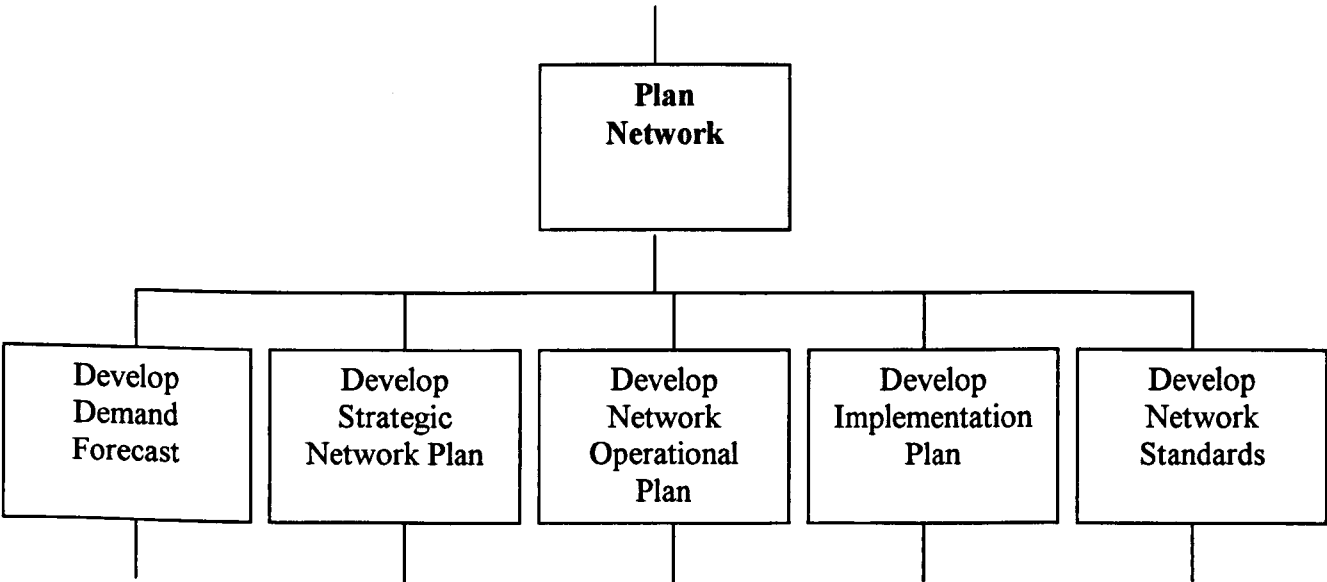


Figure 1. Functional Decomposition diagram of Network Development (Primary Function)

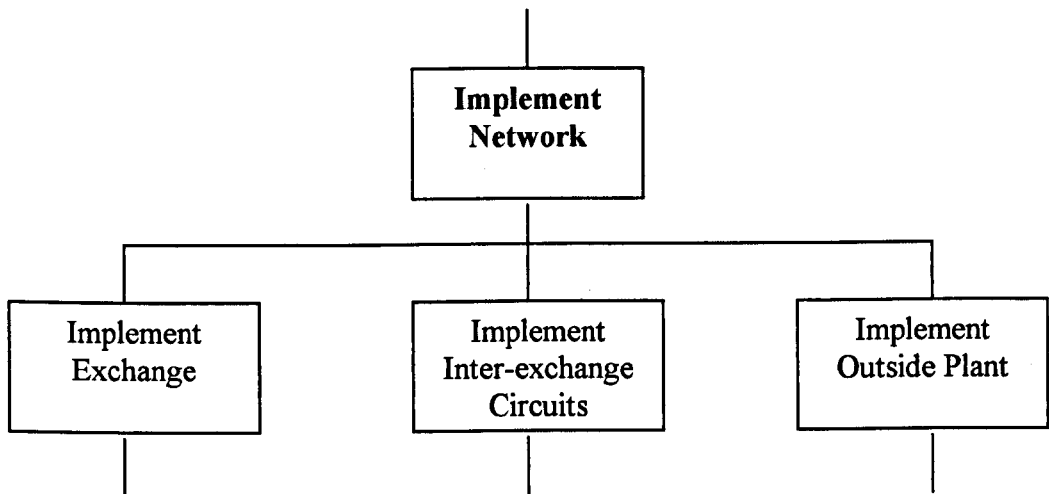
The following processes are addressed under the ‘Network Development’ function.



Process: PLAN NETWORK

This process forecasts the demand for service at local, exchange and inter-exchange levels and plans for the installation of equipment at each level. It does the forecasting and planning of changes. These changes are done for modernising the network, expanding it to meet new demand or to support new products or services. This process contains the following sub-processes:

- DEVELOP DEMAND FORECAST
- DEVELOP STRATEGIC NETWORK PLAN
- DEVELOP NETWORK OPERATIONAL PLAN
- DEVELOP IMPLEMENTATION PLAN
- DEVELOP NETWORK STANDARDS



Process: IMPLEMENT NETWORK

This process controls the installation of equipment at the local, exchange and inter-exchange levels and tests these installations. Once the new capability is in place and tested, Network Management takes over responsibility for on-going support and maintenance. This process contains the following sub-processes:

- IMPLEMENT EXCHANGE
- IMPLEMENT INTEREXCHANGE CIRCUITS
- IMPLEMENT OUTSIDE PLANT

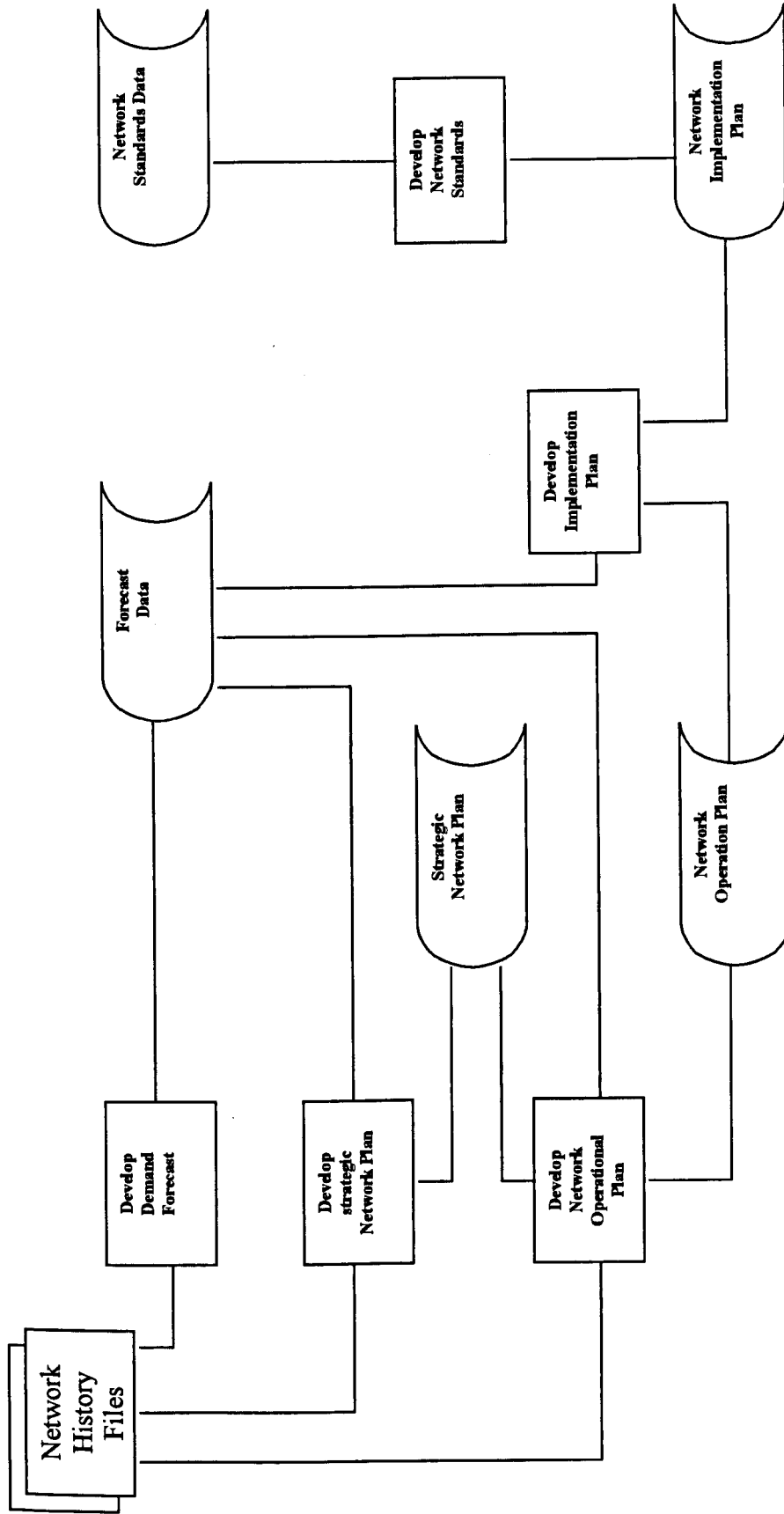


Figure 2. Information Usage Diagram of Network Development (Plan Network)

Sub-Process: DEVELOP DEMAND FORECAST

This sub-process reads telecommunications usage history information in order to forecast the future demand for service at short-term and long-term intervals. In addition, it takes into account new product and service requirements that are generated by the Corporate Strategic Planning (strategic planning) and Marketing Functions. This sub-process is contained in the PLAN NETWORK process.

Sub-Process: DEVELOP IMPLEMENTATION PLAN

This sub-process develops plans in order to implement new service at the exchange, inter-exchange and local levels including the building requirements to house this equipment. It is contained in the PLAN NETWORK process.

Sub-Process: DEVELOP NETWORK OPERATIONAL PLAN

This sub-process drafts various plans in order to implement service focusing on numbering schemes, call routing and rating, and the operations of the network. It is contained in the PLAN NETWORK process.

Sub-Process: DEVELOP NETWORK STANDARDS

This sub-process outlines the industry and company standards for materials and methods that are used to implement and maintain all levels of telecommunications service. It is contained in the PLAN NETWORK process.

Sub-Process: DEVELOP STRATEGIC NETWORK PLAN

This sub-process reads information from forecasts and usage history in order to develop an overall plan for service improvement throughout the Kingdom. It is contained in the PLAN NETWORK process.

Data Store: FORECAST DATA

This data store contains information on the analysis of historical data and predictions of future demand. It is scoped within the information usage model for the process PLAN NETWORK.

Data Store: NETWORK IMPLEMENTATION PLAN

This data store contains information details of the plan in order to install various elements of the network. It is scoped within the information usage models for the processes IMPLEMENT NETWORK, and PLAN NETWORK.

Data Store: NETWORK OPERATION PLAN

This data store contains information details of how the network will be structured. It is scoped within the information usage model for the process PLAN NETWORK.

Data Store: NETWORK STANDARDS DATA

This data store contains information on current company and industry standards for the installation and maintenance of various network elements. It is scoped within the information usage models for the processes IMPLEMENT NETWORK and PLAN NETWORK.

Data Store: STRATEGIC NETWORK PLAN

This data store contains information that details the direction of network improvement plans that best meet the demands for service. It is scoped within the information usage model for the process PLAN NETWORK.

External Agent: NETWORK HISTORY FILES

This external entity describes various historical data that are gathered and stored on the usage of various network components.

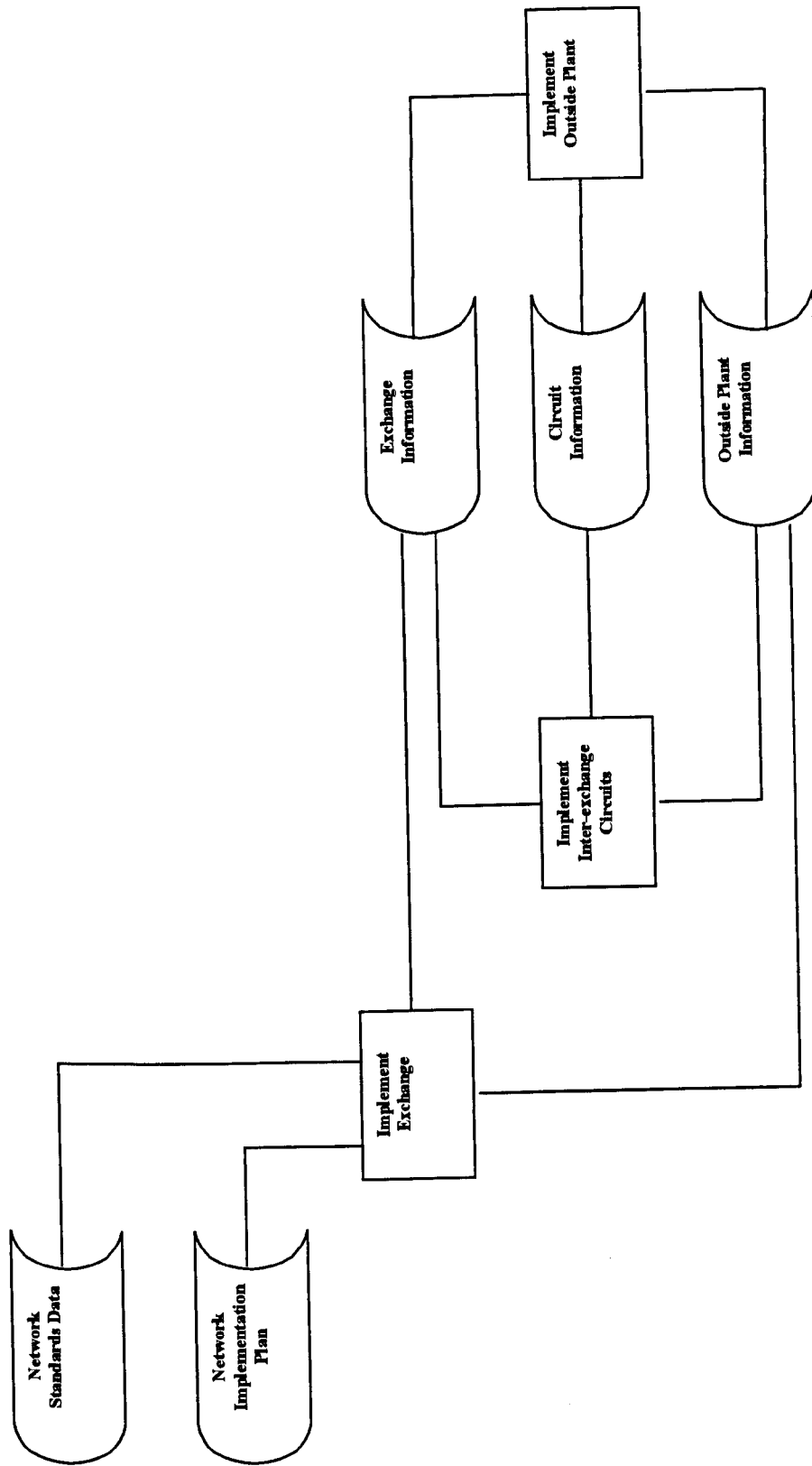


Figure 3. Information Usage Diagram of Network Development (Implement Network)

Sub-Process: IMPLEMENT INTER-EXCHANGE CIRCUITS

This sub-process controls the projects that govern the acquisition, installation and testing of inter-exchange circuits. It is contained in the IMPLEMENT NETWORK process.

Sub-Process: IMPLEMENT EXCHANGE

This sub-process controls the projects that govern the acquisition, installation and testing of new switches. It is contained in the IMPLEMENT NETWORK, process.

Sub-Process: IMPLEMENT OUTSIDE PLANT

This sub-process controls the projects that govern the installation and inspection of all outside plant elements. It is contained in the IMPLEMENT NETWORK process.

Data Store: CIRCUIT INFORMATION

This data store contains information on all the inter-exchange connections, including long distance and non-switched circuits. It is scoped within the information usage model for the process IMPLEMENT NETWORK.

Data Store: EXCHANGE INFORMATION

This data store contains the details on central office exchanges. It is scoped within the information usage model for the process IMPLEMENT NETWORK.

Data Store: NETWORK IMPLEMENTATION PLAN

This data store contains information details of the plan in order to install various elements of the network. It is scoped within the information usage models for the processes IMPLEMENT NETWORK, and PLAN NETWORK.

Data Store: NETWORK STANDARDS DATA

This data store contains information on current company and industry standards for the installation and maintenance of various network elements. It is scoped within the information usage models for the processes IMPLEMENT NETWORK and PLAN NETWORK.

Data Store: OUTSIDE PLANT INFORMATION

This data store contains information on the details of outside plant installations. It is scoped within the information usage model for the process IMPLEMENT NETWORK.

2. Network Management Function

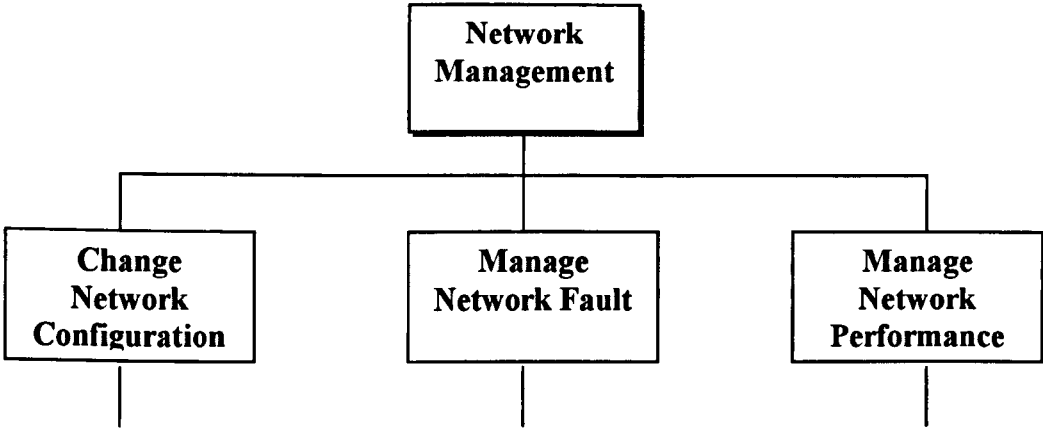
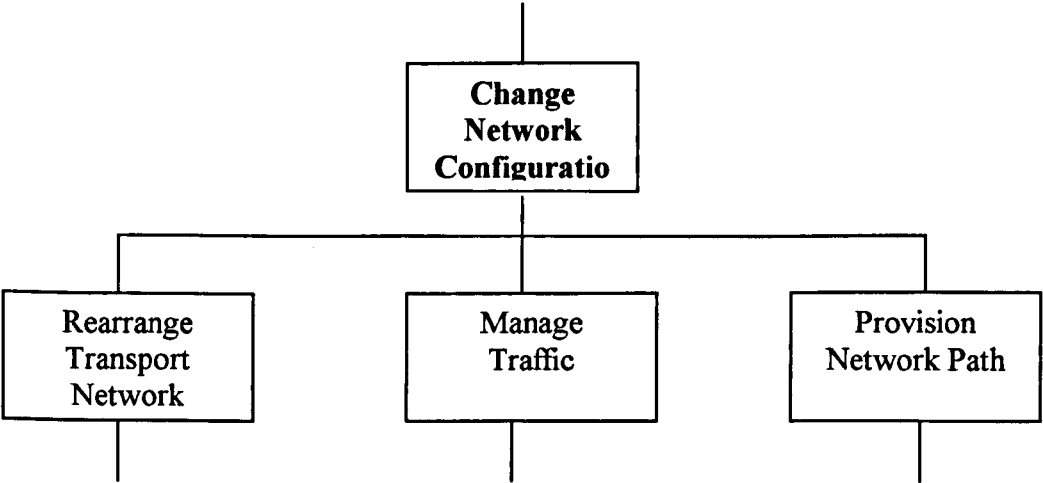


Figure 4. Functional Decomposition diagram of Network Management (Primary Function)

The following processes are addressed under the ‘Network Management’ function.



Process: CHANGE NETWORK CONFIGURATION

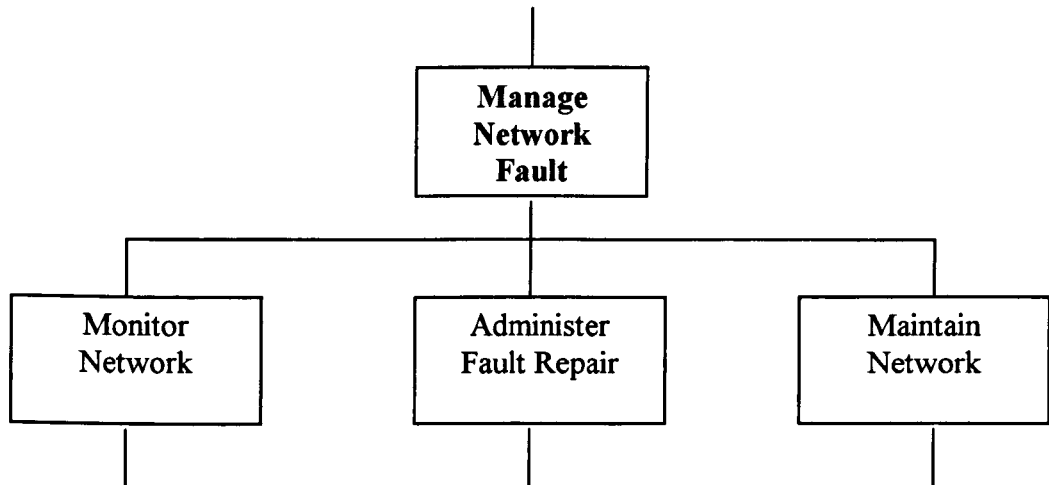
This process deals with the rearrangement of the transport network to accommodate traffic or to restore impaired service. It manages the traffic on the network and collects

billing data. This process contains the following sub-processes:

REARRANGE TRANSPORT NETWORK

MANAGE TRAFFIC

PROVISION NETWORK PATH



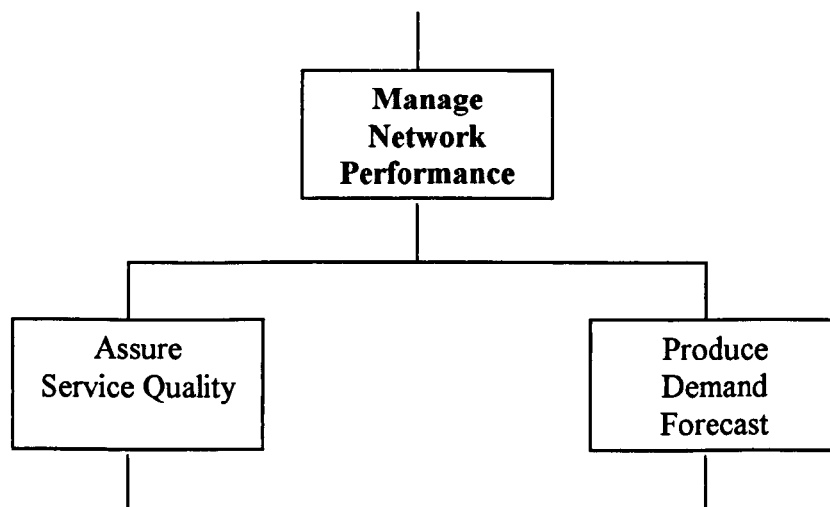
Process: MANAGE NETWORK FAULT

This process monitors the network in order to detect and analyse faults. In addition, it initiates activities to repair the fault, and ensure that the fault is corrected. The process also schedules network maintenance and carries out that maintenance. This process contains the following sub-processes:

MONITOR NETWORK

ADMINISTER FAULT REPAIR

MAINTAIN NETWORK



Process: MANAGE NETWORK PERFORMANCE

This process is performed on an on-going basis to collect and analyse network alarms, operational measurements (e.g. dial tone speed, successful call attempts) in order to detect network or failures and measures the grade of service for exchange and transmission equipment/facilities. It includes the activities of verifying alarm, running diagnostic programs, collecting and analysing of fault reports. This process contains the following sub-processes:

ASSURE SERVICE QUALITY

PRODUCE DEMAND FORECAST

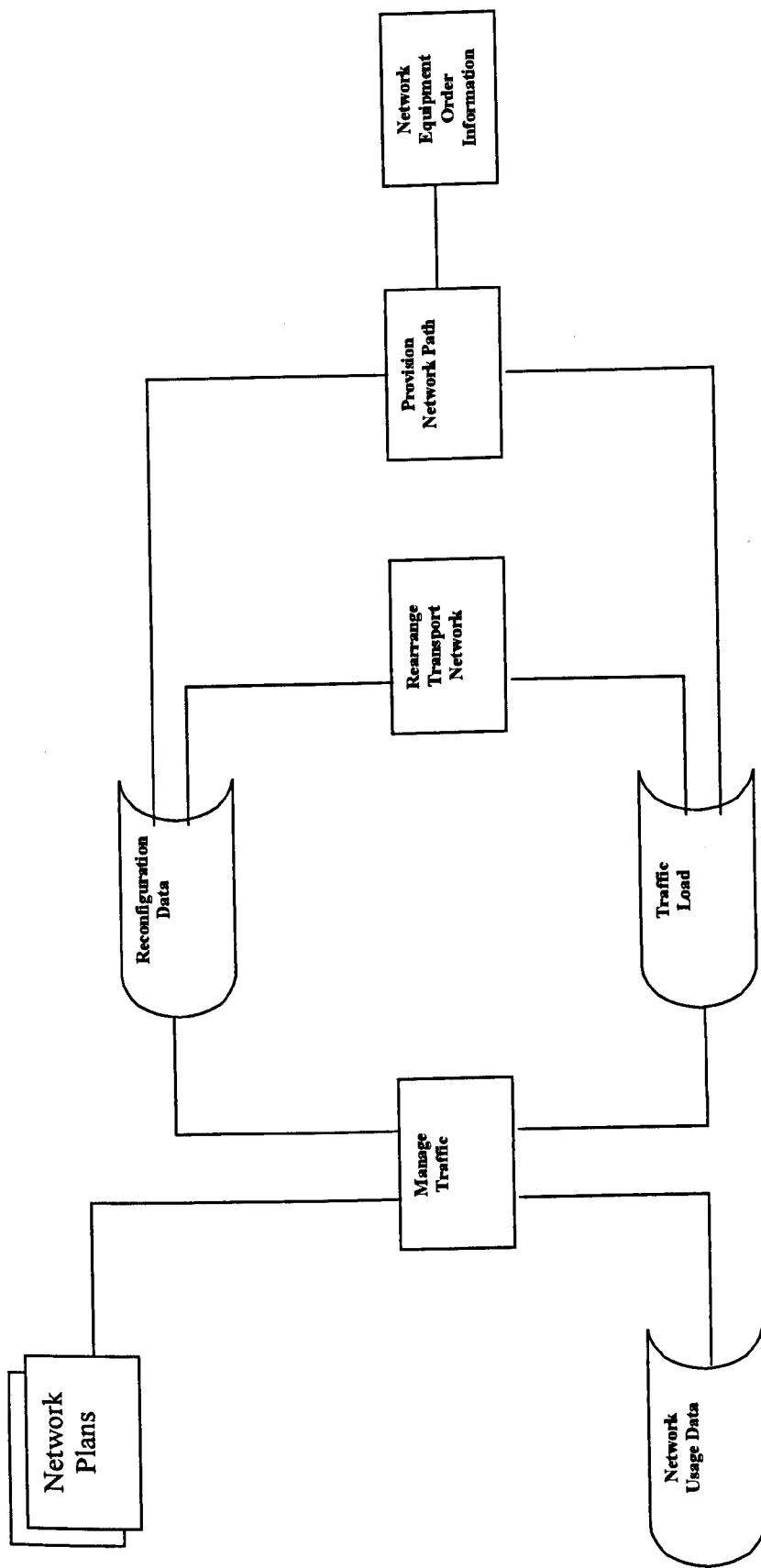


Figure 5. Information Usage Diagram of Network Management (Change Network Configuration)

Sub-Process: MANAGE TRAFFIC

This sub-process analyses the traffic load, which is placed on the switch and trunk, in order to measure traffic congestion and dimension the capacity that is required to handle existing traffic load. It initiates traffic load data, which is then used to rearrange transport network provision network path when measurements exceed acceptable traffic levels. This sub- process is contained in the CHANGE NETWORK CONFIGURATION process.

Sub-Process: PROVISION NETWORK PATH

This sub-process performs the activities that are necessary to expand switch and trunk capacity, when performance measurements exceed acceptable traffic service levels. Such activities Include ordering of equipment, installing of equipment and testing of transport path. This sub-process is contained in the CHANGE NETWORK CONFIGURATION process.

Sub-Process: REARRANGE TRANSPORT NETWORK

This sub-process eliminates/minimises traffic congestion and restores service by rearranging the transport network to balance line load. It is contained in the CHANGE NETWORK CONFIGURATION process.

Data Store: NETWORK RECONFIGURATION DATA

This data store contains information on how individual network elements are connected together, and how messages will pass through those connections. It is scoped within the information usage model for the process CHANGE NETWORK CONFIGURATION.

Data Store: NETWORK EQUIPMENT ORDER INFORMATION

This data store contains the details of a requisition for new network equipment that will be passed onto the Materials Management function. It is scoped within the information usage model for the process CHANGE NETWORK CONFIGURATION.

Data Store: NETWORK USAGE DATA

This data store contains data on the messages that have been passed through the network stored for either performance or billing purposes. It is scoped within the information usage model for the process CHANGE NETWORK CONFIGURATION.

Data Store: TRAFFIC LOAD

This data store contains information about the number of messages that are currently carried by a network component or element. It is scoped within the information usage models for the processes CHANGE NETWORK CONFIGURATION and MANAGE NETWORK PERFORMANCE.

External Agent: NETWORK PLANS

This external agent represents the plans for network infrastructure and enhancements that will be used to guide the process of managing traffic through the network.

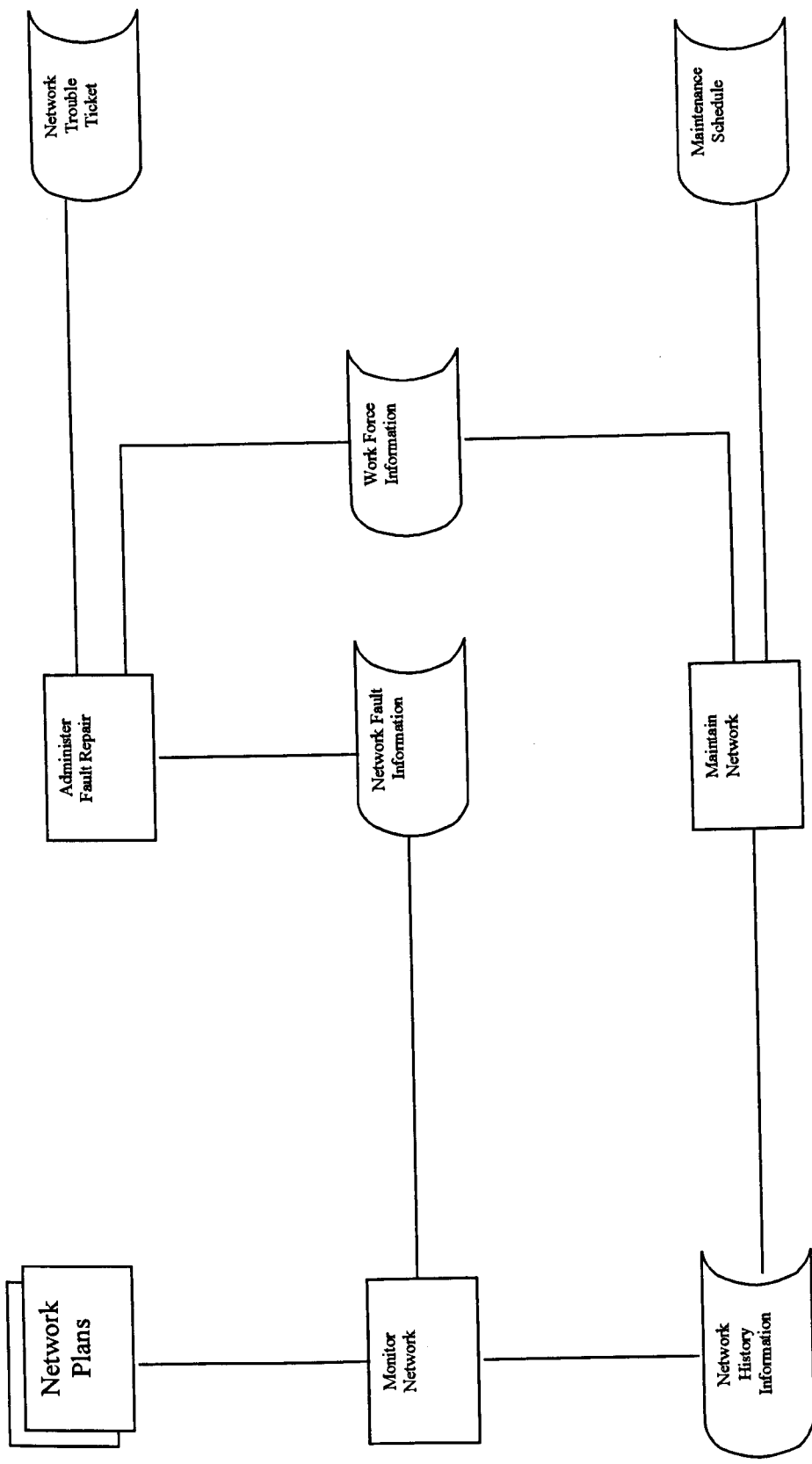


Figure 6. Information Usage Diagram of Network Management (Manage Network Fault)

Sub-Process: ADMINISTER FAULT REPAIR

This sub-process concerns itself with the administration of repairing faults that are detected in the course of monitoring the network (as opposed to faults that are reported by customers). This includes the creation, routing, scheduling and tracking of trouble tickets. This sub-process is contained in the MANAGE NETWORK FAULT process.

Sub-Process: MAINTAIN NETWORK

This sub-process is responsible for performing network maintenance on a scheduled basis, without the existence of specific fault condition in order to detect/correct problems before they affect the operation of the network. The sub-process includes determining the required intervals for routine maintenance activities, scheduling the tasks, and routing the schedule to the appropriate maintenance groups to actually perform the maintenance. This sub-process is contained in the MANAGE NETWORK FAULT process.

Sub-Process: MONITOR NETWORK

This sub-process verifies network alarms, collects & analyses fault reports, and runs diagnostics in order to monitor the health of the network. It is contained in the MANAGE NETWORK FAULT process.

Data Store: MAINTENANCE SCHEDULE

This data store contains the schedule of maintenance events for network elements. It is scoped within the information usage model for the process MANAGE NETWORK FAULT.

Data Store: NETWORK FAULT INFORMATION

This data store contains the details of alarms that are reported by network elements, which require repair or adjustment. It is scoped within the information usage model for the process MANAGE NETWORK FAULT.

Data Store: NETWORK HISTORY INFORMATION

This data store contains accumulated message information for purposes of billing and

performance. It is scoped within the information usage models for the processes MANAGE NETWORK FAULT and MANAGE NETWORK PERFORMANCE.

Data Store: NETWORK TROUBLE TICKET

This data store contains information about the network elements that reported an alarm and will be repaired or adjusted by a technician. It is scoped within the information usage model for the process MANAGE NETWORK FAULT.

Data Store: WORK FORCE INFORMATION

This data store contains the data of network orders and the employees who will complete them. It is scoped within the information usage model for the process MANAGE NETWORK FAULT.

External Agent: NETWORK PLANS

This external agent represents the plans for network infrastructure and enhancements that will be used to guide the process of managing traffic through the network.

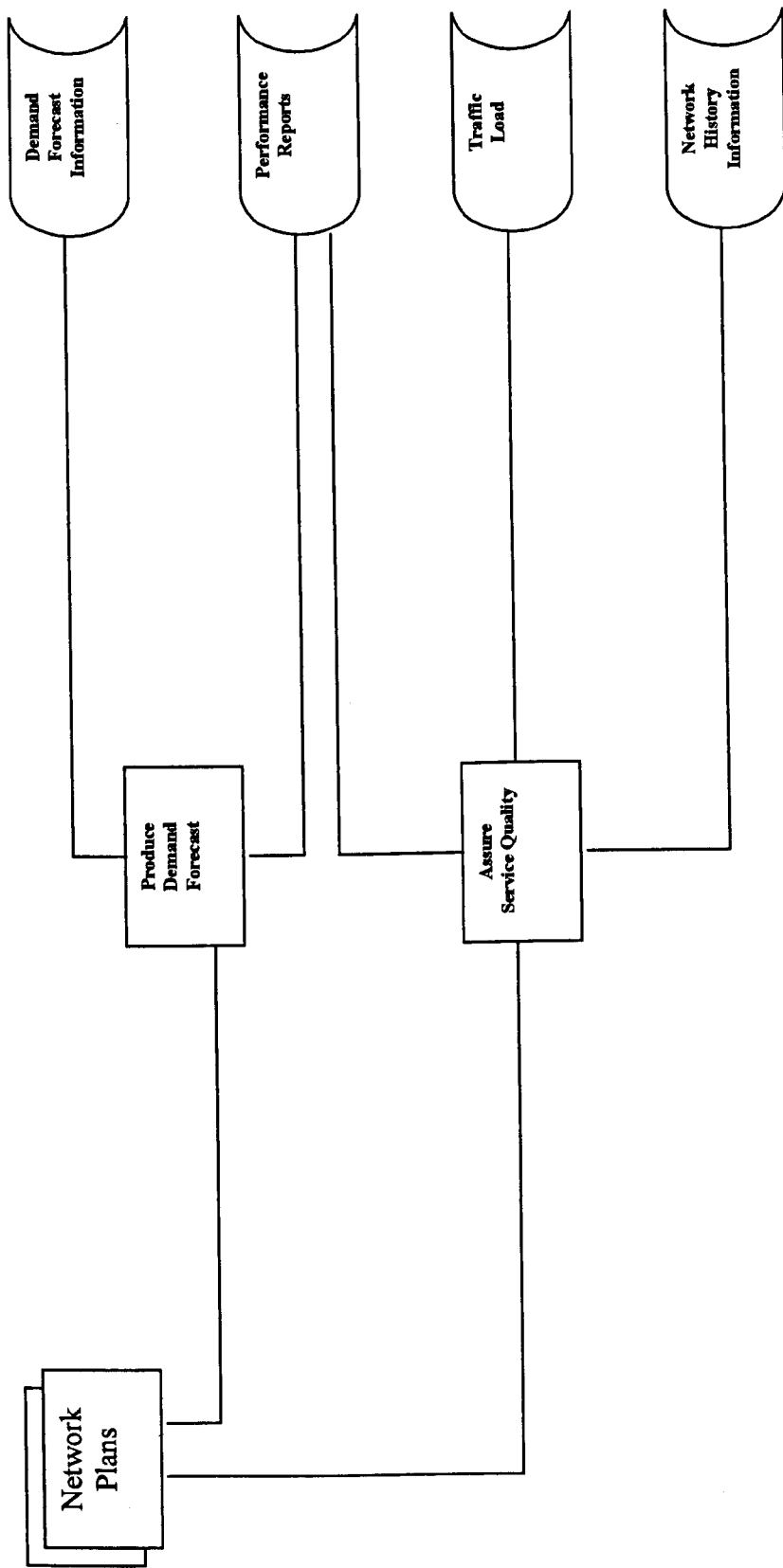


Figure 7. Information Usage Diagram of Network Management (Manage Network Performance)

Sub-Process: ASSURE SERVICE QUALITY

This sub-process involves the study of network traffic loads and the usage of all traffic sensitive network components in order to insure that sufficient capacity exists, to meet grade-of-service objectives, and that this capacity is utilised in the most efficient manner. Switch and trunk performance data is gathered and analysed, and performance reports are subsequently produced. This sub-process is contained in the MANAGE NETWORK PERFORMANCE process.

Sub-Process: PRODUCE DEMAND FORECAST

This sub-process forecast (0 to 5 years) the required capacity of switches and trunk groups based on the existing line, trunk and traffic loads. It is contained in the MANAGE NETWORK PERFORMANCE process.

Data Store: DEMAND FORECAST INFORMATION

This data store contains the results of analysing performance reports, historical information and plans. It is scoped within the information usage model for the process MANAGE NETWORK PERFORMANCE.

Data Store: NETWORK HISTORY INFORMATION

This data store contains accumulated message information for purposes of billing and performance. It is scoped within the information usage models for the processes MANAGE NETWORK FAULT and MANAGE NETWORK PERFORMANCE.

Data Store: PERFORMANCE REPORTS

This data store contains information that is formatted for executive level employees, which highlight the performance of the network and its elements. It is scoped within the information usage model for the process MANAGE NETWORK PERFORMANCE.

Data Store: TRAFFIC LOAD

This data store contains information about the number of messages that are currently carried by a network component or element. It is scoped within the information usage

models for the processes CHANGE NETWORK CONFIGURATION and MANAGE NETWORK PERFORMANCE.

External Agent: NETWORK PLANS

This external agent represents the plans for network infrastructure and enhancements that will be used to guide the process of managing traffic through the network.

3. *Marketing Function*

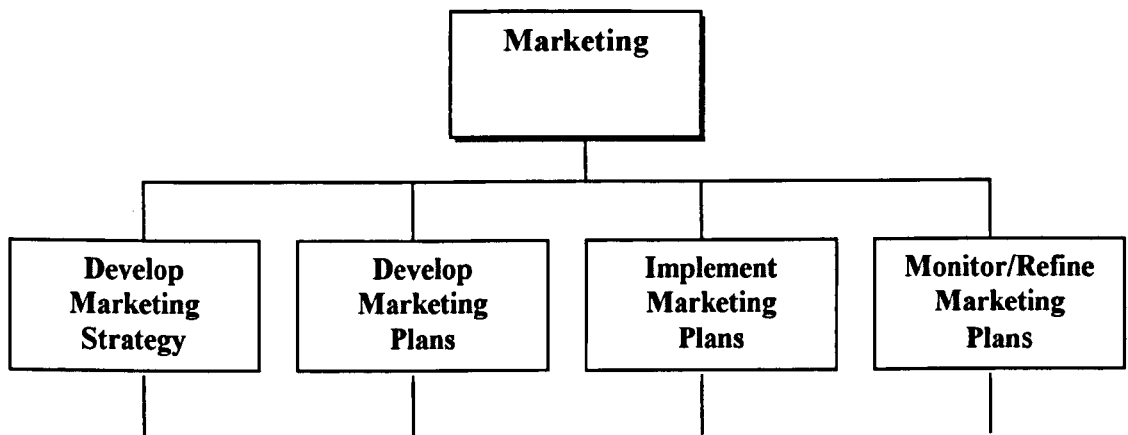
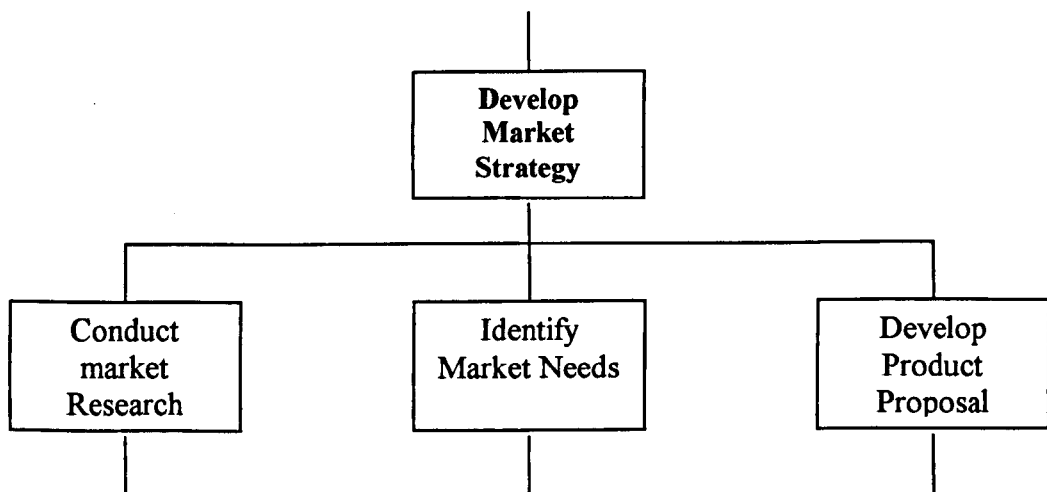


Figure 8. Functional Decomposition diagram of Marketing (Primary Function)

The following processes are addressed under the 'Marketing' function.



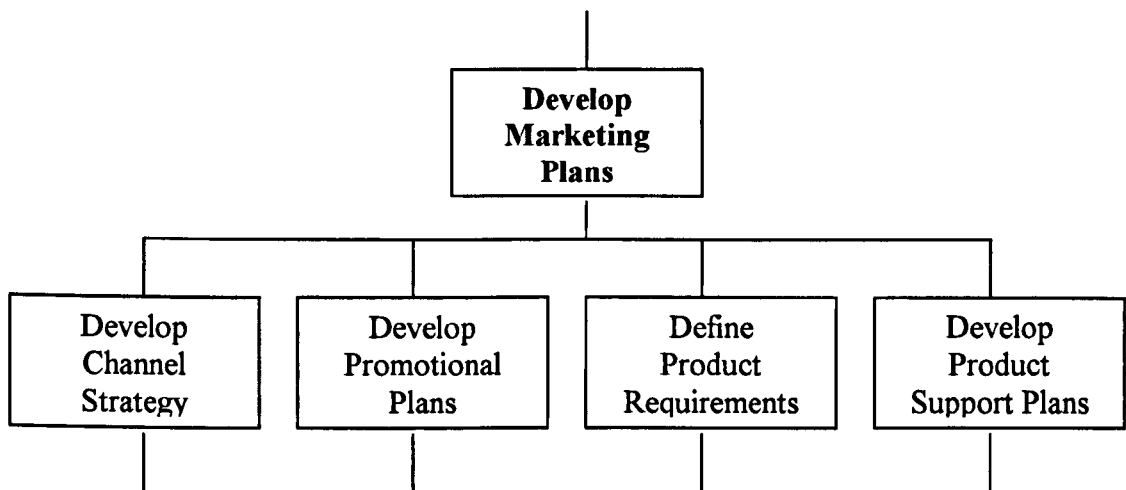
Process: DEVELOP MARKET STRATEGY

This process is directly involved with conducting market research developing proposals for new products and services that are offered by the MoPTT. The major output of this process is an approved and proposal to develop and bring to the marketplace a profitable product or service. This process contains the following sub-processes:

CONDUCT MARKET RESEARCH

IDENTIFY MARKET NEEDS

DEVELOP PRODUCT PROPOSAL



Process: DEVELOP MARKETING PLANS

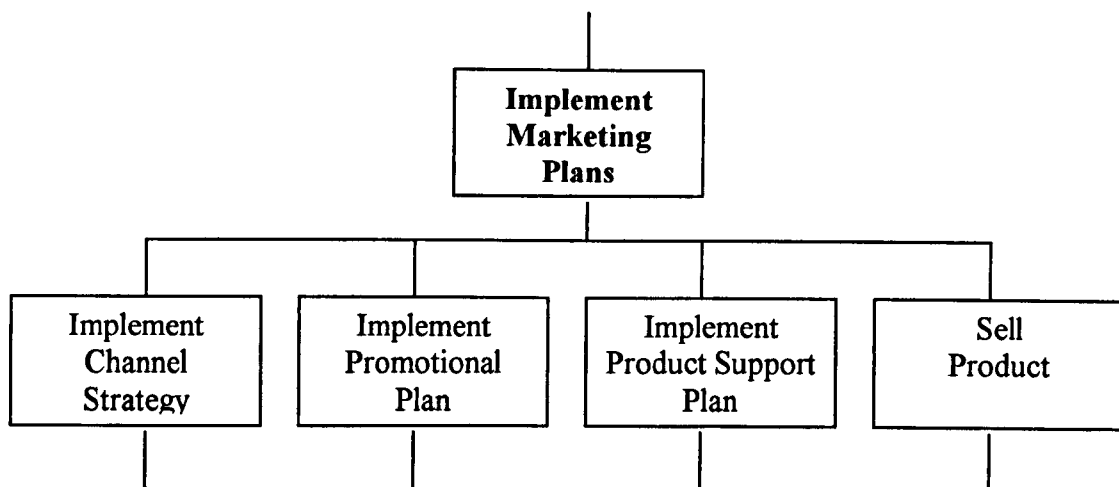
This process takes an approved proposal for a new product or service and develops the marketing plans and product requirements in order to bring the product to the marketplace. This includes developing the sales channel strategy to be employed, developing an effective promotional (advertising) plan, and developing the support materials (training and documentation) that will be needed by the sales channel(s). If external sales channels are to be used, this process initiates early negotiations with the selected partners. In addition, this process develops the specifications to be placed on network development function to create a product or service that will meet the needs, wants and desires of the marketplace and the market segments to be served. This process contains the following sub-processes:

DEVELOP CHANNEL STRATEGY

DEVELOP PROMOTIONAL PLANS

DEFINE PRODUCT REQUIREMENTS

DEVELOP PRODUCT SUPPORT PLANS



Process: IMPLEMENT MARKETING PLANS

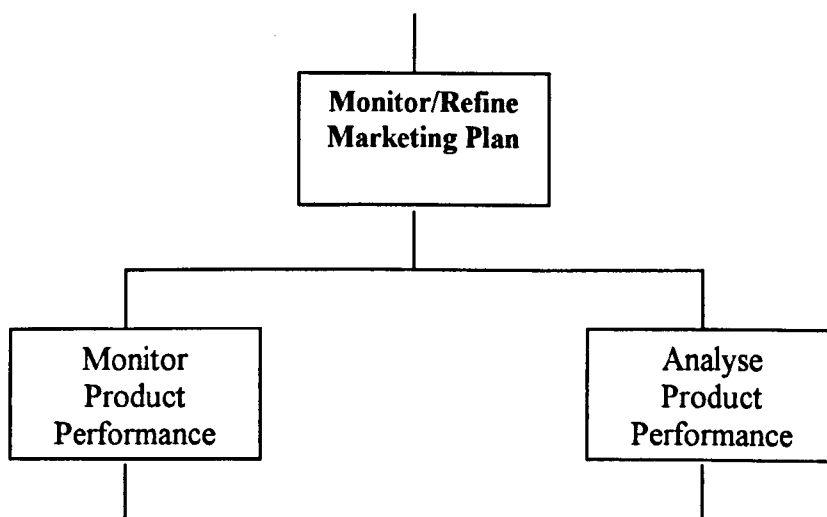
This process takes the product that is produced by the Network Development function and implements the marketing plans and sales activities that are needed to actively solicit customers for the product or service. This includes starting sales channel operations with external partners, carrying out media campaigns, and actively finding prospects and turning them into customers of the new MoPTT products and services. This process contains the following sub-processes:

IMPLEMENT CHANNEL STRATEGY

IMPLEMENT PROMOTIONAL PLAN

IMPLEMENT PRODUCT SUPPORT PLAN

SELL PRODUCT



Process: MONITOR/REFINE MARKETING PLAN

This process actively collects information on the performance of the MoPTT products and services in the marketplace. This consists of number of sales and type of customers buying the product/service. In addition, it includes collecting information on how well comparable competitor products are doing in the marketplace. The process carries out an active campaign to solicit customer feed-back on their satisfaction (or lack of) with the MoPTT products. In addition, it analyses the progress of the product in relation to expected sales and market segment penetration. From this analysis, improvements are suggested to the marketing plans in order to ensure the product expectations, customer satisfaction and profitability targets are met. This process contains the following sub-processes:

MONITOR PRODUCT PERFORMANCE

ANALYSE PRODUCT PERFORMANCE

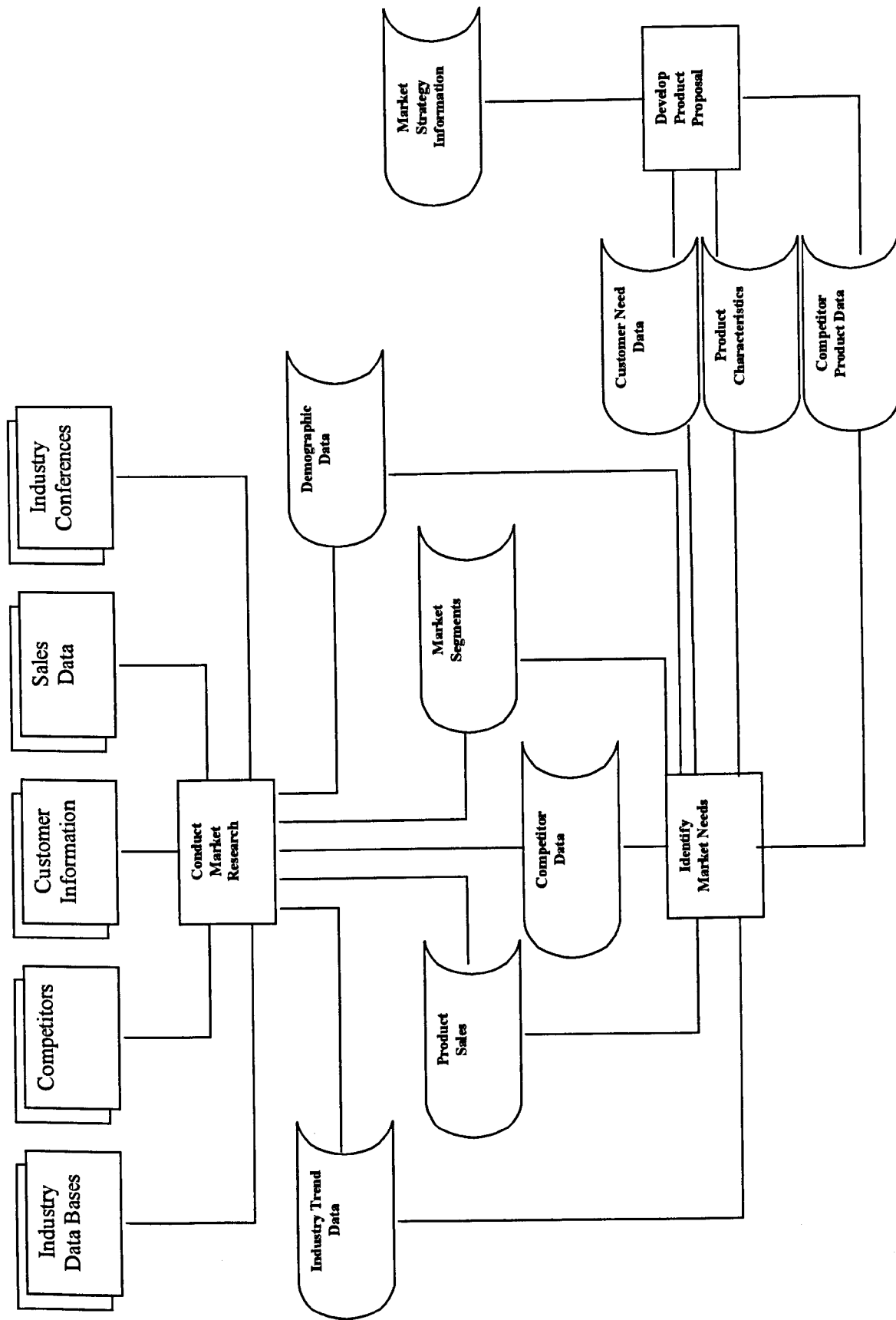


Figure 9. Information Usage Diagram of Marketing (Develop Market Strategy)

Sub-Process: CONDUCT MARKET RESEARCH

This sub-process is concerned with collecting and analysing intelligence. It gathers information from competitors, industry sources and from commercially available industry databases. In addition, it creates databases, containing the captured market intelligence, and analyses it to determine potential markets and their size. This includes defining market segments and their characteristics. This sub-process is contained in the DEVELOP MARKET STRATEGY process.

Sub-Process: DEVELOP PRODUCT PROPOSAL

This sub-process develops a proposal for a new product that can be profitable to the MoPTT. This includes identifying the potential for the new product/service, the characteristics of the needed product, the cost to develop, and the required support costs. The proposal will be presented to the executive management for approval and funding. The success of this process is measured by how many product proposals are funded and brought to the marketplace. This sub-process is contained in the DEVELOP MARKET STRATEGY process.

Sub-Process: IDENTIFY MARKET NEEDS

This sub-process develops profiles for customers, in each of the market segments and of interest to the MoPTT. Product trends are also analysed along with competitor products. The main objective of this sub-process is to identify potential product thrusts that will meet the needs, wants and desires of customers and businesses in the market segments and of interest to the MoPTT. This sub-process is contained in the DEVELOP MARKET STRATEGY process.

Data Store: COMPETITOR DATA

This data store contains information about the various MoPTT competitors. It describes the competitors, their products and services, market segments, and market shares. This data store is scoped within the information usage model for the process DEVELOP MARKET STRATEGY.

Data Store: COMPETITOR PRODUCT DATA

This data store contains details about competitors' products and services. It describes each product, extent of market penetration and customer reactions. This data store is scoped within the information usage model for the process DEVELOP MARKET STRATEGY.

Data Store: CUSTOMER NEED DATA

This data store contains information about customer needs, wants and desires for products that the MoPTT provides or is contemplating. It is often gathered through focus groups and research into the needs of the marketplace. In addition, it can be provided by customer service personnel, who interact with the customers and potential customers of the MoPTT. This data store is scoped within the information usage model for the process DEVELOP MARKET STRATEGY.

Data Store: DEMOGRAPHIC DATA

This data store contains demographic and economic data about the population, which the MoPTT serves or desires to serve. It contains information about the age, income, and other characteristics of the population of interest. This data store is scoped within the information usage model for the process DEVELOP MARKET STRATEGY.

Data Store: INDUSTRY TREND DATA

This data store contains information about the technology and product trends that are occurring or projected to occur in the telecommunications industry. It is scoped within the information usage model for the process DEVELOP MARKET STRATEGY.

Data Store: MARKET SEGMENTS

This data store contains information about the market segments to which the MoPTT intends to market its products and services. This information describes each segment, its characteristics (age, income, size). This data store is scoped within the information usage model for the process DEVELOP MARKET STRATEGY.

Data Store: MARKET STRATEGY INFORMATION

This data store contains information about the marketing strategies that are employed by the MoPTT, and contains the target goals and the specific description of the strategies that will be employed. It is scoped within the information usage models for the processes DEVELOP MARKET STRATEGY, DEVELOP MARKETING PLANS and MONITOR/REFINE MKTNG PLAN.

Data Store: PRODUCT CHARACTERISTICS

This data store contains information about the target characteristics of new products and services that are desired by the MoPTT customers or being introduced into the industry by competitors. It is scoped within the information usage model for the process DEVELOP MARKET STRATEGY.

Data Store: PRODUCT SALES

This data store contains information about the sales of products and services. It contains the number of sales by market segment, expected and attained revenue, and extent of market penetration. This data store is scoped within the information usage models for the processes DEVELOP MARKET STRATEGY and MONITOR/REFINE MKTNG PLAN.

External Agent: INDUSTRY DATA BASES

These are commercially available databases about companies and industries. Examples of such databases are Dow Jones, Bloomberg news service and the LOTUS news services. These services provide on-line databases that can be used to research market trends, competitor thrusts, emerging technology and new developments in the telecommunications industry.

External Agent: COMPETITORS

These are the major competitors of the MoPTT. Intelligence about these competitors is gathered from various sources and placed into a market intelligence database. Sources of information are press and trade journals, commercial databases, and from exchanges with competitors themselves.

External Agent: CUSTOMER INFORMATION

This is information about the MoPTT's current customer base. This information is captured from customer billing data, trouble reports and application for telephone services. Other sources may be customer satisfaction surveys and output of focus groups in order to determine customer opinions about the MoPTT products and services.

External Agent: PRODUCT SALES DATA

This is information about the sales and effectiveness of the MoPTT products and services. This data is gathered as a by-product of customer service activities, especially the sales and servicing of the MoPTT products.

External Agent: INDUSTRY CONFERENCES

These are industry conferences that occur throughout the year. These conferences provide valuable market intelligence about competitors, trends in the industry and insights into new emerging technologies.

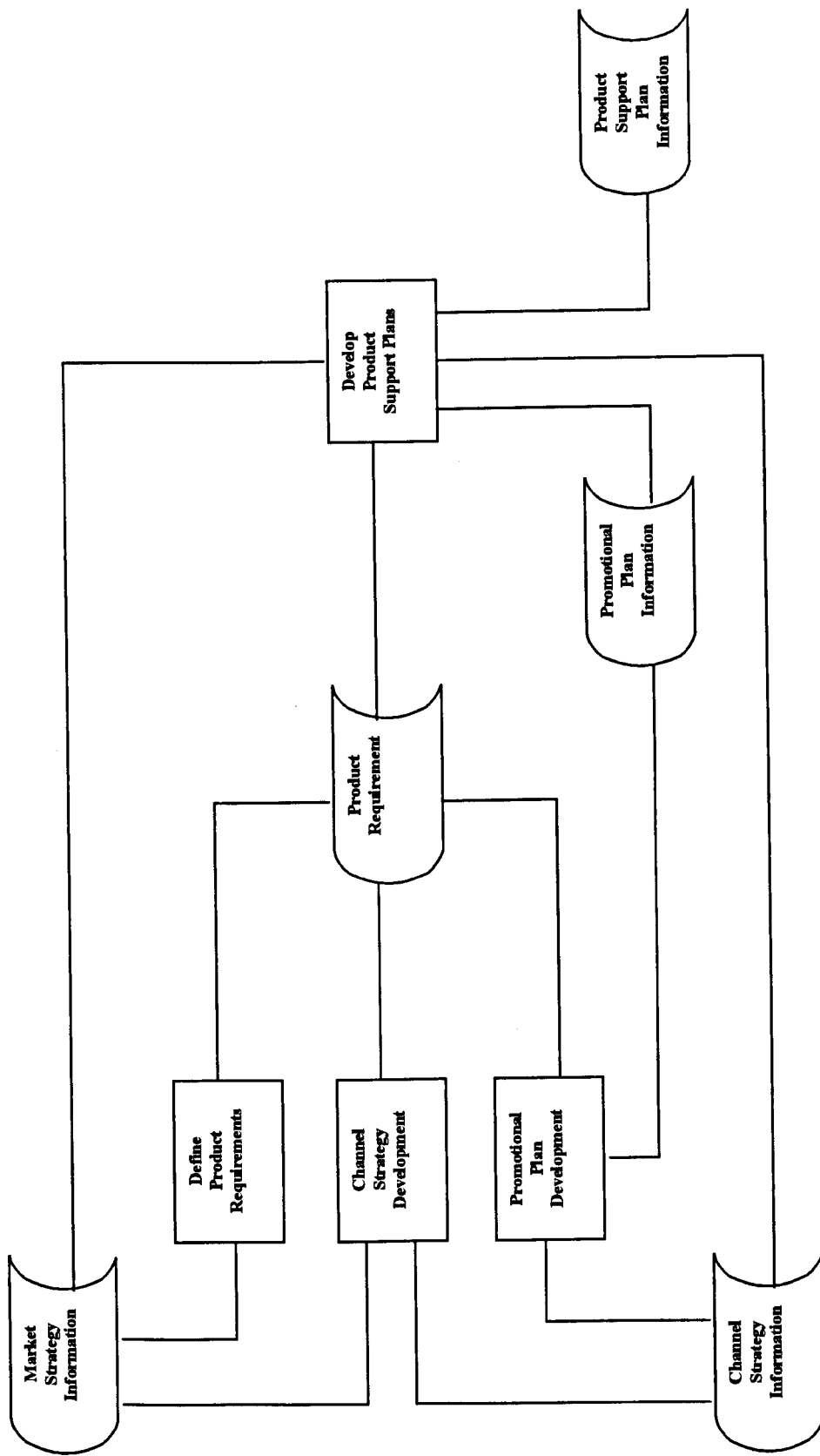


Figure 10. Information Usage Diagram of Marketing (Develop Marketing Plans)

Sub-Process: DEFINE PRODUCT REQUIREMENTS

From the market intelligence that have been captured and analysed from the previous sub-process, this sub-process develops customer profiles and product trends related to the market segments and of interest to the MoPTT. This includes analysing products targeted at the market segment of interest. The key output of this task is the identification of the wants, needs and desires of the market segment population of interest to the MoPTT. This sub-process is contained in the DEVELOP MARKETING PLANS process.

Sub-Process: DEVELOP PRODUCT SUPPORT PLANS

This sub-process defines the plan that will put in place the activities and organisation's needs to effectively sell and support a new product. This includes necessary training, support document and procedures. In addition, it includes necessary sales plans and sales training. This sub-process is contained in the DEVELOP MARKETING PLANS process.

Sub-Process: DEVELOP CHANNEL STRATEGY

This sub-process identifies the most effective sales channel that will be used to deliver the MoPTT products and services to its customers. This includes identifying potential external partners, defining effective pricing strategies, and conducting preliminary negotiations with the sales channel organisations. This sub-process is contained in the DEVELOP MARKETING PLANS process.

Sub-Process: DEVELOP PROMOTIONAL PLAN

This sub-process determines the appropriate promotional methods and media campaign that are needed to actively promote a new product or service. It puts in place an approved media budget to support the promotional campaign. This sub-process is contained in the DEVELOP MARKETING PLANS process.

Data Store: CHANNEL STRATEGY INFORMATION

This data store contains information that is pertained to the various marketing channels with which the MoPTT has formed sales and service arrangements and contracts. This information describes the alternate channel, the goals meant to be reached by the channel strategy and any contractual arrangements or negotiations that are under way. This data

store is scoped within the information usage models for the processes DEVELOP MARKETING PLANS and IMPLEMENT MARKETING PLANS.

Data Store: MARKET STRATEGY INFORMATION

This data store contains information about the marketing strategies that are employed by the MoPTT, and contains the target goals and the specific description of the strategies that will be employed. It is scoped within the information usage models for the processes DEVELOP MARKET STRATEGY, DEVELOP MARKETING PLANS and MONITOR/REFINE MKTNG PLAN.

Data Store: PRODUCT REQUIREMENTS

This data store contains specifications for new or enhanced products and services, which are needed to effectively penetrate the MoPTT's target segments and carry out its marketing strategies. This data store is scoped within the information usage model for the process DEVELOP MARKETING PLANS.

Data Store: PRODUCT SUPPORT PLAN INFORMATION

This data store contains information on the plans for how each of the major product families will be supported. It includes proposed sales campaigns, media campaigns, and internal and external channel support plans. This data store is scoped within the information usage models for the processes DEVELOP MARKETING PLANS and IMPLEMENT MARKETING PLANS.

Data Store: PROMOTIONAL PLAN INFORMATION

This data store contains information on the various promotional plans, which will be used to introduce and attract customers for products and services. It is scoped within the information usage models for the processes DEVELOP MARKETING PLANS and IMPLEMENT MARKETING PLANS.

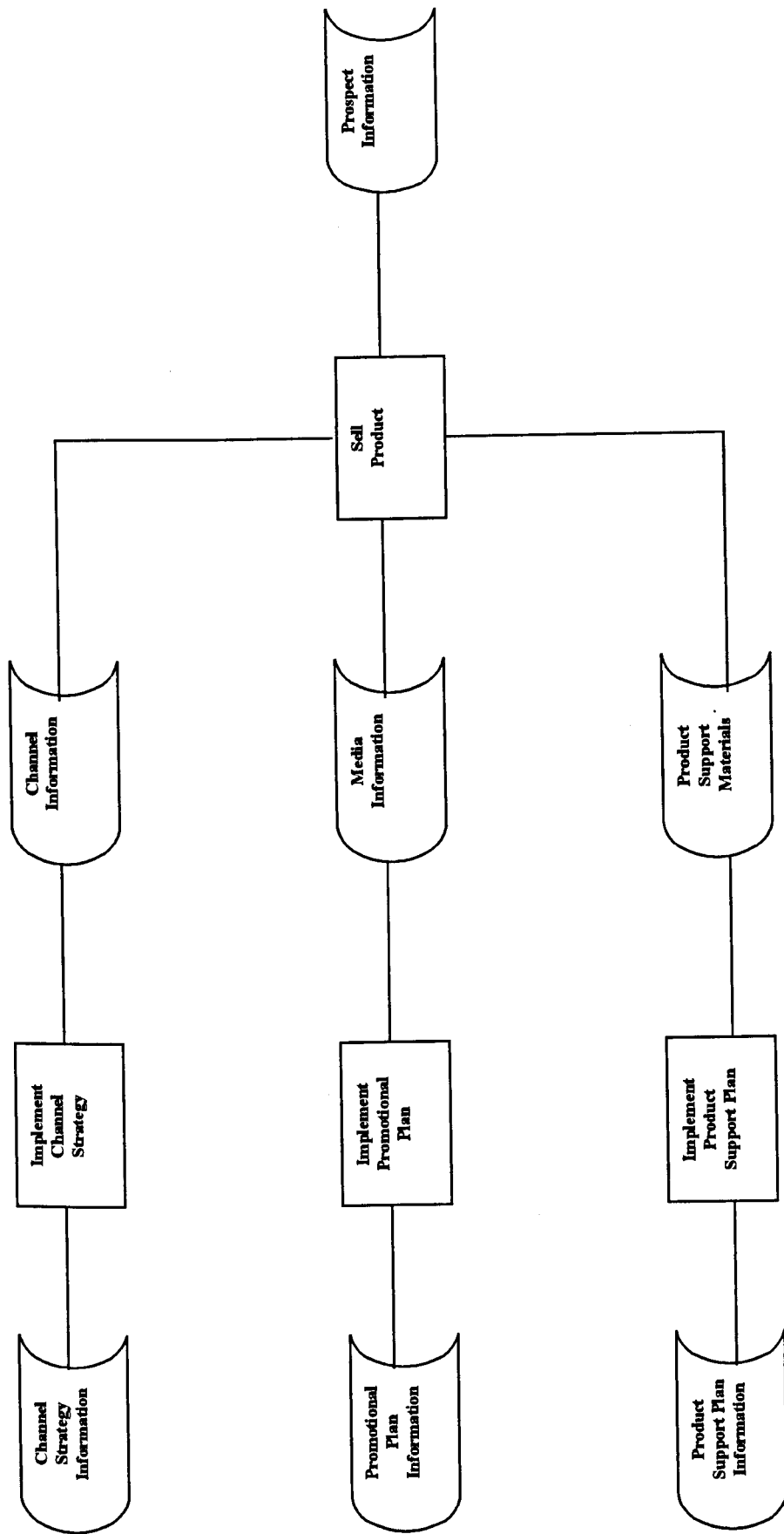


Figure 11. Information Usage Diagram of Marketing (Implement Marketing Plans)

Sub-Process: IMPLEMENT PRODUCT SUPPORT PLAN

This sub-process implements the product plans in order to support product sales and service. This includes conducting product training, implementation of the new product or service on the MoPTT network, and maintaining and supporting the product once it is delivered to a customer. It includes support centres to answer sales and service questions from Customer Service personnel and from channel partner personnel. This sub-process is contained in the IMPLEMENT MARKETING PLANS process.

Sub-Process: IMPLEMENT CHANNEL STRATEGY

This sub-process establishes and maintains effective operations in a selected sales channel through which a new product or service will be sold and serviced. This includes negotiating contracts with channel partners, training sales channel personnel, and putting in place plans and procedures that are needed to effectively support channel operations. This sub-process is contained in the IMPLEMENT MARKETING PLANS process.

Sub-Process: IMPLEMENT PROMOTIONAL PLAN

This sub-process negotiates media contracts that are needed to support a media campaign for a new product or service. It is contained in the IMPLEMENT MARKETING PLANS process.

Sub-Process: SELL PRODUCT

This sub-process deals with the sale of the MoPTT products and services. It includes identifying prospective buyers of the product or service, contacting those buyers and soliciting business. In addition, it includes all activities from prospect identification through to the closing of a sale and turning a prospect into a customer of the MoPTT. This sub-process is contained in the IMPLEMENT MARKETING PLANS process.

Data Store: CHANNEL INFORMATION

This data store contains information about the effectiveness of any alternate channels that are used by the MoPTT in order to sell and service its products and services. It includes information about internal channels (the MoPTT's own sales and service personnel and organisations), as well as external channels (other companies with which the MoPTT has

formed sales and servicing arrangements). This data store is scoped within the information usage model for the process IMPLEMENT MARKETING PLANS.

Data Store: CHANNEL STRATEGY INFORMATION

This data store contains information that is pertained to the various marketing channels with which the MoPTT has formed sales and service arrangements and contracts. This information describes the alternate channel, the goals meant to be reached by the channel strategy and any contractual arrangements or negotiations that are under way. This data store is scoped within the information usage models for the processes DEVELOP MARKETING PLANS and IMPLEMENT MARKETING PLANS.

Data Store: MEDIA INFORMATION

This data store contains information about the various media campaigns and advertising agencies that the MoPTT deals with. It contains a description of the used media, the cost of the media, and the success rates of each campaign. This data store is scoped within the information usage model for the process IMPLEMENT MARKETING PLANS.

Data Store: PRODUCT SUPPORT MATERIALS

This data store contains information that is needed to produce product support materials in order to aid in sales of products. It includes sales brochures, product feature training materials and sales techniques to support sales of products. This data store is scoped within the information usage model for the process IMPLEMENT MARKETING PLANS.

Data Store: PRODUCT SUPPORT PLAN INFORMATION

This data store contains information on the plans for how each of the major product families will be supported. It includes proposed sales campaigns, media campaigns, and internal and external channel support plans. This data store is scoped within the information usage models for the processes DEVELOP MARKETING PLANS and IMPLEMENT MARKETING PLANS.

Data Store: PROMOTIONAL PLAN INFORMATION

This data store contains information on the various promotional plans, which will be used to introduce and attract customers for products and services. It is scoped within the information usage models for the processes DEVELOP MARKETING PLANS and IMPLEMENT MARKETING PLANS.

Data Store: PROSPECT INFORMATION

This data store contains information about specific customers or categories of customers who will be reached through one or more direct or indirect sales campaigns. It is scoped within the information usage model for the process IMPLEMENT MARKETING PLANS.

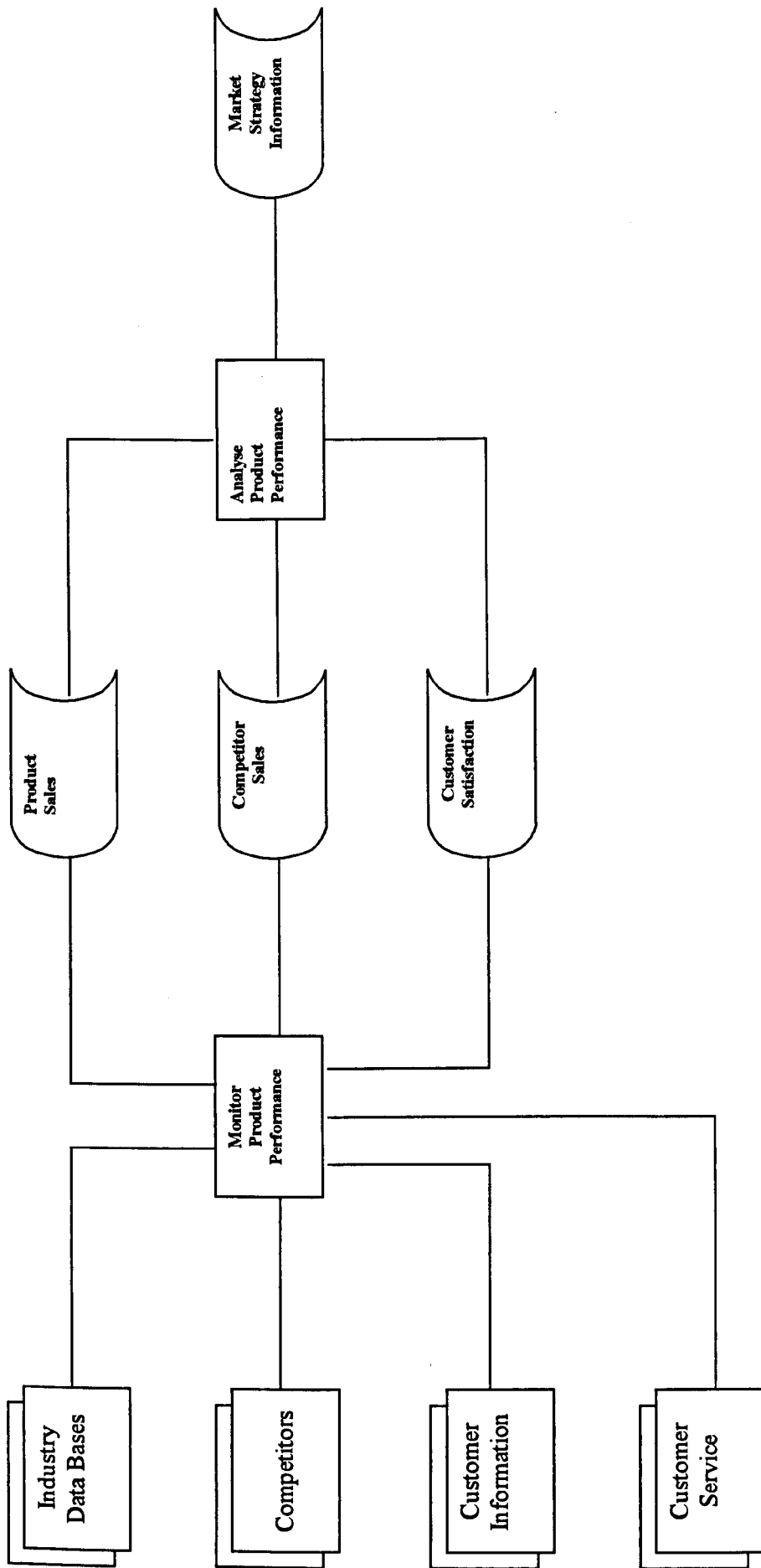


Figure 12. Information Usage Diagram of Marketing (Monitor/Refine Marketing Plan)

Sub-Process: MONITOR PRODUCT PERFORMANCE

This sub-process collects information that is related to the performance of a product or service in the marketplace. This includes collecting data on product sales, characteristics of customers buying the product, customer satisfaction with the products or services, and products and marketing activities. This sub-process is contained in the MONITOR / REFINER MARKETING PLAN process.

Sub-Process: ANALYSE PRODUCT PERFORMANCE

This sub-process deals with analysing how well the MoPTT products and services are performing in the marketplace. If the product is not meeting sales, customer satisfaction or profit targets, then the process determines the possible problem areas such as ineffective sales channel performance, sources of customer dissatisfaction and effect of competitor products or marketing strategies. This sub-process develops proposed changes to the marketing plan in order to improve product performance. It is contained in the MONITOR / REFINER MARKETING PLAN process.

Data Store: PRODUCT SALES

This data store contains information about the sales of products and services. It contains the number of sales by market segment, expected and attained revenue, and extent of market penetration. This data store is scoped within the information usage models for the processes DEVELOP MARKET STRATEGY and MONITOR/REFINER MARKETING PLAN.

Data Store: COMPETITOR SALES

This data store contains more details about competitor sales in the market segments and of interest to the MoPTT. It is scoped within the information usage model for the process MONITOR/REFINER MARKETING PLAN.

Data Store: CUSTOMER SATISFACTION

This data store contains information about customer satisfaction with the MoPTT's products and services. This information can be gathered through customer satisfaction surveys, or through customer service personnel who interact with customers and potential

customers of the MoPTT. This data store is scoped within the information usage model for the process MONITOR/REFINE MARKETING PLAN.

Data Store: MARKET STRATEGY INFORMATION

This data store contains information about the marketing strategies that are employed by the MoPTT, and contains the target goals and the specific description of the strategies that will be employed. It is scoped within the information usage models for the processes DEVELOP MARKET STRATEGY, DEVELOP MARKETING PLANS and MONITOR/REFINE MARKETING PLAN.

External Agent: INDUSTRY DATA BASES

These are commercially available databases about companies and industries. Examples of such databases are Dow Jones, Bloomberg news service and the LOTUS news services. These services provide on-line databases that can be used to research market trends, competitor thrusts, emerging technology and new developments in the telecommunications industry.

External Agent: COMPETITORS

These are the major competitors of the MoPTT. Intelligence about these competitors is gathered from various sources and placed into a market intelligence database. Sources of information are press and trade journals, commercial databases, and from exchanges with competitors themselves.

External Agent: CUSTOMER INFORMATION

This is information about the MoPTT's current customer base. This information is captured from customer billing data, trouble reports and application for telephone services. Other sources may be customer satisfaction surveys and output of focus groups in order to determine customer opinions about the MoPTT products and services.

External Agent: CUSTOMER SERVICE

This is a function of customer service. It provides marketing data about customers, product sales, and customer trouble reports and application for service.

4. Customer Services Function

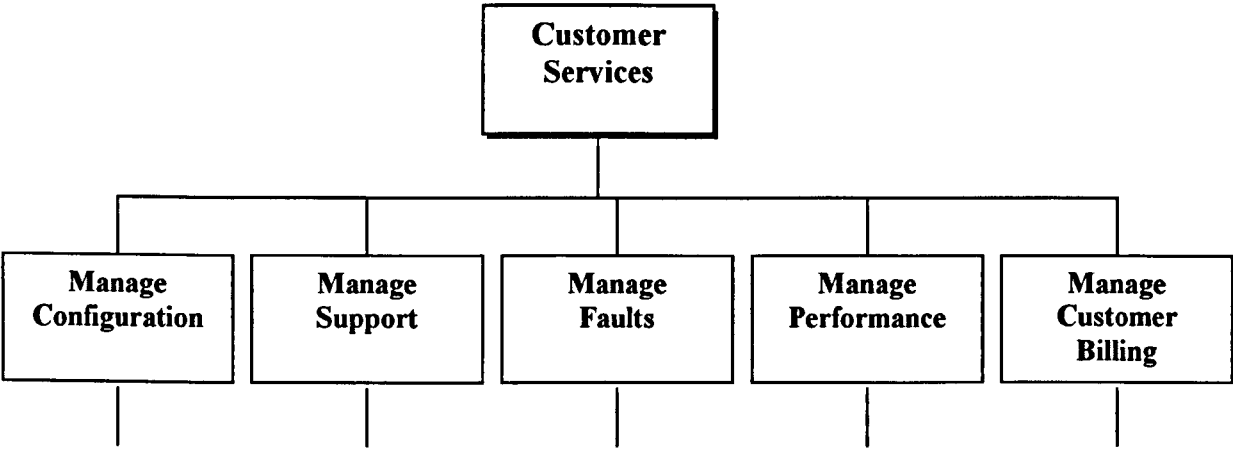
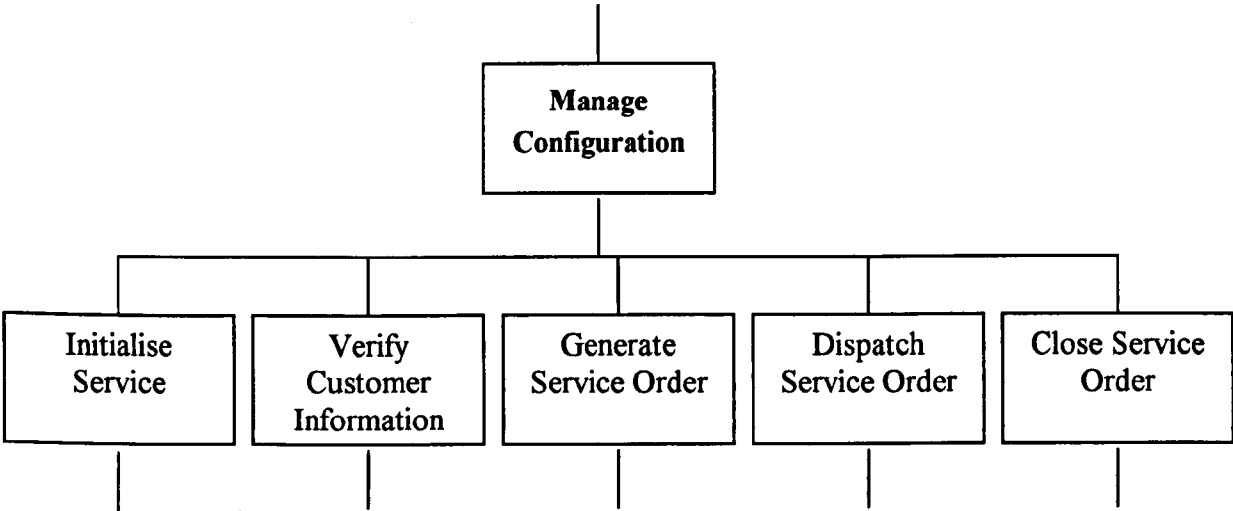


Figure 13. Functional Decomposition diagram of Customer Services (Primary Function)

The following processes are addressed under the ‘Customer Service’ function.

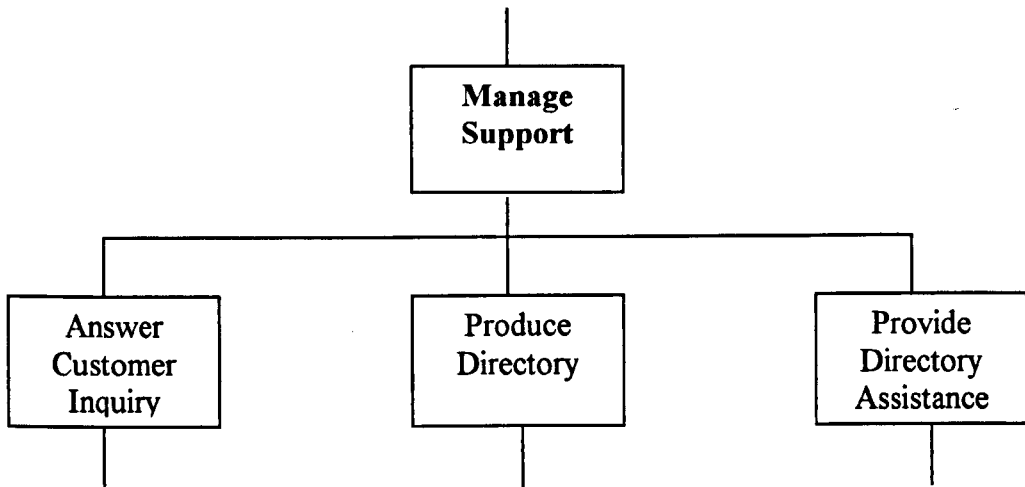


Process: MANAGE CONFIGURATION

This process is concerned of dealing with the customer and providing him with assorted telecommunications services. It begins with providing the customer with information about products and services and collecting information about the customer. In addition, the process verifies customer information and credit worthiness and determines if the customer request for service can be satisfied. The process then generates a service order

and dispatches the service order for initiating service with the customer. The process then closes out the service order and notifies the customer of the initiation of service. This process contains the following sub-processes:

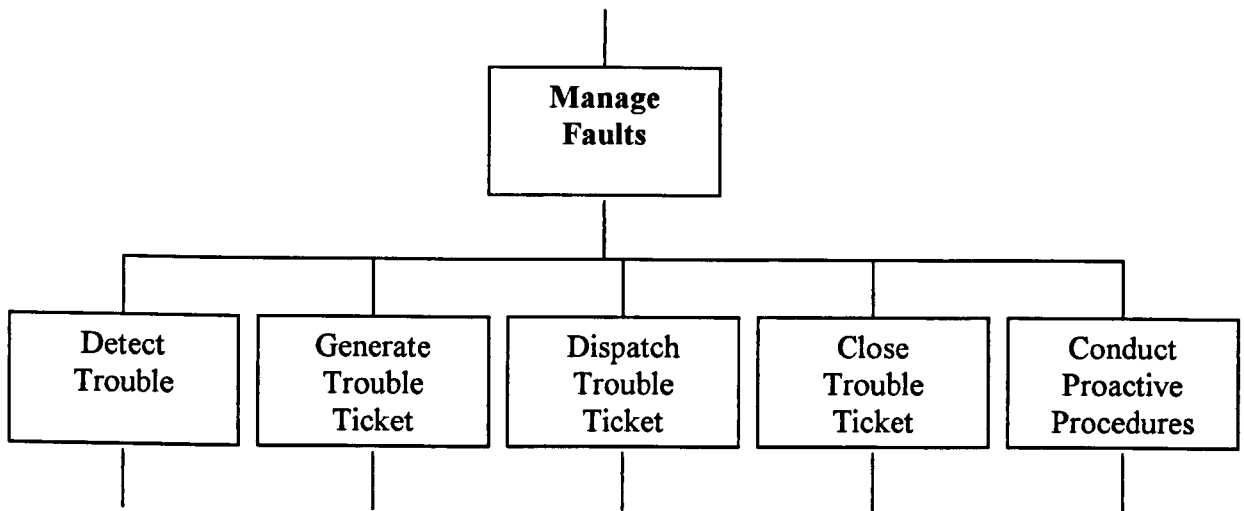
INITIALISE SERVICE
VERIFY CUSTOMER INFORMATION
GENERATE SERVICE ORDER
DISPATCH SERVICE ORDER
CLOSE SERVICE ORDER



Process: MANAGE SUPPORT

This process deals with answering customer inquiries (e.g. product information requests, billing information) and with producing and managing the Directory. In addition, it provides directory assistance to customers. This process contains the following sub-processes:

ANSWER CUSTOMER INQUIRY
PRODUCE DIRECTORY
PROVIDE DIRECTORY ASSISTANCE



Process: MANAGE FAULTS

This process begins with the detection of faults. These faults can be detected as a result of a customer complaint with his service or by network monitoring. The process then generates a trouble ticket, dispatches the trouble ticket and finally closes the trouble ticket when the fault is corrected. In addition, the process carries out proactive procedures to prevent faults occurring on the network. This process contains the following sub-processes:

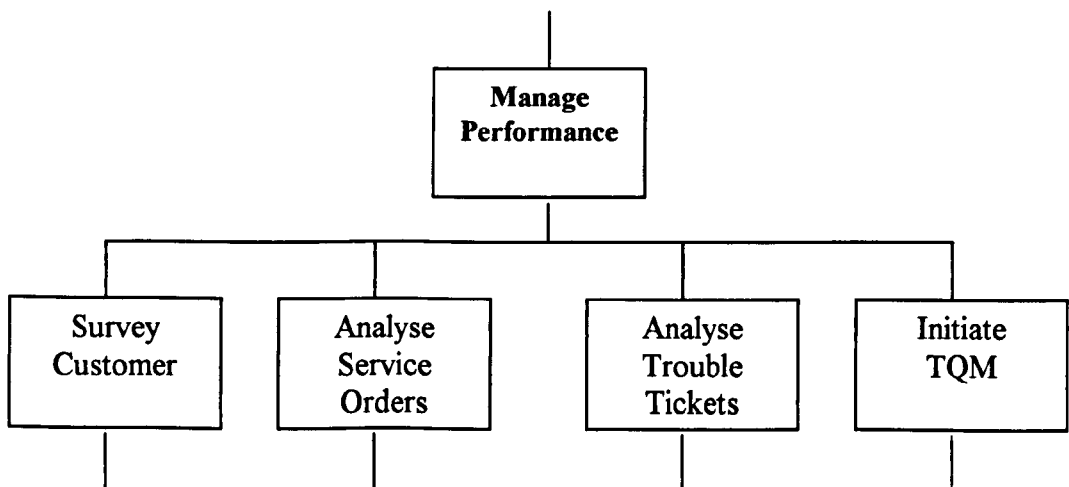
DETECT TROUBLE

GENERATE TROUBLE TICKET

DISPATCH TROUBLE TICKET

CLOSE TROUBLE TICKET

CONDUCT PROACTIVE PROCEDURES



Process: MANAGE PERFORMANCE

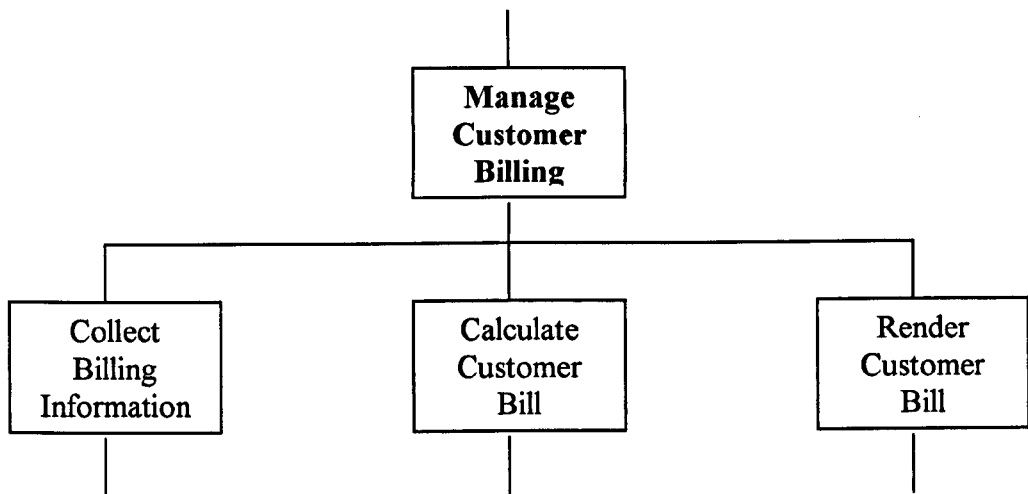
This process deals with the assessment of the quality of service delivered to customers. It includes actively surveying customers, analysing service order and trouble tickets and initiating active Total Quality Management (TQM) analysis and performance improvement activities. This process contains the following sub-processes:

SURVEY CUSTOMER

ANALYSE SERVICE ORDERS

ANALYSE TROUBLE TICKETS

INITIATE TQM



Process: MANAGE CUSTOMER BILLING

This process collects call records, which are generated by Network Management. From these records the process calculates the customer bill and renders the bill to the customer for payment. This process contains the following sub-processes:

COLLECT BILLING INFORMATION

CALCULATE CUSTOMER BILL

RENDER CUSTOMER BILL

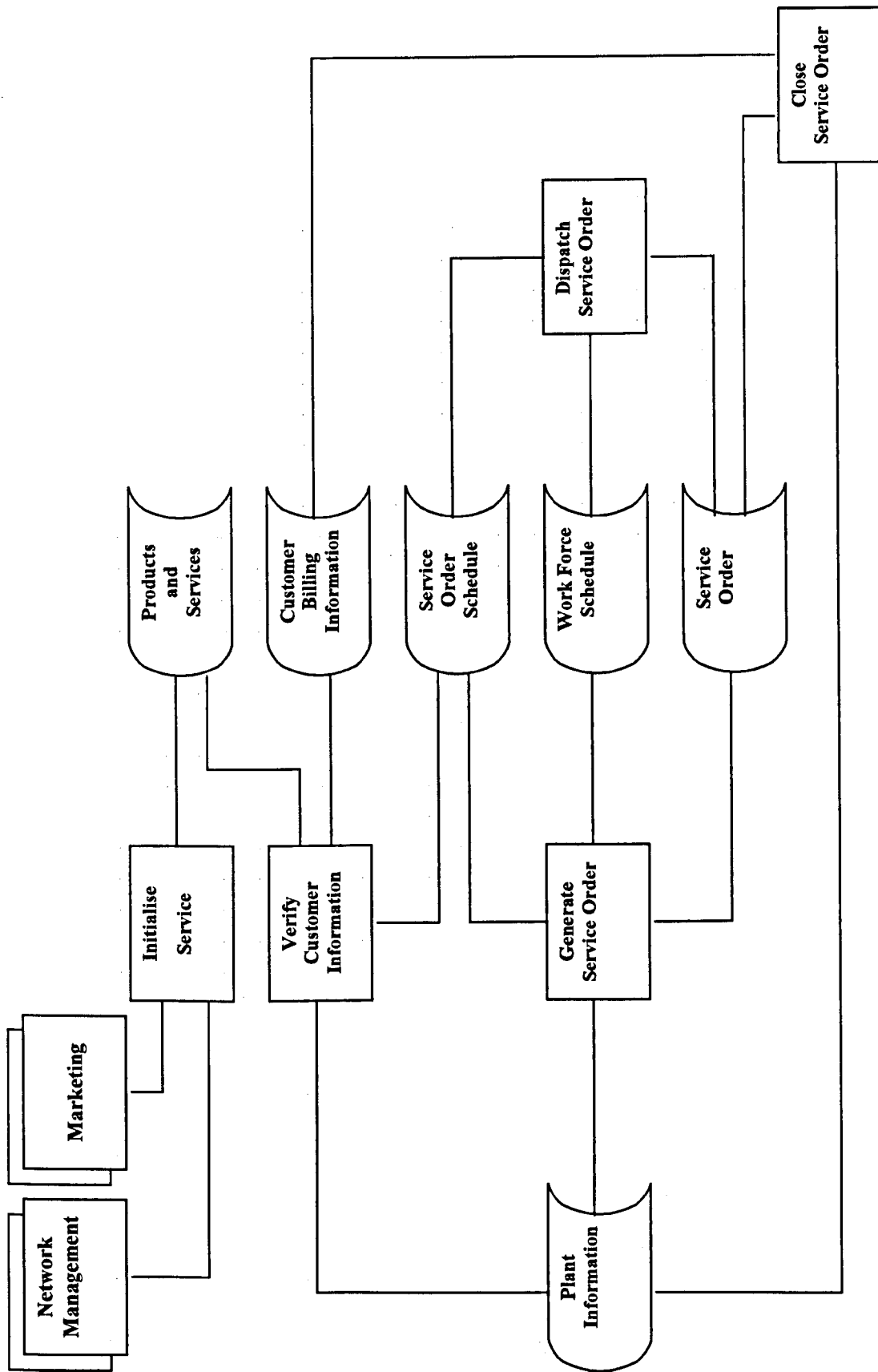


Figure 14. Information Usage Diagram of Customer Services (Manage Configuration)

Sub-Process: INITIALISE SERVICE

This sub-process answers customer queries about new service. It is contained in the MANAGE CONFIGURATION process.

Sub-Process: VERIFY CUSTOMER INFORMATION

This sub-process verifies the information that is supplied by the customer, and verifies the customer's credit worthiness. It is contained in the MANAGE CONFIGURATION process.

Sub-Process: GENERATE SERVICE ORDER

This sub-process creates a service order, it can design and assign a circuit to the order and can schedule the work force to complete the service order. It is contained in the MANAGE CONFIGURATION process.

Sub-Process: DISPATCH SERVICE ORDER

This sub-process distributes service orders and initiates work on the switches in order to complete the service order. In addition, it tracks service orders and the work force assigned in order to complete them. This sub-process is contained in the MANAGE CONFIGURATION process.

Sub-Process: CLOSE SERVICE ORDER

This sub-process tests new installations and performs quality assurance on the completion of the service order. In addition, it notifies the customer of the start of service. This sub-process is contained in the MANAGE CONFIGURATION process.

Data Store: CUSTOMER BILLING INFORMATION

This data store contains information on all charges applied to each customer bill. It is scoped within the information usage models for the processes MANAGE CONFIGURATION, MANAGE CUSTOMER BILLING, MANAGE FAULTS and MANAGE SUPPORT.

Data Store: PLANT INFORMATION

This data store contains all the pertinent plant data about each customer (the path of dial tone from the central office to the customer's location). It is scoped within the information usage models for the processes MANAGE CONFIGURATION and MANAGE FAULTS.

Data Store: PRODUCTS AND SERVICES

This data store contains the catalogue of products and services that are available to a new or existing customer. It is scoped within the information usage models for the processes MANAGE CONFIGURATION and MANAGE SUPPORT.

Data Store: SERVICE ORDER

This data store contains each customer's order for service. It is scoped within the information usage models for the processes MANAGE CONFIGURATION, MANAGE PERFORMANCE and MANAGE SUPPORT.

Data Store: SERVICE ORDER SCHEDULE

This data store contains information on priorities and schedule items for various service order types. It is scoped within the information usage models for the processes MANAGE CONFIGURATION, MANAGE PERFORMANCE and MANAGE SUPPORT.

Data Store: WORK FORCE SCHEDULE

This data store contains information on employees that are available to take action on service orders and trouble tickets. It is scoped within the information usage models for the processes MANAGE CONFIGURATION, MANAGE FAULTS, MANAGE PERFORMANCE and MANAGE SUPPORT.

External Agent: NETWORK MANAGEMENT

This external agent represents information about possible problems within the network that may effect a customer's order for service. In addition, this agent communicates with the service representative that service may now be available in a certain area.

External Agent: MARKETING

This external agent represents information about new products and services that can be offered to new and existing customers.

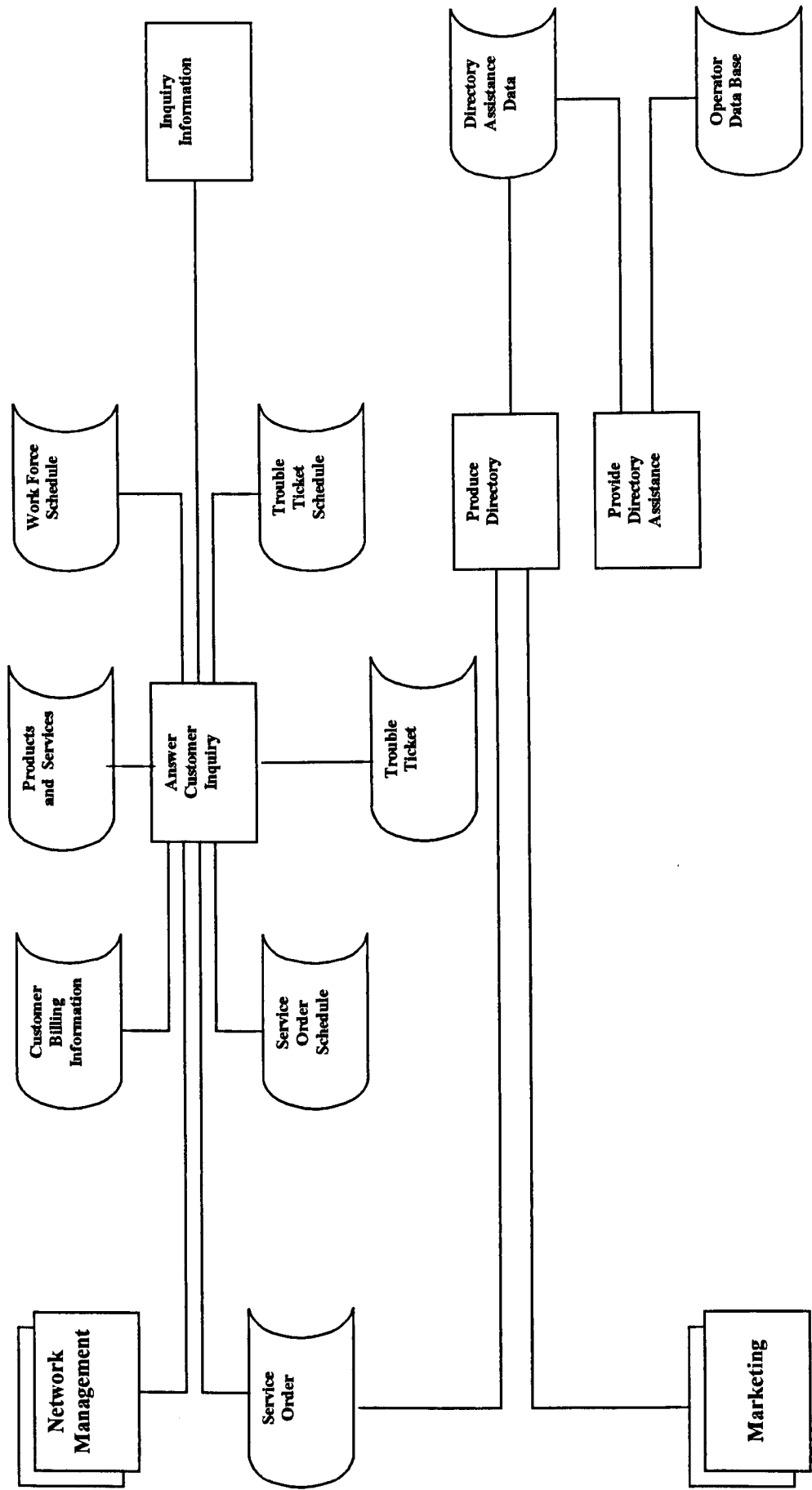


Figure 15. Information Usage Diagram of Customer Service (Manage Support)

Sub-Process: ANSWER CUSTOMER INQUIRY

This sub-process deals with the answering of customer queries for information. This includes supplying new product information and product feature information. This sub-process is contained in the MANAGE SUPPORT process.

Sub-Process: PRODUCE DIRECTORY

This sub-process produces and distributes the telephone directory of the MoPTT. It is contained in the MANAGE SUPPORT process.

Sub-Process: PROVIDE DIRECTORY ASSISTANCE

This sub-process provides directory assistance to the customers that are calling in for directory information. It is contained in the MANAGE SUPPORT process.

Data Store: CUSTOMER BILLING INFORMATION

This data store contains information on all charges applied to each customer bill. It is scoped within the information usage models for the processes MANAGE CONFIGURATION, MANAGE CUSTOMER BILLING, MANAGE FAULTS and MANAGE SUPPORT.

Data Store: DIRECTORY ASSISTANCE DATA

This data store contains information on customers, addresses and telephone numbers. It is scoped within the information usage model for the process MANAGE SUPPORT.

Data Store: INQUIRY INFORMATION

This data store contains the results of a broad inquiry into the customer databases including billing, service orders and trouble tickets. It is scoped within the information usage model for the process MANAGE SUPPORT.

Data Store: OPERATOR DATABASE

This data store contains the information about customers (directory assistance) that is used by operator services personnel. It is scoped within the information usage model for

the process MANAGE SUPPORT.

Data Store: PRODUCTS AND SERVICES

This data store contains the catalogue of products and services that are available to a new or existing customer. It is scoped within the information usage models for the processes MANAGE CONFIGURATION and MANAGE SUPPORT.

Data Store: SERVICE ORDER

This data store contains each customer's order for service. It is scoped within the information usage models for the processes MANAGE CONFIGURATION, MANAGE PERFORMANCE and MANAGE SUPPORT.

Data Store: SERVICE ORDER SCHEDULE

This data store contains information on priorities and schedule items for various service order types. It is scoped within the information usage models for the processes MANAGE CONFIGURATION, MANAGE PERFORMANCE and MANAGE SUPPORT.

Data Store: TROUBLE TICKET

This data store contains all customer repair requests. It is scoped within the information usage models for the processes MANAGE FAULTS, MANAGE PERFORMANCE and MANAGE SUPPORT.

Data Store: TROUBLE TICKET SCHEDULE

This data store contains information on priorities and clearing times for various trouble conditions. It is scoped within the information usage models for the processes MANAGE FAULTS, MANAGE PERFORMANCE and MANAGE SUPPORT.

Data Store: WORK FORCE SCHEDULE

This data store contains information on employees that are available to take action on service orders and trouble tickets. It is scoped within the information usage models for the processes MANAGE CONFIGURATION, MANAGE FAULTS, MANAGE PERFORMANCE and MANAGE SUPPORT.

External Agent: NETWORK MANAGEMENT

This external agent represents information about possible problems within the network that may effect a customer's order for service. In addition, this agent communicates with the service representative that service may now be available in a certain area.

External Agent: MARKETING

This external agent represents information about new products and services that can be offered to new and existing customers.

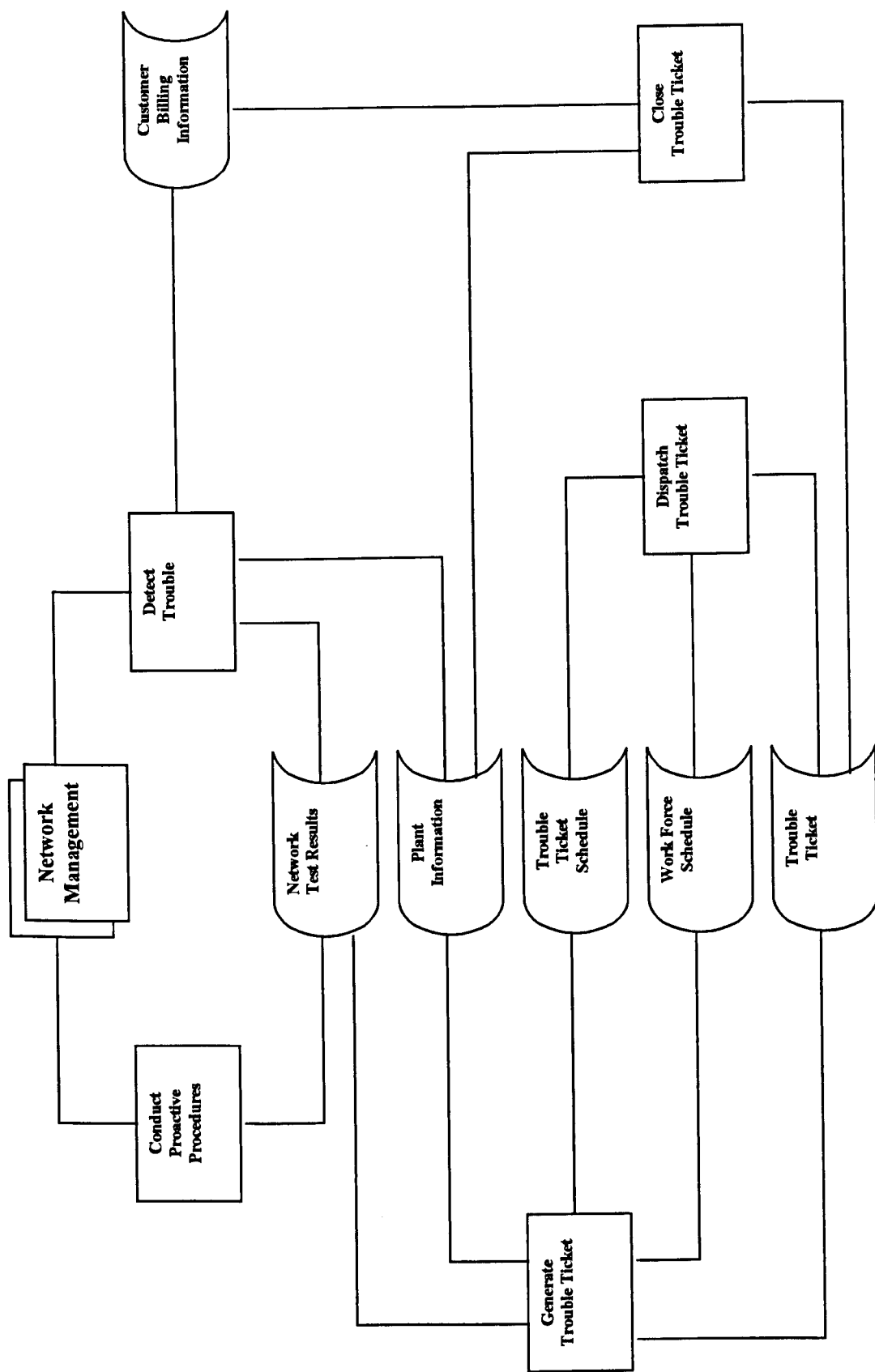


Figure 16. Information Usage Diagram of Customer Service (Manage Faults)

Sub-Process: DETECT TROUBLE

This sub-process determines trouble with the service that is provided. It takes in customer complaints and monitors the results of network tests. This sub-process is contained in the MANAGE FAULTS process.

Sub-Process: DISPATCH TROUBLE TICKET

This process distributes trouble tickets, and tracks the progress of the ticket and the work force working on the ticket. It is contained in the MANAGE FAULTS process.

Sub-Process: GENERATE TROUBLE TICKET

This sub-process creates trouble tickets, diagnoses the fault and schedules work force in order to correct the fault. It is contained in the MANAGE FAULTS process.

Sub-Process: CLOSE TROUBLE TICKET

This sub-process tests the repair that has been made, and performs quality assurance of the trouble ticket. In addition, it notifies the customer that the trouble has been tackled. This sub-process is contained in the MANAGE FAULTS process.

Sub-Process: CONDUCT PROACTIVE PROCEDURES

This sub-process conducts automated testing of the network and conducts inspection of the network to prevent faults from occurring. It is contained in the MANAGE FAULTS process.

Data Store: CUSTOMER BILLING INFORMATION

This data store contains information on all charges applied to each customer bill. It is scoped within the information usage models for the processes MANAGE CONFIGURATION, MANAGE CUSTOMER BILLING, MANAGE FAULTS and MANAGE SUPPORT.

Data Store: NETWORK TEST RESULTS

This data store contains the results of various automated and manual tests upon the

network that may result in the creation of a customer trouble ticket. It is scoped within the information usage model for the process MANAGE FAULTS.

Data Store: PLANT INFORMATION

This data store contains all the pertinent plant data about each customer (the path of dial tone from the central office to the customer's location). It is scoped within the information usage models for the processes MANAGE CONFIGURATION and MANAGE FAULTS.

Data Store: TROUBLE TICKET

This data store contains all customer repair requests. It is scoped within the information usage models for the processes MANAGE FAULTS, MANAGE PERFORMANCE and MANAGE SUPPORT.

Data Store: TROUBLE TICKET SCHEDULE

This data store contains information on priorities and clearing times for various trouble conditions. It is scoped within the information usage models for the processes MANAGE FAULTS, MANAGE PERFORMANCE and MANAGE SUPPORT.

Data Store: WORK FORCE SCHEDULE

This data store contains information on employees that are available to take action on service orders and trouble tickets. It is scoped within the information usage models for the processes MANAGE CONFIGURATION, MANAGE FAULTS, MANAGE PERFORMANCE and MANAGE SUPPORT.

External Agent: NETWORK MANAGEMENT

This external agent represents information about possible problems within the network that may effect a customer's order for service. In addition, this agent communicates with the service representative that service may now be available in a certain area.

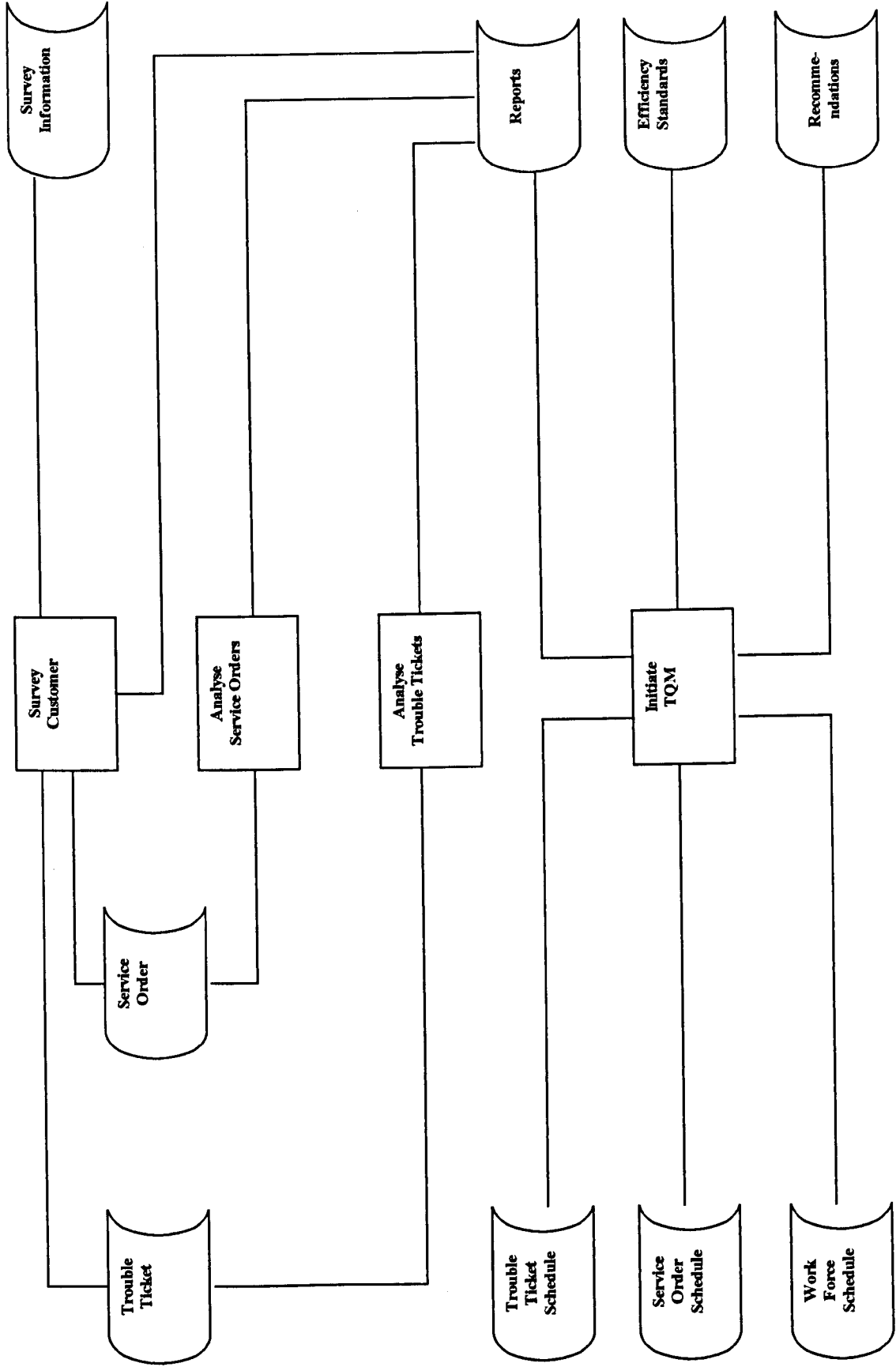


Figure 17. Information Usage Diagram of Customer Service (Manage Performance)

Sub-Process: SURVEY CUSTOMER

This sub-process actively surveys the customer satisfaction with the products and services that are provided by the MoPTT. In addition, it analyses and reports on the results of the customer surveys. This sub-process is contained in the MANAGE PERFORMANCE process.

Sub-Process: ANALYSE SERVICE ORDERS

This sub-process analyses and reports on the service order history. It is contained in the MANAGE PERFORMANCE process.

Sub-Process: ANALYSE TROUBLE TICKETS

This sub-process analyses and reports on the trouble ticket history. It is contained in the MANAGE PERFORMANCE process.

Sub-Process: INITIATE TQM

This sub-process gathers work force data, determines efficiency ratings and recommends process improvement in order to improve efficiency and effective of the work force. It is contained in the MANAGE PERFORMANCE process.

Data Store: EFFICIENCY STANDARDS

This data store contains the standards by which performance will be compared in order to determine efficiency ratings. It is scoped within the information usage model for the process MANAGE PERFORMANCE.

Data Store: RECOMMENDATIONS

This data store contains the methods to improve performance based on the results of surveys and other analysis. It is scoped within the information usage model for the process MANAGE PERFORMANCE.

Data Store: REPORTS

This data store contains the executive level information on trouble ticket and service

order history that is used in the analysis for total quality management. It is scoped within the information usage model for the process MANAGE PERFORMANCE.

Data Store: SERVICE ORDER

This data store contains each customer's order for service. It is scoped within the information usage models for the processes MANAGE CONFIGURATION, MANAGE PERFORMANCE and MANAGE SUPPORT.

Data Store: SERVICE ORDER SCHEDULE

This data store contains information on priorities and schedule items for various service order types. It is scoped within the information usage models for the processes MANAGE CONFIGURATION, MANAGE PERFORMANCE and MANAGE SUPPORT.

Data Store: SURVEY INFORMATION

This data store contains the results of questionnaires that are received from customers on how they feel about the actions that have been taken on their requests for service and repair. It is scoped within the information usage model for the process MANAGE PERFORMANCE.

Data Store: TROUBLE TICKET

This data store contains all customer repair requests. It is scoped within the information usage models for the processes MANAGE FAULTS, MANAGE PERFORMANCE and MANAGE SUPPORT.

Data Store: TROUBLE TICKET SCHEDULE

This data store contains information on priorities and clearing times for various trouble conditions. It is scoped within the information usage models for the processes MANAGE FAULTS, MANAGE PERFORMANCE and MANAGE SUPPORT.

Data Store: WORK FORCE SCHEDULE

This data store contains information on employees that are available to take action on service orders and trouble tickets. It is scoped within the information usage models for the

processes MANAGE CONFIGURATION, MANAGE FAULTS, MANAGE
PERFORMANCE and MANAGE SUPPORT.

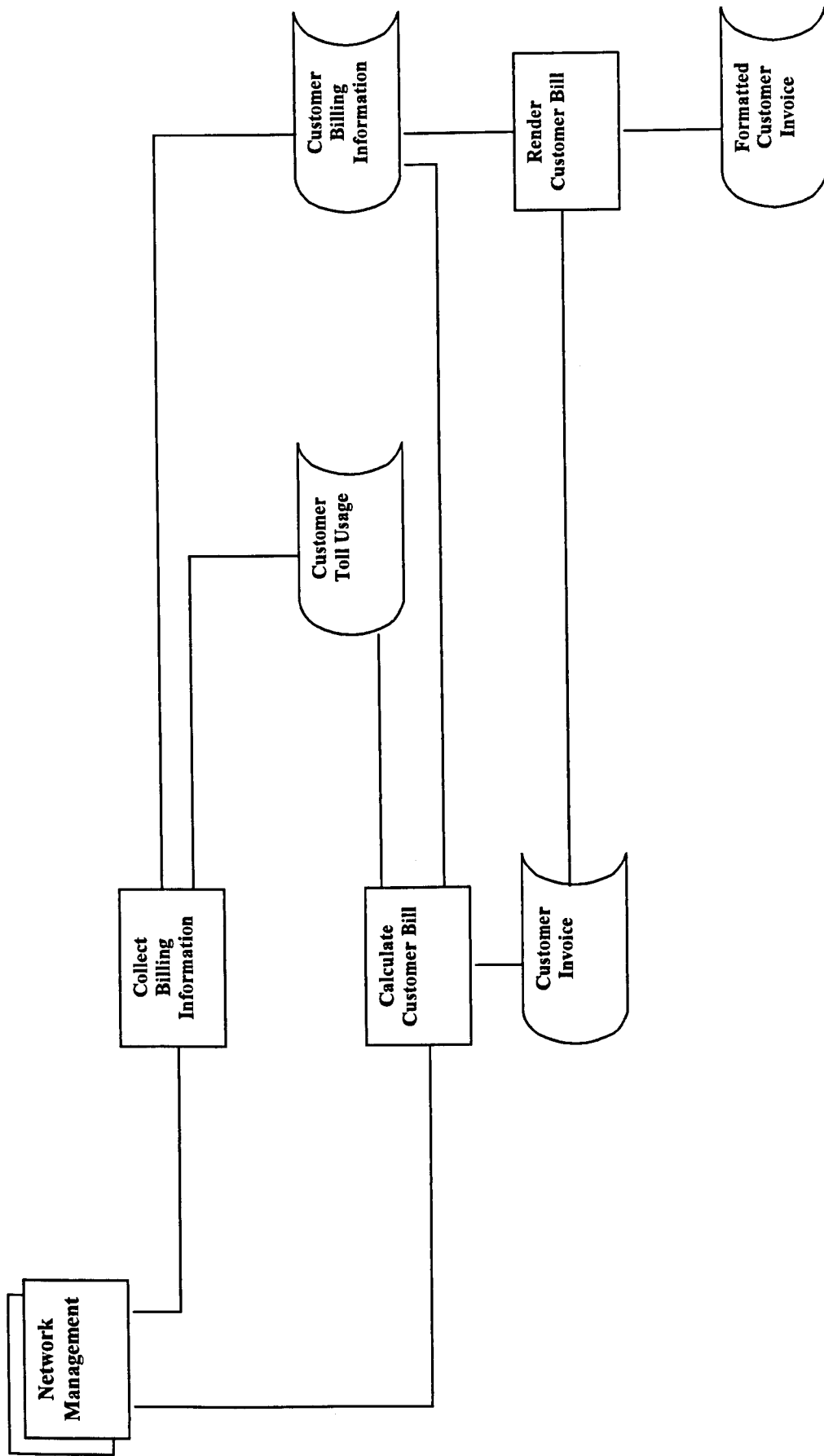


Figure 18. Information Usage Diagram of Customer Service (Manage Customer Billing)

Sub-Process: COLLECT BILLING INFORMATION

This sub-process collects and validates network usage data and other data, which are needed to bill the customer for services rendered. This sub-process is contained in the MANAGE CUSTOMER BILLING process.

Sub-Process: CALCULATE CUSTOMER BILL

This sub-process obtains rate information, reconciles usage to the customer and performs necessary calculation to determine the amount in order to be billed to the customer. It is contained in the MANAGE CUSTOMER BILLING process.

Sub-Process: RENDER CUSTOMER BILL

This sub-process processes the customer bill, and maintains the customer billing records. It is contained in the MANAGE CUSTOMER BILLING process,

Data Store: CUSTOMER BILLING INFORMATION

This data store contains information on all charges applied to each customer bill. It is scoped within the information usage models for the processes MANAGE CONFIGURATION, MANAGE CUSTOMER BILLING, MANAGE FAULTS and MANAGE SUPPORT.

Data Store: CUSTOMER INVOICE

This data store contains all the customer bills in a form in order to be converted to a printable format. It is scoped within the information usage model for the process MANAGE CUSTOMER BILLING.

Data Store: CUSTOMER TOLL USAGE

This data store contains the switch information that is converted in order to format the billing system that will be used. It is scoped within the information usage model for the process MANAGE CUSTOMER BILLING.

Data Store: FORMATTED CUSTOMER INVOICE

This data store contains the customer bills in a printing process format. It is scoped within the information usage model for the process **MANAGE CUSTOMER BILLING**.

External Agent: NETWORK MANAGEMENT

This external agent represents information about possible problems within the network that may effect a customer's order for service. In addition, this agent communicates with the service representative that service may now be available in a certain area.

5. Strategic Planning Function

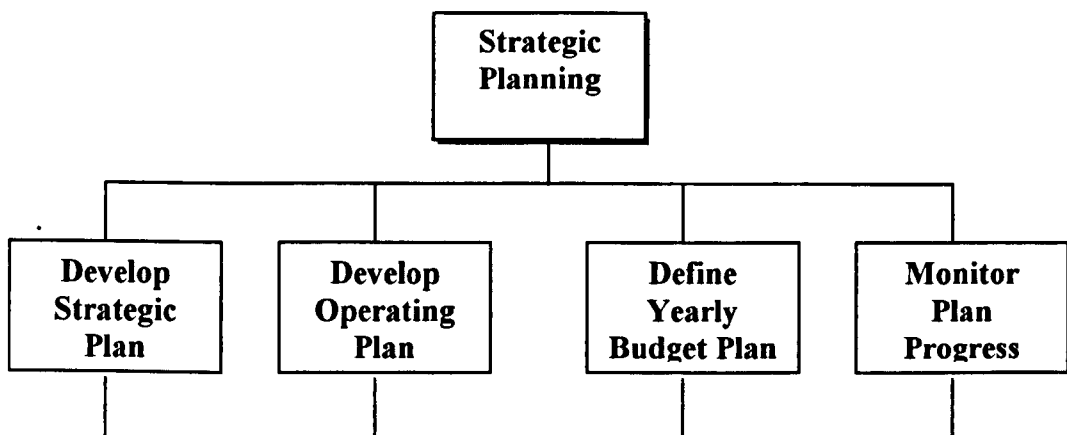
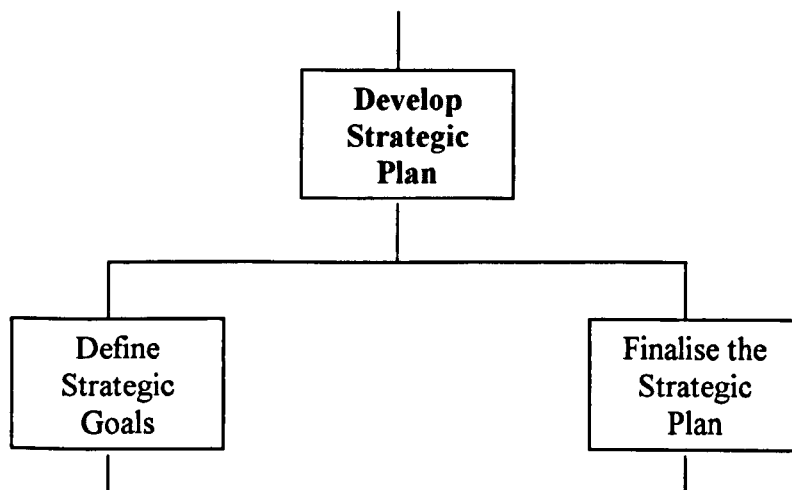


Figure 19. Functional Decomposition diagram of Strategic Planning (Support Function)

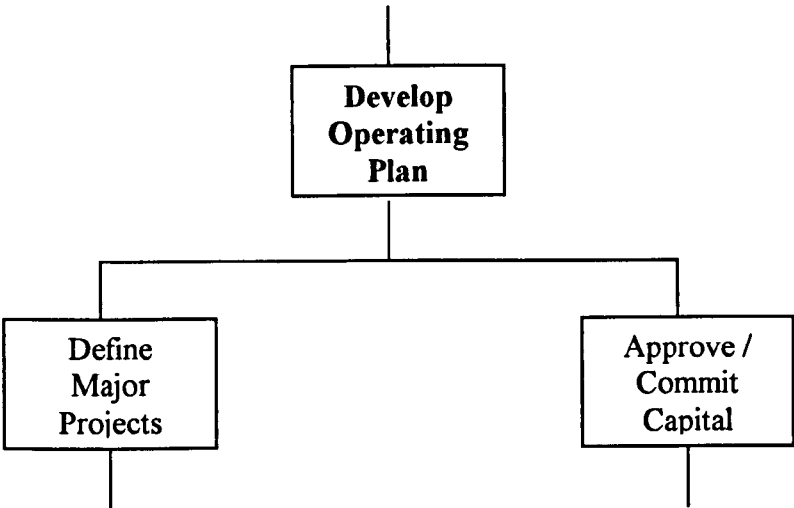
The following processes are addressed under the 'Strategic Planning' function.



Process: DEVELOP STRATEGIC PLAN

This process develops and maintains a strategic plan for the MoPTT. The process develops or reviews the key goals and objectives that will be obtained in the five-year strategic period. These goals reflect the directions of the MoPTT as well as the key objectives of the Kingdom. Long range strategies aim is attaining the goals and objectives that are developed by functional area (Network Development, Customer Service, Human Resources, etc.). The functional strategies are rolled into an overall corporate strategic plan for the MoPTT. The strategic plan becomes the guiding force behind the major thrusts and projects undertaken by the MoPTT for the next five years. The strategic plan is reviewed yearly and modified to reflect any changes to the Kingdom or the MoPTT goals and new marketplace challenges. This process contains the following sub-processes:

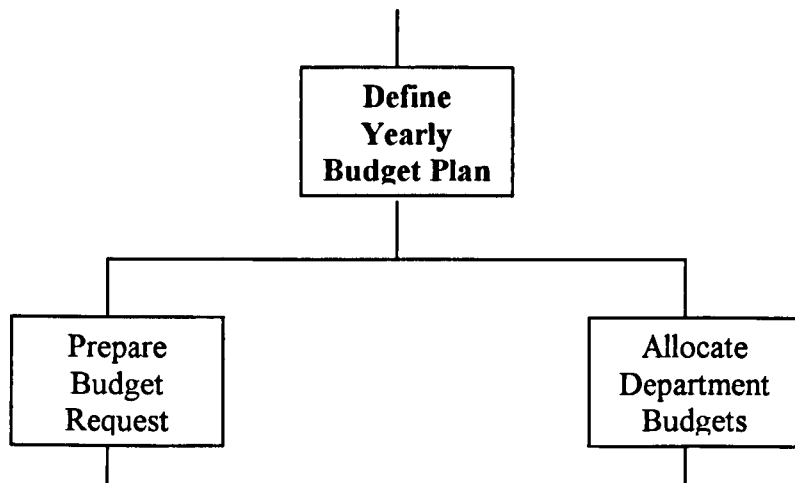
- DEFINE STRATEGIC GOALS
- FINALISE THE STRATEGIC PLAN



Process: DEVELOP OPERATING PLAN

This process develops the two-year operating plan. This plan consists of the major projects that must be funded or to be started in the next two years in order to support the strategic plan. Projects are defined, sized and submitted for approval and funding. Once projects are approved, the needed capital will be committed. This process contains the following sub-processes:

- DEFINE MAJOR PROJECTS
- APPROVE / COMMIT CAPITAL

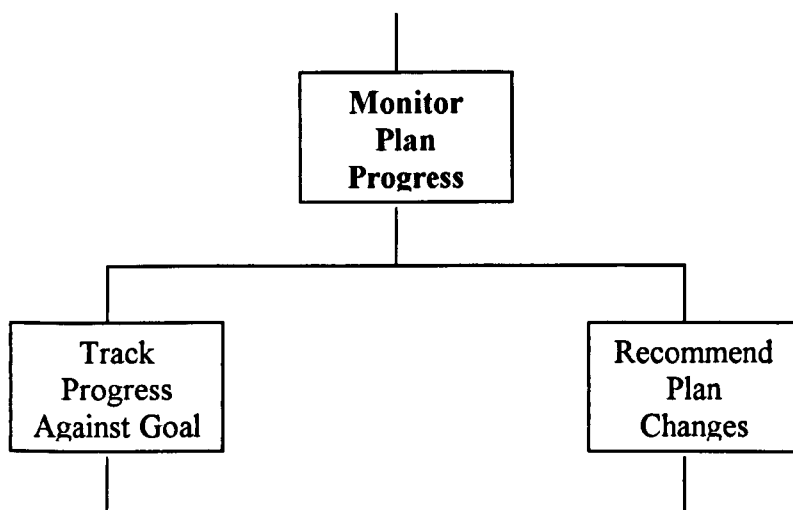


Process: DEFINE YEARLY BUDGET PLAN

This process develops a yearly budget for the MoPTT that supports the strategic and operating plans. Departments submit plans, which are consolidated into the MoPTT budget request to the Ministry of Finance. After the budget is approved by the Ministry, departmental budgets are adjusted in order to reflect any budget changes that are made by the Ministry. This process contains the following sub-processes:

PREPARE BUDGET REQUEST

ALLOCATE DEPARTMENT BUDGETS



Process: MONITOR PLAN PROGRESS

This process monitors how well the organisation is progressing in meeting its strategic and operational goals.' The process tracks financial performance, strategic objective measurements, progress of major projects and budget attainment. When variances are found the cause of the variance is determined and recommended changes to the strategic, operating or budget plans are made. These recommendations are fed back to the appropriate plan development or budget process. This process contains the following sub-processes:

TRACK PROGRESS AGAINST GOALS

RECOMMEND PLAN CHANGES

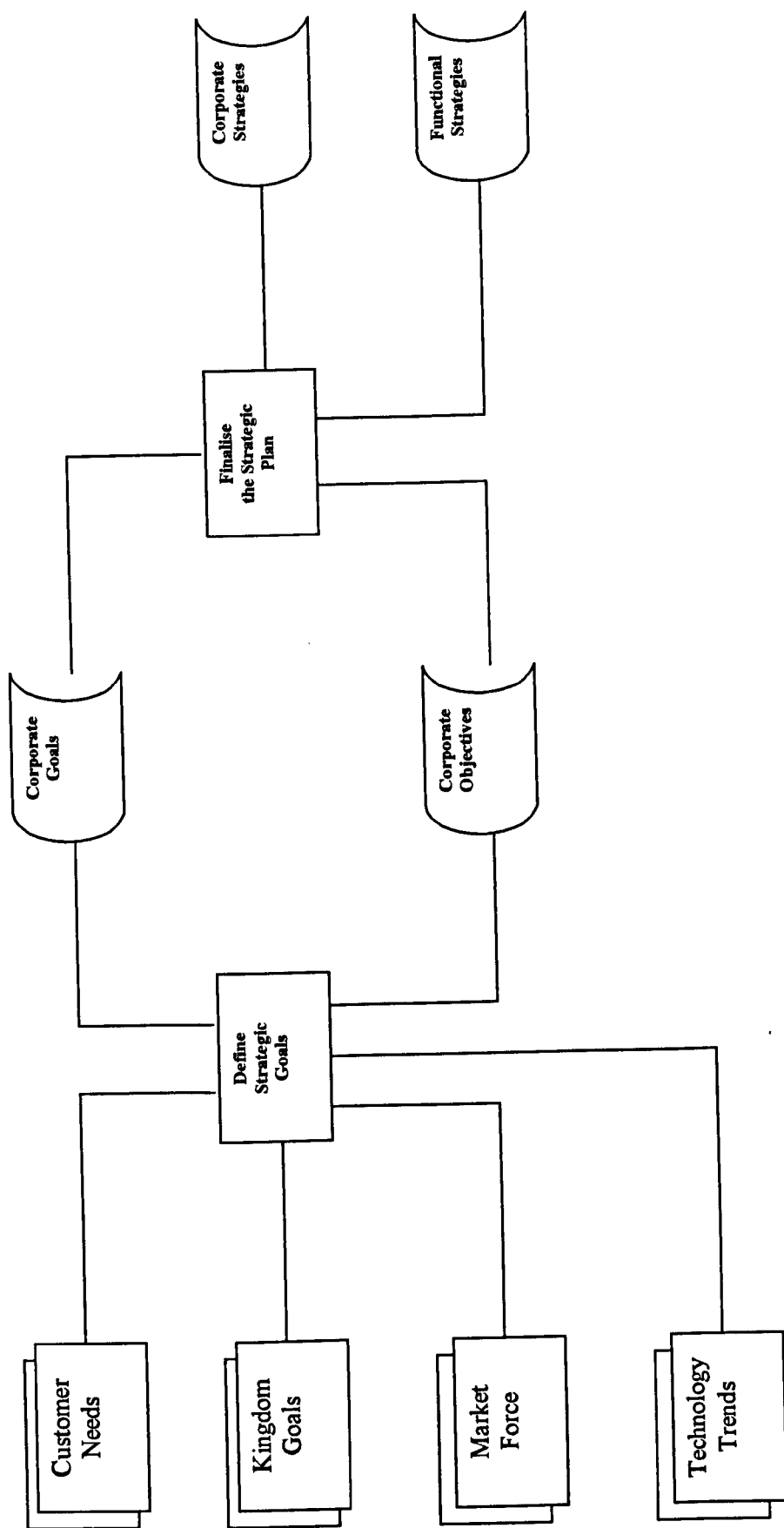


Figure 20. Information Usage Diagram of Strategic Planning (Develop Strategic Plan)

Sub-Process: DEFINE STRATEGIC GOALS

This sub-process defines or reviews the key strategic goals and objectives that the MoPTT wishes to obtain within the next five years. Each goal has a set of objectives associated with it, which provide a measure of how well the goal is being met. Kingdom goals, revenue needs, marketplace opportunities and profitability goals are some of the goals set. Other major goals and objectives such as Saudisation are also set. This sub-process is contained in the DEVELOP STRATEGIC PLAN process.

Sub-Process: FINALISE THE STRATEGIC PLAN

This process reviews and consolidates the functional plans into corporate strategic plan for the MoPTT. The plan is then reviewed and approved by executive management to become the basis for developing the operations plan. The corporate and functional plans are reviewed annually and changed, if needed. This sub-process is contained in the DEVELOP STRATEGIC PLAN process.

Data Store: CORPORATE GOALS

This data store contains information details about the MoPTT's goals. It is scoped within the information usage model for the process DEVELOP STRATEGIC PLAN.

Data Store: CORPORATE OBJECTIVES

This data store contains information details about the MoPTT's objectives. It is scoped within the information usage model for the process DEVELOP STRATEGIC PLAN.

Data Store: CORPORATE STRATEGIES

This data store contains information details about the MoPTT's strategies. It is scoped within the information usage models for the processes DEFINE YEARLY BUDGET PLAN, DEVELOP OPERATING PLAN, DEVELOP STRATEGIC PLAN and MONITOR PLAN PROGRESS.

Data Store: FUNCTIONAL STRATEGIES

This data store contains information on the functional strategic plans that are developed by the MoPTT. These plans are tied to the corporate strategic plan and goals/objectives.

This data store is scoped within the information usage models for the processes DEFINE YEARLY BUDGET PLAN, DEVELOP OPERATING PLAN, DEVELOP STRATEGIC PLAN and MONITOR PLAN PROGRESS.

External Agent: CUSTOMER NEEDS

This is information on projected customer needs. This information is used for market planning and the development of the MoPTT goals and strategies.

External Agent: KINGDOM GOALS

This is information on the national goals set for the Kingdom.

External Agent: MARKET FORCES

This is information on the market and external forces, which can affect the setting of kingdom and the MoPTT goals.

External Agent: TECHNOLOGY TRENDS

This is information on the directions of technology, which can affect the setting of the MoPTT goals and strategies.

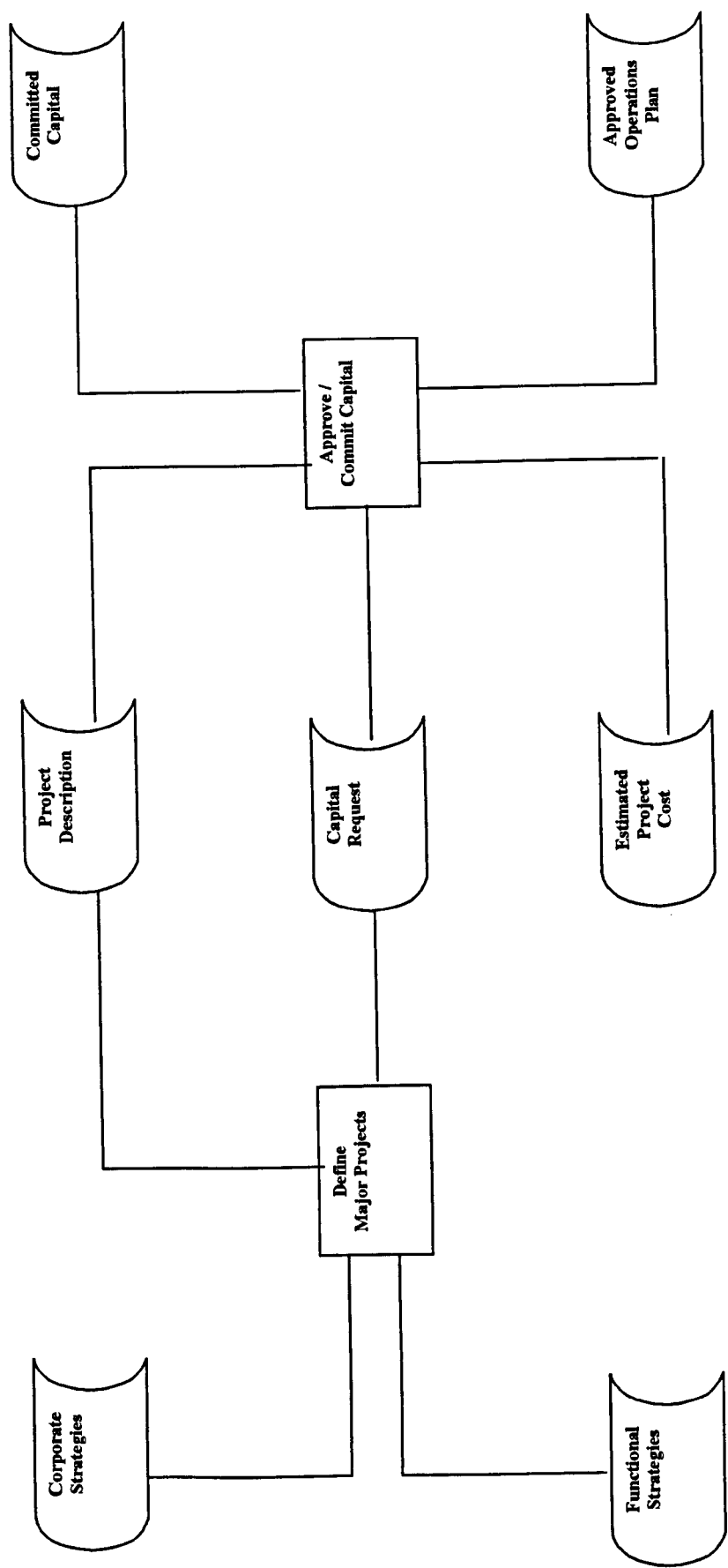


Figure 21. Information Usage Diagram of Strategic Planning (Develop Operating Plan)

Sub-Process: DEFINE MAJOR PROJECTS

This sub-process defines the major projects that need to be started or funded within the next two years in order to meet the strategic plan goals and objectives. The project funding is estimated by one year, and the capital needs are determined according to that. This sub-process is contained in the DEVELOP OPERATING PLAN process.

Sub-Process: APPROVE/COMMIT CAPITAL

This sub-process develops capital requests and submits them for approval. Once approving the capital is committed, the project becomes part of the approved operations plan. This sub-process is contained in the DEVELOP OPERATING PLAN process.

Data Store: APPROVED OPERATIONS PLAN

This data store contains information on the key projects and programs that are funded and approved in order to occur within the operations plan period. It is scoped within the information usage models for the processes DEFINE YEARLY BUDGET PLAN, DEVELOP OPERATING PLAN and MONITOR PLAN PROGRESS.

Data Store: CAPITAL REQUEST

This data store contains information on the capital requests that are made for funding programs and projects from the operations plan. It is scoped within the information usage model for the process DEVELOP OPERATING PLAN.

Data Store: COMMITTED CAPITAL

This data store contains information on capital that has been approved and committed to operations plan projects and programs. It is scoped within the information usage model for the process DEVELOP OPERATING PLAN.

Data Store: CORPORATE STRATEGIES

This data store contains information details about the MoPTT's strategies. It is scoped within the information usage models for the processes DEFINE YEARLY BUDGET PLAN, DEVELOP OPERATING PLAN, DEVELOP STRATEGIC PLAN and MONITOR PLAN PROGRESS.

Data Store: ESTIMATED PROJECT COST

This data store contains information description of actual and projected costs of projects and programs in the operations plan. It is scoped within the information usage model for the process DEVELOP OPERATING PLAN.

Data Store: FUNCTIONAL STRATEGIES

This data store contains information on the functional strategic plans that are developed by the MoPTT. These plans are tied to the corporate strategic plan and goals/objectives. This data store is scoped within the information usage models for the processes DEFINE YEARLY BUDGET PLAN, DEVELOP OPERATING PLAN, DEVELOP STRATEGIC PLAN and MONITOR PLAN PROGRESS.

Data Store: PROJECT DESCRIPTION

This data store contains information description of the various projects and programs that are needed to implement the operations and strategic plans. It is scoped within the information usage model for the process DEVELOP OPERATING PLAN.

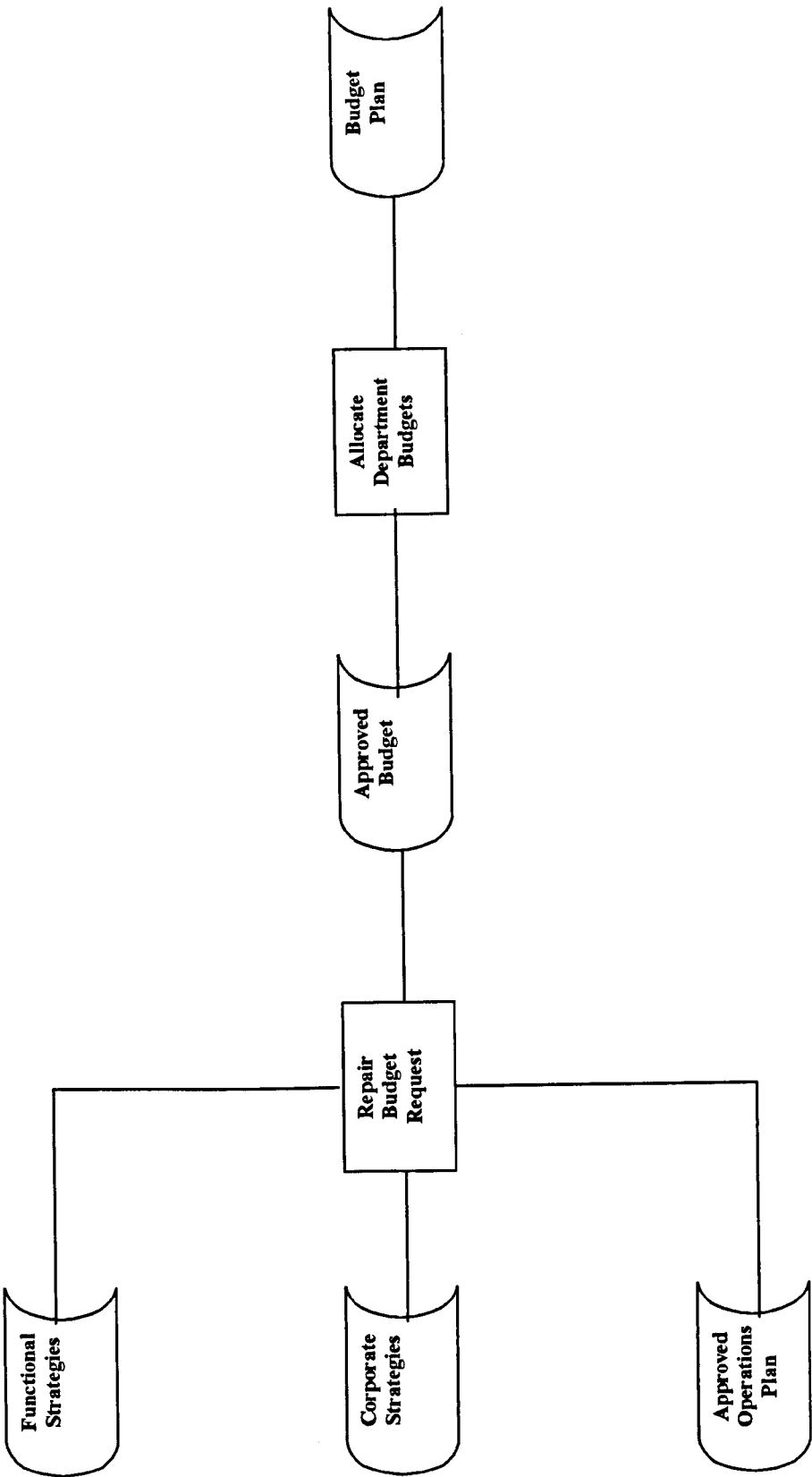


Figure 22. Information Usage Diagram of Strategic Planning (Define Yearly Budget Plan)

Sub-Process: PREPARE BUDGET REQUEST

Based on the approved strategic and operations plans, affected departments prepare their yearly budget requests. These are collected and reviewed. The budget is consolidated into a single budget for the MoPTT and submitted for approval. A budget request is completed and submitted to the Ministry of Finance for approval. This sub-process is contained in the DEFINE YEARLY BUDGET PLAN process.

Sub-Process: ALLOCATE DEPARTMENT BUDGETS

Once the MoPTT budget is approved by the Ministry of Finance, departmental budgets are determined and allocated for the next year. This sub-process is contained in the DEFINE YEARLY BUDGET PLAN process.

Data Store: FUNCTIONAL STRATEGIES

This data store contains information on the functional strategic plans that are developed by the MoPTT. These plans are tied to the corporate strategic plan and goals/objectives. This data store is scoped within the information usage models for the processes DEFINE YEARLY BUDGET PLAN, DEVELOP OPERATING PLAN, DEVELOP STRATEGIC PLAN and MONITOR PLAN PROGRESS.

Data Store: CORPORATE STRATEGIES

This data store contains information details about the MoPTT's strategies. It is scoped within the information usage models for the processes DEFINE YEARLY BUDGET PLAN, DEVELOP OPERATING PLAN, DEVELOP STRATEGIC PLAN and MONITOR PLAN PROGRESS.

Data Store: APPROVED OPERATIONS PLAN

This data store contains information on the key projects and programs that are funded and approved in order to occur within the operations plan period. It is scoped within the information usage models for the processes DEFINE YEARLY BUDGET PLAN, DEVELOP OPERATING PLAN and MONITOR PLAN PROGRESS.

Data Store: BUDGET PLAN

This data store contains information on the budget that is submitted to the Ministry of Finance for approval. It is scoped within the information usage models for the processes DEFINE YEARLY BUDGET PLAN and MONITOR. PLAN PROGRESS.

Data Store: APPROVED BUDGET

This data store contains information on the approved departmental budgets. It contains approved spending levels and expenditures to date. This data store is scoped within the information usage model for the process DEFINE YEARLY BUDGET PLAN.

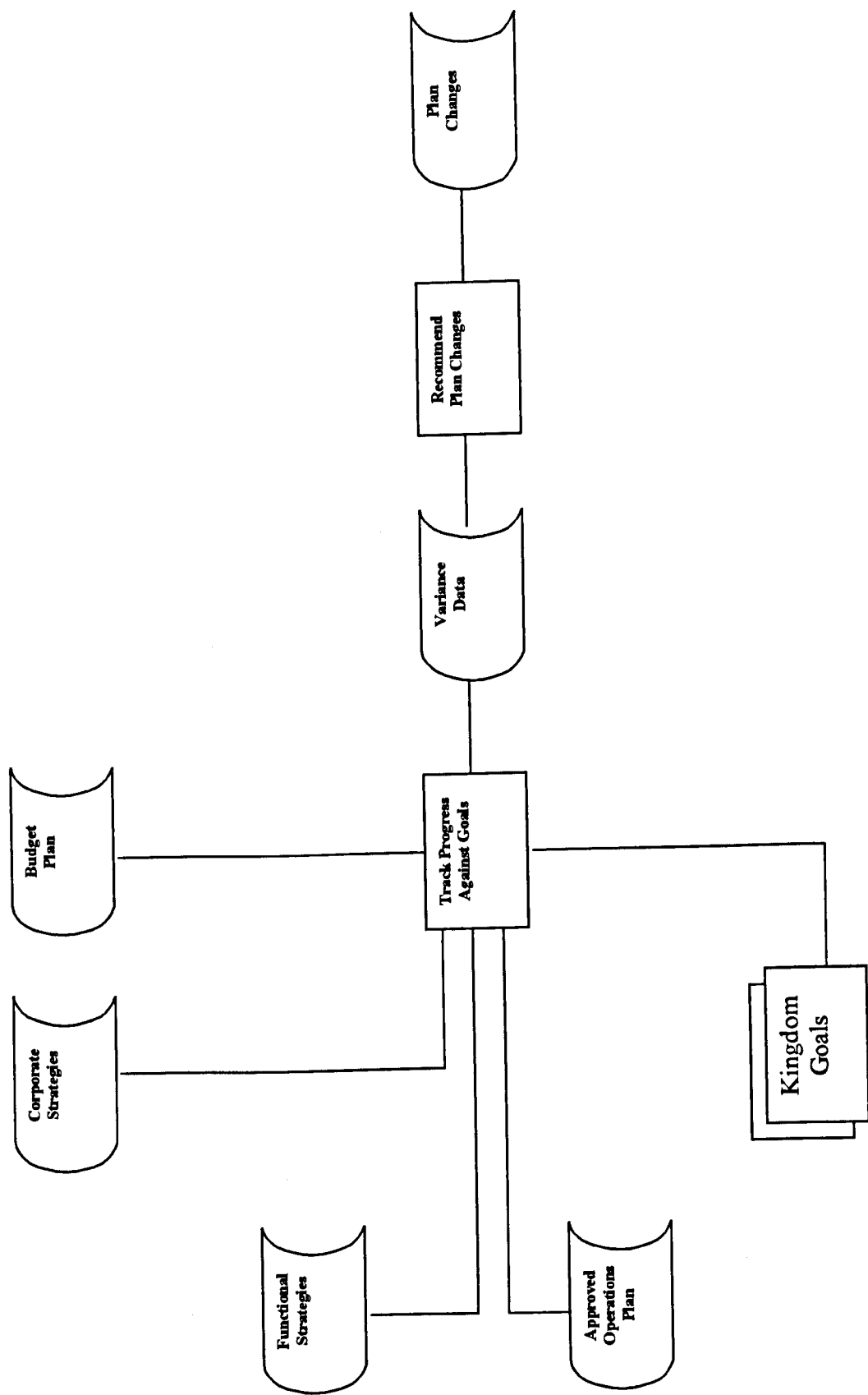


Figure 23. Information Usage Diagram of Strategic Planning (Monitor Plan Progress)

Sub-Process: TRACK PROGRESS AGAINST GOALS

This sub-process collects and analyses operational data to how well the MoPTT organisations are meeting the strategic goals and objectives. Reports are made to executive management monthly for tracking progress against goals, capital expenditures and budget. This sub-process is contained in the MONITOR PLAN PROGRESS process.

Sub-Process: RECOMMEND PLAN CHANGES

This sub-process determines the causes of difficulties in meeting the strategic goals and objectives. Suggested changes to strategies, operational plans and budget allocations are made for incorporation into the strategic, operations and budget plans. This sub-process is contained in the MONITOR PLAN PROGRESS process.

Data Store: APPROVED OPERATIONS PLAN

This data store contains information on the key projects and programs that are funded and approved in order to occur within the operations plan period. It is scoped within the information usage models for the processes DEFINE YEARLY BUDGET PLAN, DEVELOP OPERATING PLAN and MONITOR PLAN PROGRESS.

Data Store: CORPORATE STRATEGIES

This data store contains information details about the MoPTT's strategies. It is scoped within the information usage models for the processes DEFINE YEARLY BUDGET PLAN, DEVELOP OPERATING PLAN, DEVELOP STRATEGIC PLAN and MONITOR PLAN PROGRESS.

Data Store: FUNCTIONAL STRATEGIES

This data store contains information on the functional strategic plans that are developed by the MoPTT. These plans are tied to the corporate strategic plan and goals/objectives. This data store is scoped within the information usage models for the processes DEPINE YEARLY BUDGET PLAN, DEVELOP OPERATING PLAN, DEVELOP STRATEGIC PLAN and MONITOR PLAN PROGRESS.

Data Store: PLAN CHANGES

This data store contains information description of the approved plan changes that are made to the operations and strategic plans. It is scoped within the information usage model for the process MONITOR PLAN PROGRESS.

Data Store: VARIANCE DATA

This data store contains information description of the various changes from the operations, strategic and budget plans and the reasons for these changes. It store is scoped within the information usage model for the process MONITOR PLAN PROGRESS.

Data Store: BUDGET PLAN

This data store contains information on the budget that is submitted to the Ministry of Finance for approval. It is scoped within the information usage models for the processes DEFINE YEARLY BUDGET PLAN and MONITOR. PLAN PROGRESS.

External Agent: KINGDOM GOALS

This is information on the national goals set for the Kingdom.

6. Financial Management Function

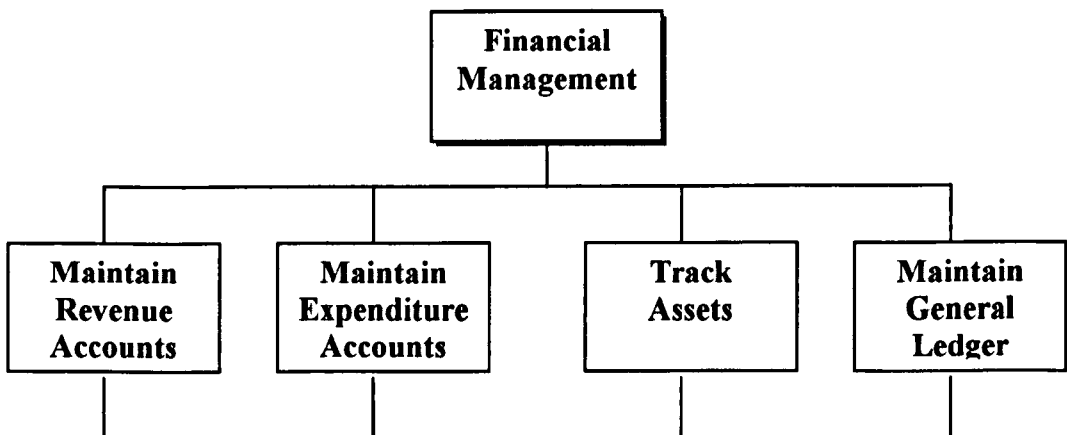
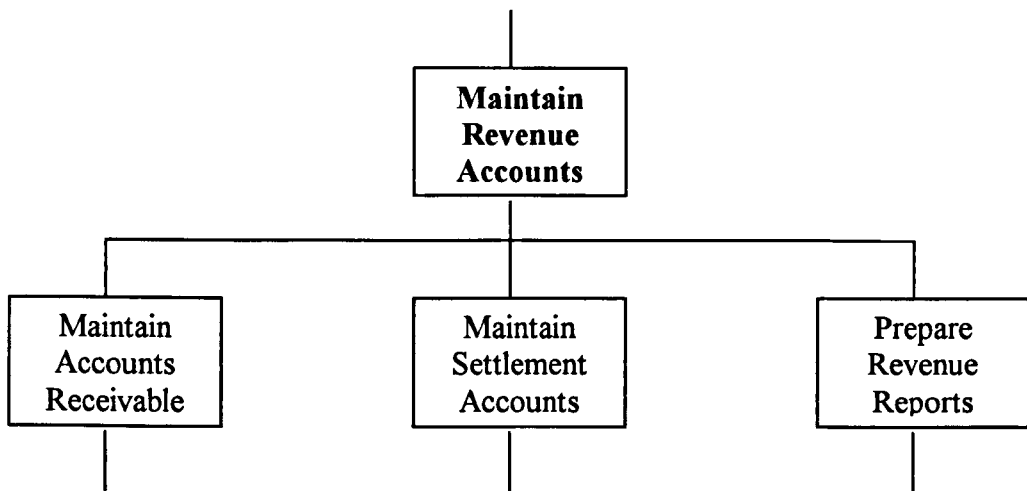


Figure 24. Functional Decomposition diagram of Financial Management (Support Function)

The following processes are addressed under the ‘Financial Management’ function.



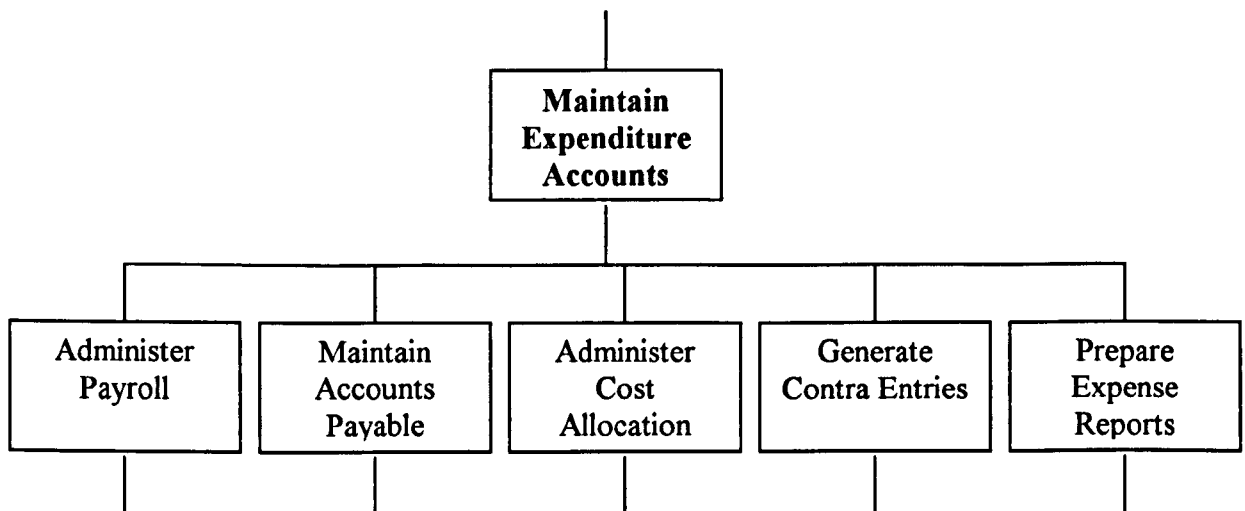
Process: MAINTAIN REVENUE ACCOUNTS

This process records billed revenue, payments and adjustments and other accounts receivable. It contains the following sub-processes:

MAINTAIN ACCOUNTS RECEIVABLE

MAINTAIN SETTLEMENT ACCOUNTS

PREPARE REVENUE REPORTS



Process: MAINTAIN EXPENDITURE ACCOUNTS

This process records the outflow of funds to payroll, vendors and other outside agencies.

This process contains the following sub- processes:

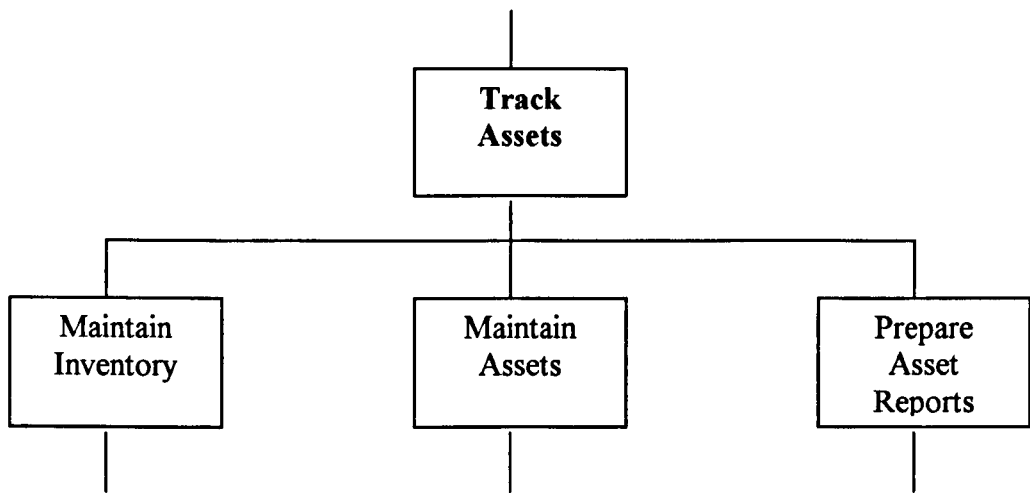
ADMINISTER PAYROLL

MAINTAIN ACCOUNTS PAYABLE

ADMINISTER COST ALLOCATION

GENERATE CONTRA ENTRIES

PREPARE EXPENSE REPORTS



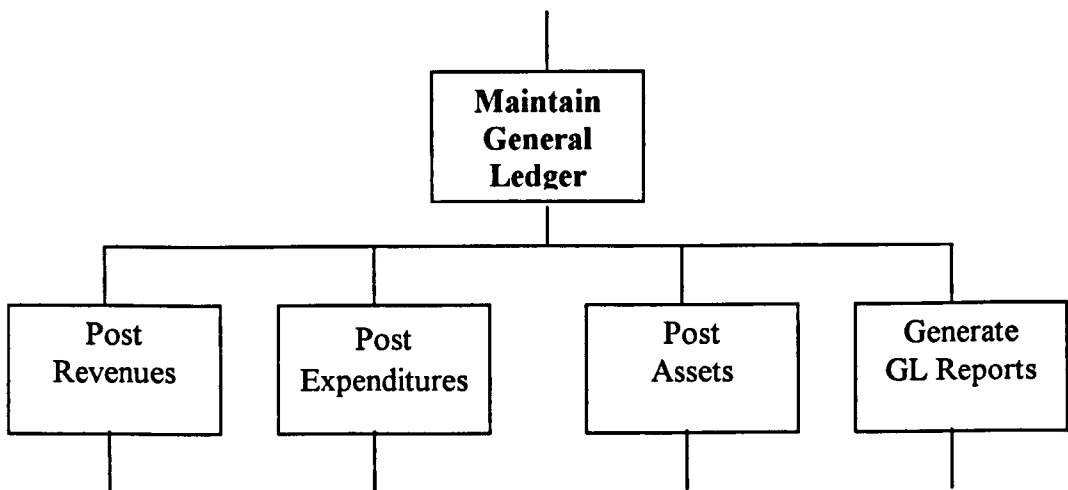
Process: TRACK ASSETS

This process maintains balances for all fixed and non-fixed (stock) assets. It contains the following sub-processes:

MAINTAIN INVENTORY

MAINTAIN ASSETS

PREPARE ASSET REPORTS



Process: MAINTAIN GENERAL LEDGER

This process posts revenue and expenditures to the general ledger. It contains the following sub-processes:

POST REVENUES

POST EXPENDITURES

POST ASSETS

PREPARE GENERAL LEDGER (GL) REPORTS

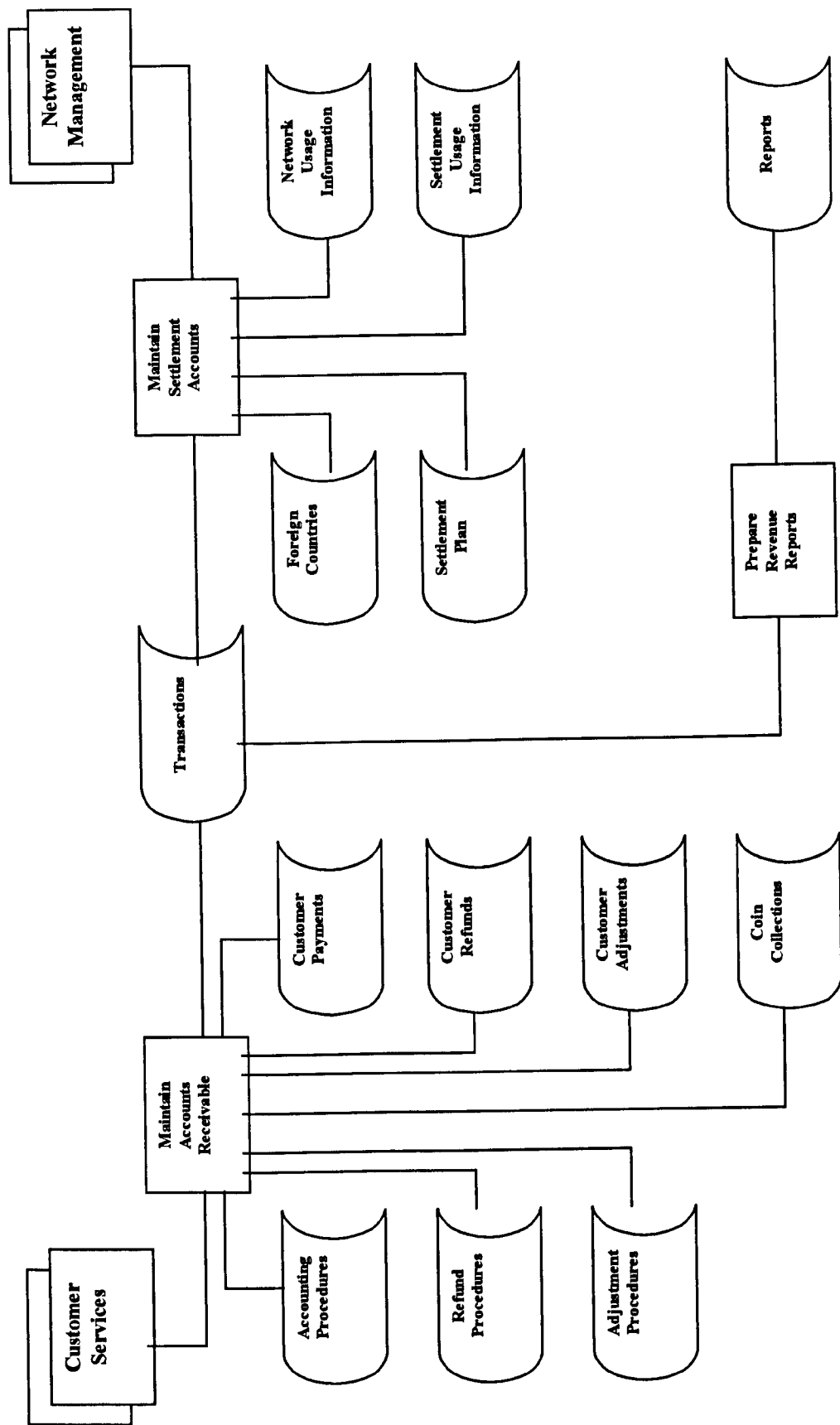


Figure 25. Information Usage Diagram of Financial Management (Maintain Revenue Accounts)

Sub-Process: MAINTAIN ACCOUNTS RECEIVABLE

This sub process creates and controls accounts receivable by calculating administration charges, applying charges, payments, adjustments, refunds and coin collections. It is contained in the MAINTAIN REVENUE ACCOUNTS process.

Sub-Process: MAINTAIN SETTLEMENT ACCOUNTS

This sub process identifies network usage volumes, which are subject to settlement with other foreign country administrations, and keeps track of international leased line availability. It is contained in the MAINTAIN REVENUE ACCOUNTS process.

Sub-Process: PREPARE REVENUE REPORTS

This sub process gathers information on revenues and the effect of rate changes on revenues at various levels of detail. It is contained in the MAINTAIN REVENUE ACCOUNTS process and GENERATE FINANCIAL REPORTS process.

Data Store: ACCOUNTING PROCEDURES

This data store contains a set of terms and conditions that govern the accounting rules and methods. It is scoped within the information usage models for the processes MAINTAIN EXPENDITURE ACCTS., MAINTAIN GENERAL LEDGER and MAINTAIN REVENUE ACCOUNTS.

Data Store: REFUND PROCEDURES

This data store contains rules in order to control how refunds are issued. It is scoped within the information usage model for the process MAINTAIN REVENUE ACCOUNTS.

Data Store: ADJUSTMENT PROCEDURES

This data store contains controls that are imposed upon methods that adjust revenue and expense accounts. It is scoped within the information usage model for the process MAINTAIN REVENUE ACCOUNTS.

Data Store: CUSTOMER PAYMENTS

This data store contains the details of customer payments that are contained in various batches in order to be entered into the journals. It is scoped within the information usage model for the process MAINTAIN REVENUE ACCOUNTS.

Data Store: CUSTOMER REFUNDS

This data store contains the final refund information that will be applied to the expense journals. It is scoped within the information usage model for the process MAINTAIN REVENUE ACCOUNTS.

Data Store: CUSTOMER ADJUSTMENTS

This data store contains the final customer adjustments that have been made in order to be posted to journals. It is scoped within the information usage model for the process MAINTAIN REVENUE ACCOUNTS.

Data Store: COIN COLLECTIONS

This data store contains the revenues that are collected from all coin telephones. It is scoped within the information usage model for the process MAINTAIN REVENUE ACCOUNTS.

Data Store: TRANSACTIONS

This data store contains a list of all events that involve the movement of money to revenue, expenditure and asset accounts. It is scoped within the information usage models for the processes GENERATE FINANCIAL REPORTS, MAINTAIN GENERAL LEDGER, MAINTAIN REVENUE ACCOUNTS and TRACK ASSETS.

Data Store: FOREIGN COUNTRIES

This data store contains a list of countries with which the MoPTT will conduct settlement transactions. It is scoped within the information usage model for the process MAINTAIN REVENUE ACCOUNTS.

Data Store: SETTLEMENT PLAN

This data store contains the rules that control how settlements with other countries will be handled. It is scoped within the information usage model for the process MAINTAIN REVENUE ACCOUNTS.

Data Store: NETWORK USAGE INFORMATION

This data store contains the usage information of the international circuits in order to determine settlement amounts. It is scoped within the information usage model for the process MAINTAIN REVENUE ACCOUNTS.

Data Store: SETTLEMENT USAGE INFORMATION

This data store contains originating and terminating settlement usage data for calls that are going through the network, from and to foreign countries. It is scoped within the information usage model for the process MAINTAIN REVENUE ACCOUNTS.

Data Store: REPORTS

This data store contains the reports of revenue, expense and asset accounts. It is scoped within the information usage models for the process MAINTAIN REVENUE ACCOUNTS, MAINTAIN EXPENDITURE ACCTS and TRACK ASSETS.

External Agent: CUSTOMER SERVICES

This external agent to the Financial Management function provides customer charges and payment information for account receivable and revenue reports.

External Agent: NETWORK MANAGEMENT

This external agent to the Financial Management function provides information on usage of international dedicated circuits and network assets.

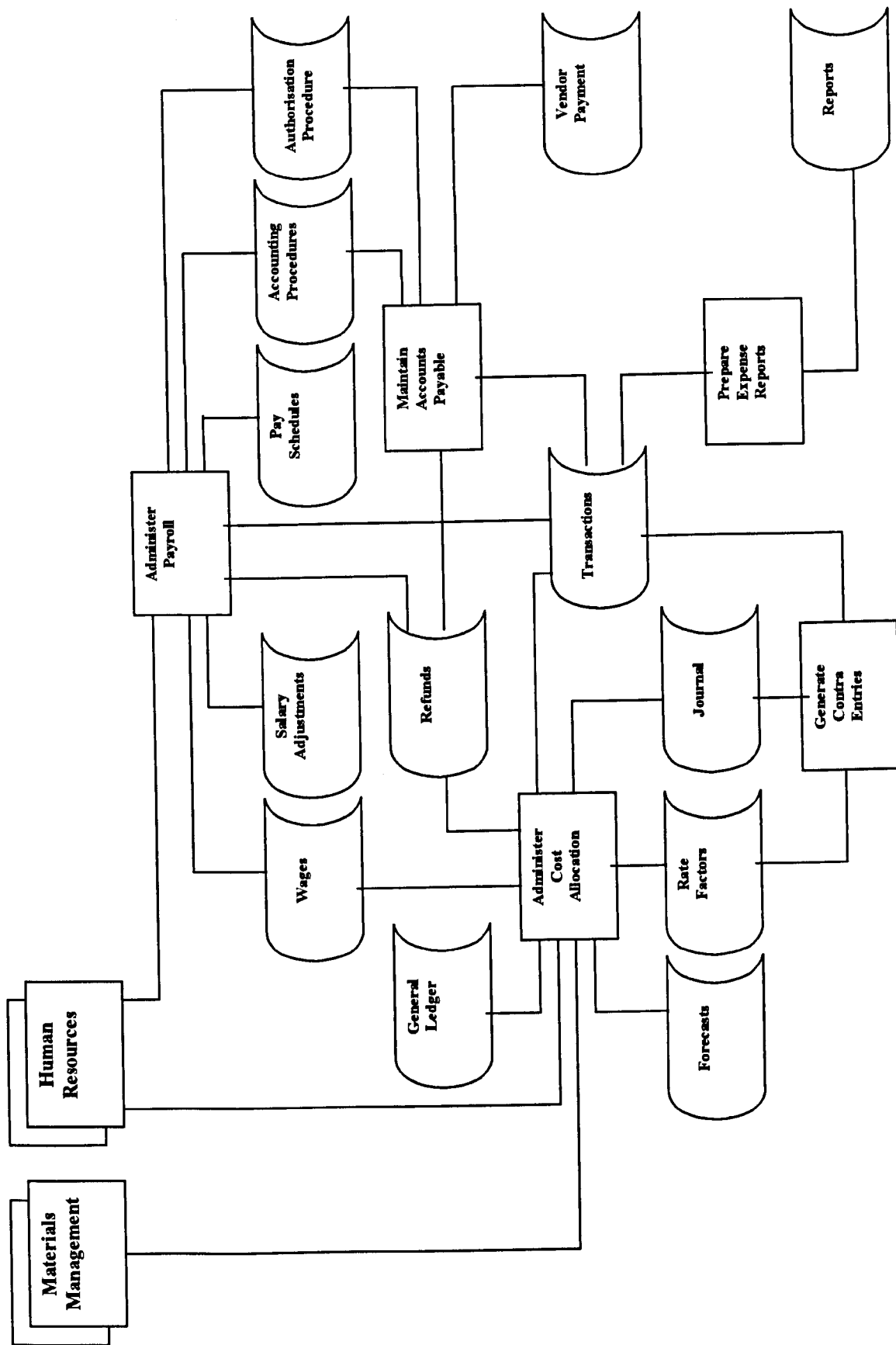


Figure 26. Information Usage Diagram of Financial Management (Maintain Expenditure Accounts)

Sub-Process: ADMINISTER PAYROLL

This sub process controls payroll activities including earnings, payroll related benefits, deductions and disbursements. It is contained in the MAINTAIN EXPENDITURE ACCOUNTS process.

Sub-Process: MAINTAIN ACCOUNTS PAYABLE

This sub process authorises disbursements to suppliers for goods and services and for miscellaneous employee expenses. It is contained in the MAINTAIN EXPENDITURE ACCOUNTS process.

Sub-Process: ADMINISTER COST ALLOCATION

This sub-process distributes costs which cannot be allocated to final accounts as they are incurred such as labour rates, material unit costs and expense allocation. It is contained in the MAINTAIN EXPENDITURE ACCOUNTS process.

Sub-Process: GENERATE CONTRA ENTRIES

This sub process complements the cost evaluation process by creating off-setting transactions in clearing accounts, and the prorate process by producing a nil effect on prorated journalised transactions. It is contained in the MAINTAIN EXPENDITURE ACCOUNTS process.

Sub-Process: PREPARE EXPENSE REPORTS

This sub process gathers information from the general ledger on actual costs. It is contained in the GENERATE FINANCIAL REPORTS process and MAINTAIN EXPENDITURE ACCOUNTS process.

Data Store: WAGES

This data store contains all wages information for the MoPTT's employees. It is scoped within the information usage model for the process MAINTAIN EXPENDITURE ACCOUNTS.

Data Store: GENERAL LEDGER

This data store contains the logical collection of accounting data including transactions, journals, and analysis results. It is scoped within the information usage models for the processes, MAINTAIN EXPENDITURE ACCOUNTS and MAINTAIN GENERAL LEDGER.

Data Store: FORECASTS

This data store contains information that is created by the process of allocating costs. It is scoped within the information usage model for the process MAINTAIN EXPENDITURE ACCOUNTS.

Data Store: RATE FACTORS

This data store contains rates that are used to clear charges held in clearing accounts, such as labour rates, vehicle usage, overhead, administrative, and prorate accounts. It is scoped within the information usage models for the processes GENERATE FINANCIAL REPORTS, and MAINTAIN EXPENDITURE ACCTS., MAINTAIN GENERAL LEDGER and TRACK ASSETS.

Data Store: SALARY ADJUSTMENTS

This data store contains information on the adjustments that are made to employee salaries during the payroll process. It is scoped within the information usage model for the process MAINTAIN EXPENDITURE ACCTS.

Data Store: REFUNDS

This data store contains the final list of refunds that will be issued to customers or vendors. It is scoped within the information usage model for the process MAINTAIN EXPENDITURE ACCTS.

Data Store: JOURNAL

This data store contains the current month activities and month to date summary results of all transactions. It is scoped within the information usage models for the processes, MAINTAIN EXPENDITURE ACCTS. and MAINTAIN GENERAL LEDGER.

Data Store: TRANSACTIONS

This data store contains a list of all events that involve the movement of money to revenue, expenditure and asset accounts. It is scoped within the information usage models for the processes GENERATE FINANCIAL REPORTS, MAINTAIN GENERAL LEDGER, MAINTAIN REVENUE ACCOUNTS, MAINTAIN EXPENDITURE ACCOUNTS and TRACK ASSETS.

Data Store: PAY SCHEDULES

This data store contains a calendar of pay-days in order to determine when to initiate payroll actions. It is scoped within the information usage model for the process MAINTAIN EXPENDITURE ACCTS.

Data Store: ACCOUNTING PROCEDURES

This data store contains a set of terms and conditions that govern the accounting rules and methods. It is scoped within the information usage models for the processes MAINTAIN EXPENDITURE ACCTS., MAINTAIN GENERAL LEDGER and MAINTAIN REVENUE ACCOUNTS.

Data Store: AUTHORISATION PROCEDURE

This data store contains a set of rules that detail the level of authorisation that is needed to complete adjustments to accounts receivable. It is scoped within the information usage model for the process MAINTAIN EXPENDITURE ACCTS.

Data Store: VENDOR PAYMENT

This data store contains the payments that are made to vendors for goods and services. It is scoped within the information usage model for the process MAINTAIN EXPENDITURE ACCTS.

Data Store: REPORTS

This data store contains the reports of revenue, expense and asset accounts. It is scoped within the information usage models for the process MAINTAIN REVENUE

ACCOUNTS, MAINTAIN EXPENDITURE ACCTS and TRACK ASSETS.

External Agent: MATERIALS MANAGEMENT

This external agent to the Financial Management function provides information on material costs and assets.

External Agent: HUMAN RESOURCES

This external agent to the Financial Management function provides information for the administration of payroll.

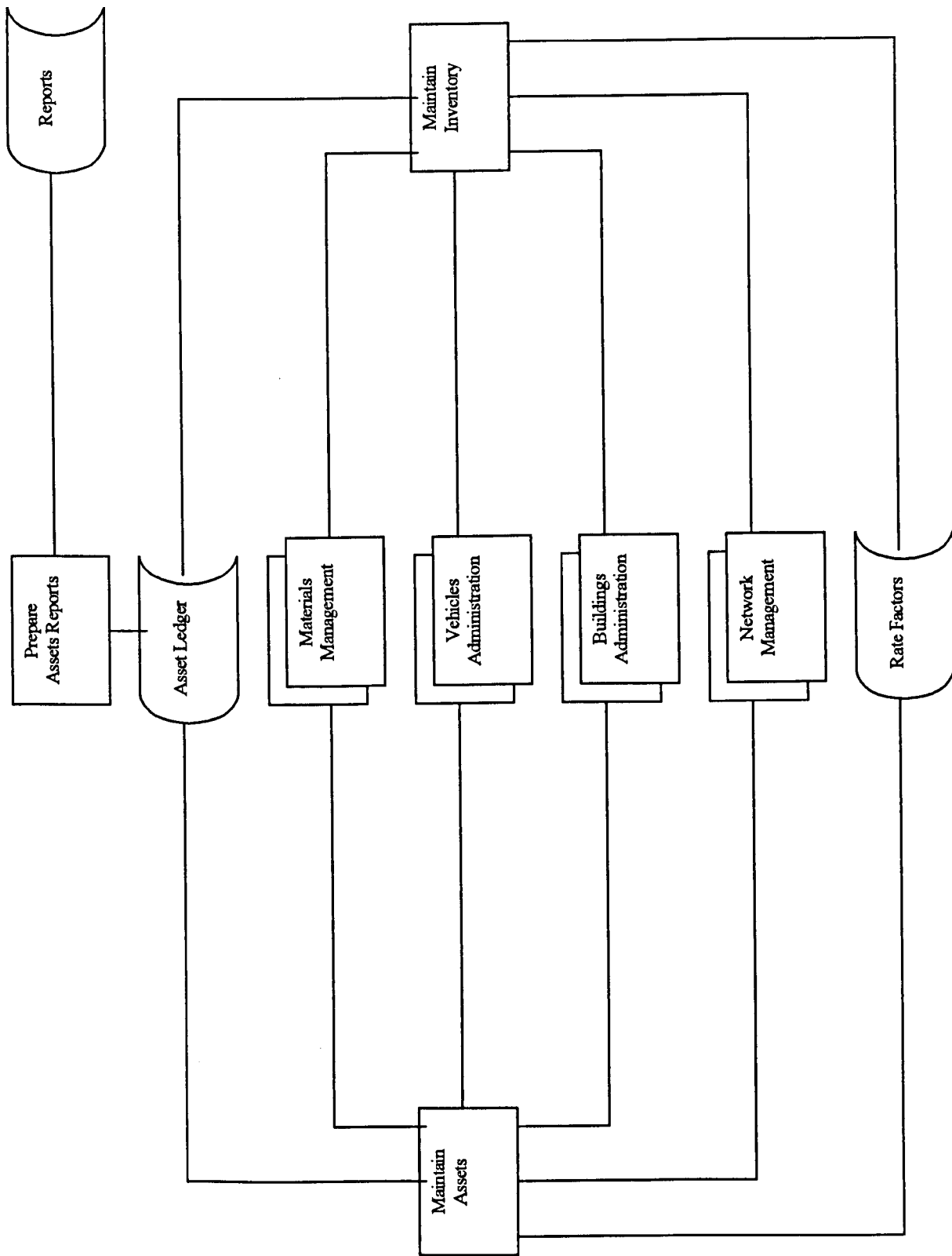


Figure 27. Information Usage Diagram of Financial Management (Track Assets)

Sub-Process: MAINTAIN INVENTORY

This sub-process determines the asset value of stock, including its depreciation. It is contained in the TRACK ASSETS process.

Sub-Process: MAINTAIN ASSETS

This sub-process determines the value of assets, including its depreciation. It is contained in the TRACK ASSETS process.

Sub-Process: PREPARE ASSET REPORTS

This sub-process gathers information on fixed and non-fixed assets reports at various levels of detail. It is contained in the GENERATE FINANCIAL REPORTS process and TRACK ASSETS process.

Data Store: ASSET LEDGER

This data store contains details of assets from Materials Management, Network Management, Vehicles Management and Buildings & Land Management. It is scoped within the information usage models for the processes GENERATE FINANCIAL REPORTS, MAINTAIN EXPENDITURE ACCOUNTS, MAINTAIN GENERAL LEDGER and TRACK ASSETS.

Data Store: RATE FACTORS

This data store contains rates that are used to clear charges held in clearing accounts, such as labour rates, vehicle usage, overhead, administrative, and prorate accounts. It is scoped within the information usage models for the processes GENERATE FINANCIAL REPORTS, MAINTAIN EXPENDITURE ACCOUNTS, MAINTAIN GENERAL LEDGER, and TRACK ASSETS.

Data Store: REPORTS

This data store contains the reports of revenue, expense and asset accounts. It is scoped within the information usage models for the process MAINTAIN REVENUE ACCOUNTS, MAINTAIN EXPENDITURE ACCOUNTS, and TRACK ASSETS.

External Agent: MATERIALS MANAGEMENT

This external agent to the Financial Management function provides information on material costs and assets.

External Agent: NETWORK MANAGEMENT

This external agent to the Financial Management function provides information on usage of international dedicated circuits and network assets.

External Agent: VEHICLES ADMINISTRATION

This external agent to the Financial Management function provides information on the asset value and depreciation of motor vehicles.

External Agent: BUILDINGS ADMINISTRATION

This external agent to the Financial Management function provides information on real property, which will help to determine asset value.

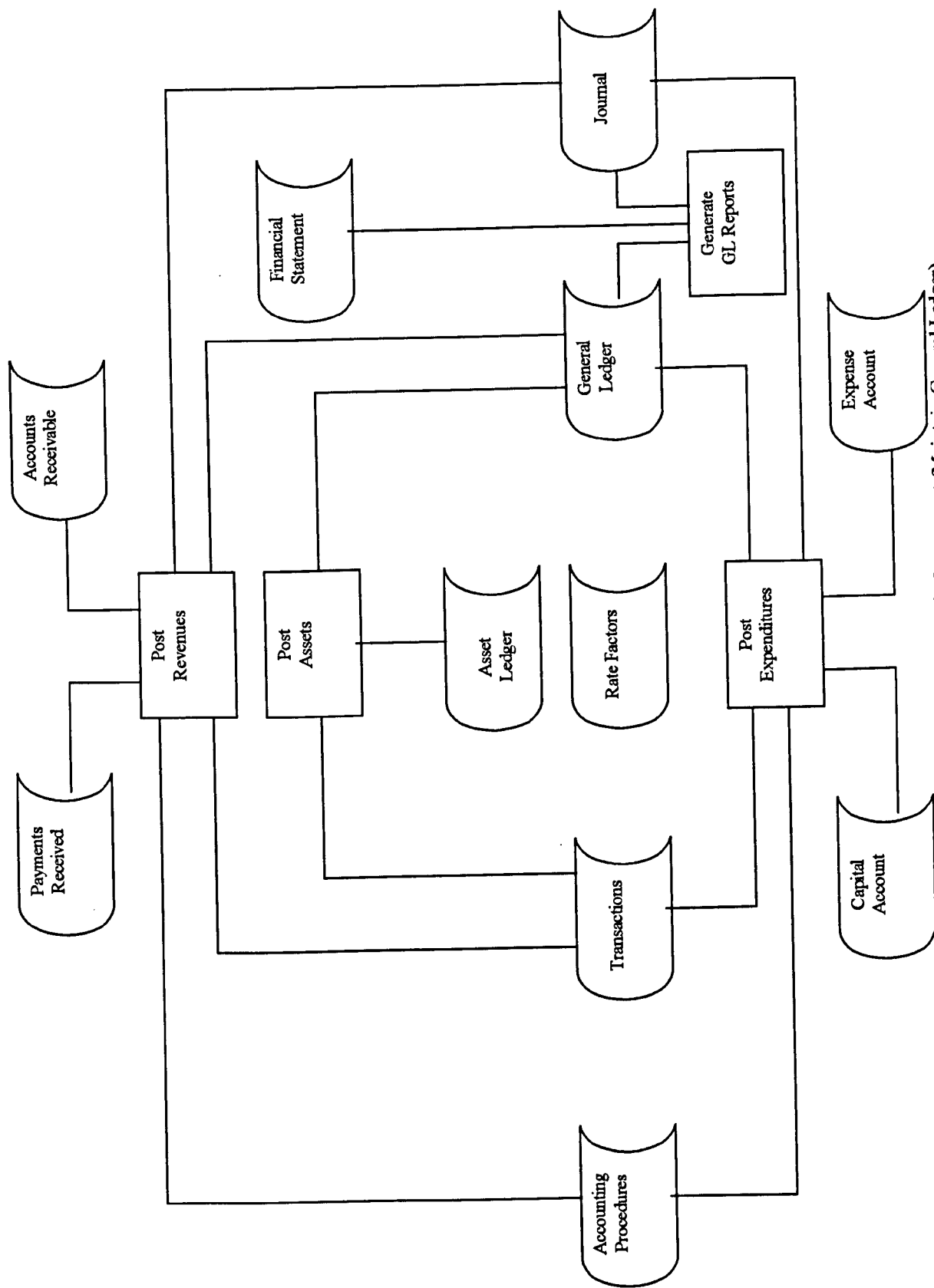


Figure 28. Information Usage Diagram of Financial Management (Maintain General Ledger)

Sub-Process: POST REVENUES

This sub process posts and balances revenues to journal records revenues, accounts amounts that are earned but unbilled, and/or billed but not received. It is contained in the MAINTAIN GENERAL LEDGER process.

Sub-Process: POST EXPENDITURES

This sub process maintains posts and balances expenses to the general ledger, and adjusts clearing accounts. It is contained in the MAINTAIN GENERAL LEDGER process.

Sub-Process: POST ASSETS

This sub process maintains posts and balances assets to the general ledger, and adjusts the capital accounts. It is contained in the MAINTAIN GENERAL LEDGER process.

Sub-Process: GENERATE GENERAL LEDGER REPORTS

This sub-process prepares reports for revenues, expenses and assets after they have been posted to the general ledger. It is contained in the MAINTAIN GENERAL LEDGER process.

Data Store: ACCOUNTING PROCEDURES

This data store contains a set of terms and conditions that govern the accounting rules and methods. It is scoped within the information usage models for the processes MAINTAIN EXPENDITURE ACCTS., MAINTAIN GENERAL LEDGER and MAINTAIN REVENUE ACCOUNTS.

Data Store: PAYMENTS RECEIVED

This data store contains details of all amounts that are received and from where to be posted to journals. It is scoped within the information usage models for the processes GENERATE FINANCIAL REPORTS and MAINTAIN GENERAL LEDGER.

Data Store: TRANSACTIONS

This data store contains a list of all events that involve the movement of money to

revenue, expenditure and asset accounts. It is scoped within the information usage models for the processes GENERATE FINANCIAL REPORTS, MAINTAIN GENERAL LEDGER, MAINTAIN REVENUE ACCOUNTS and TRACK ASSETS.

Data Store: CAPITAL ACCOUNT

This data store contains the value of assets or liabilities in which costs are capitalised for allocation over the useful life for depreciation. It is scoped within the information usage model for the process MAINTAIN GENERAL LEDGER.

Data Store: ASSET LEDGER

This data store contains details of assets from Materials Management, Network Management, Vehicles Management and Buildings & Land Management. It is scoped within the information usage models for the processes GENERATE FINANCIAL REPORTS, MAINTAIN GENERAL LEDGER and TRACK ASSETS.

Data Store: RATE FACTORS

This data store contains rates that are used to clear charges held in clearing accounts, such as labour rates, vehicle usage, overhead, administrative, and prorate accounts. It is scoped within the information usage models for the processes GENERATE FINANCIAL REPORTS, and MAINTAIN EXPENDITURE ACCTS., MAINTAIN GENERAL LEDGER and TRACK ASSETS.

Data Store: ACCOUNTS RECEIVABLE

This data store contains the accrued value for services rendered during a reporting period. It is scoped within the information usage models for the processes GENERATE FINANCIAL REPORTS and MAINTAIN GENERAL LEDGER.

Data Store: GENERAL LEDGER

This data store contains the logical collection of accounting data including transactions, journals, and analysis results. It is scoped within the information usage models for the processes, MAINTAIN EXPENDITURE ACCTS. and MAINTAIN GENERAL LEDGER.

Data Store: EXPENSE ACCOUNT

This data store contains the accrued cost of conducting business, including cash expenditures and capitalised expenditures. It is scoped within the information usage model for the process MAINTAIN GENERAL LEDGER.

Data Store: FINANCIAL STATEMENT

This data store contains a special version of a financial report for the MoPTT in order to be analysed at the executive level. It is scoped within the information usage model for the process MAINTAIN GENERAL LEDGER.

Data Store: JOURNAL

This data store contains the current month activities and month to date summary results of all transactions. It is scoped within the information usage models for the processes, MAINTAIN EXPENDITURE ACCTS. and MAINTAIN GENERAL LEDGER.

7. Human Resources Function

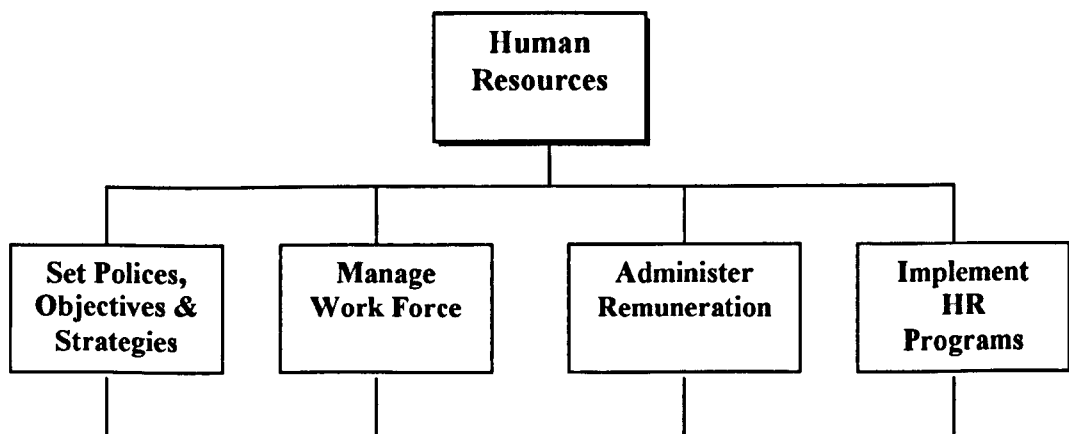
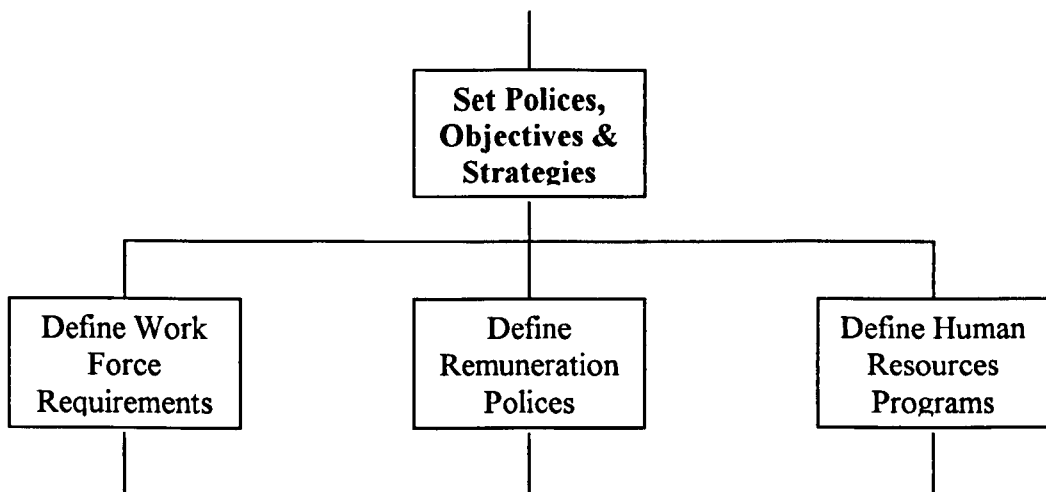


Figure 29. Functional Decomposition diagram of Human Resources (Support Function)

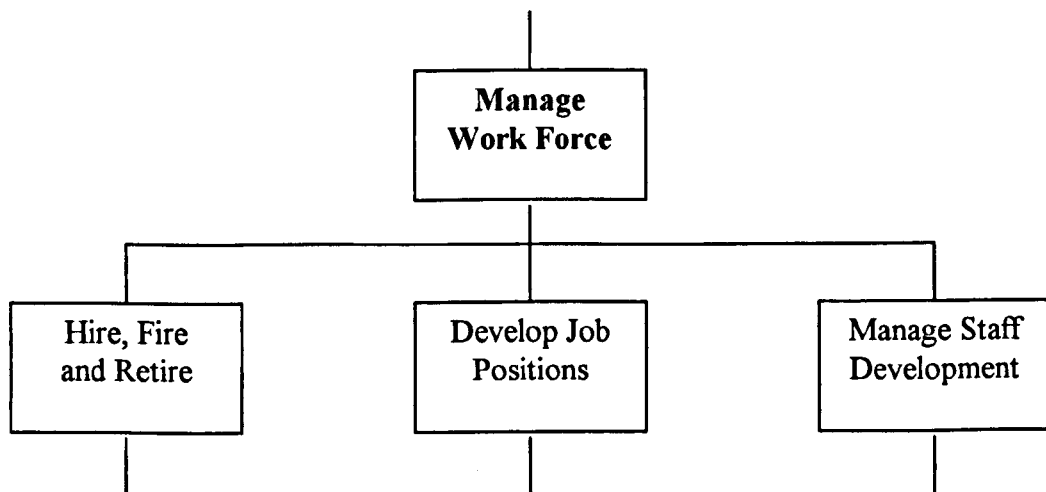
The following processes are addressed under the ‘Human Resources’ function.



Process: SET POLICIES, OBJECTIVES AND STRATEGIES

This process sets overall policies, objectives and personnel strategies. This includes defining pay and benefit plans and practices. In addition, it includes research into comparable and benefits provided by other companies within the Kingdom. This process contains the following sub-processes:

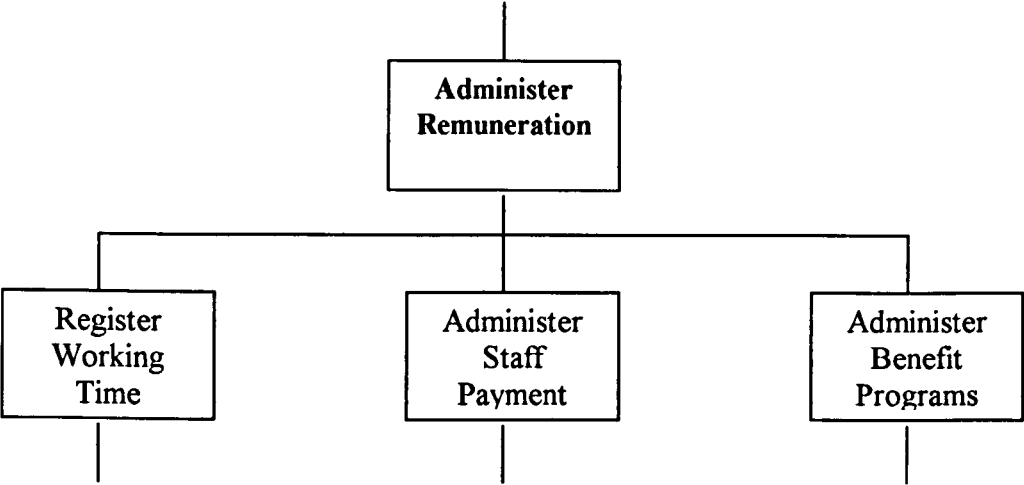
- DEFINE WORK FORCE REQUIREMENTS
- DEFINE REMUNERATION POLICIES
- DEFINE HUMAN RESOURCES PROGRAMS



Process: MANAGE WORK FORCE

This process defines position descriptions and duties of job categories of work performance within the MoPTT. Tasks that are performed in this process include hiring, firing, and retiring personnel. In addition, they include staff career development, the measurement of staff skills and employee satisfaction. This process contains the following sub-processes:

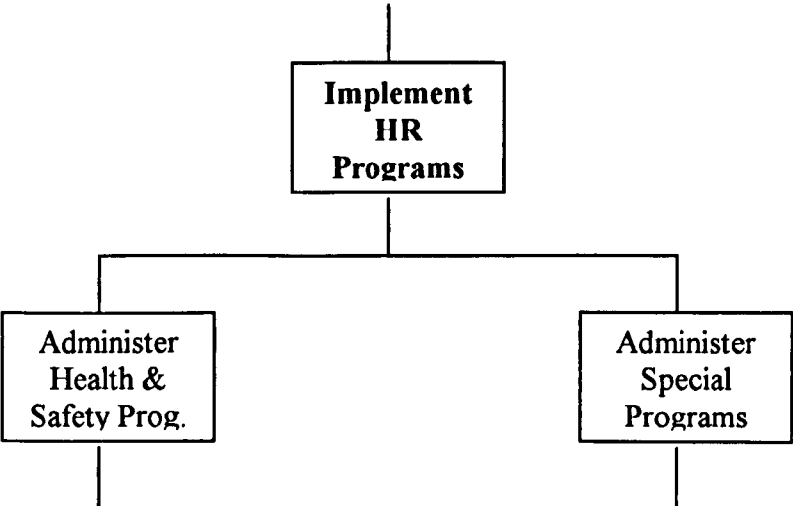
HIRE, FIRE & RETIRE
DEVELOP JOB POSITIONS
MANAGE STAFF DEVELOPMENT



Process: ADMINISTER REMUNERATION

This process registers personnel work times, insures personnel are paid properly, and that benefit programs are administered properly. It contains the following sub-processes:

- REGISTER WORKING TIME
- ADMINISTER STAFF PAYMENT
- ADMINISTER BENEFIT PROGRAMS



Process: IMPLEMENT HR PROGRAMS

This process actively administers and implements health and safety programs and other special programs that are related to the effective and safe utilisation of the MoPTT work force. In addition, the process insures that employment's practices and laws are followed.

This process contains the following sub-processes:

ADMINISTER HEALTH & SAFETY PROGRAMS

ADMINISTER SPECIAL PROGRAMS

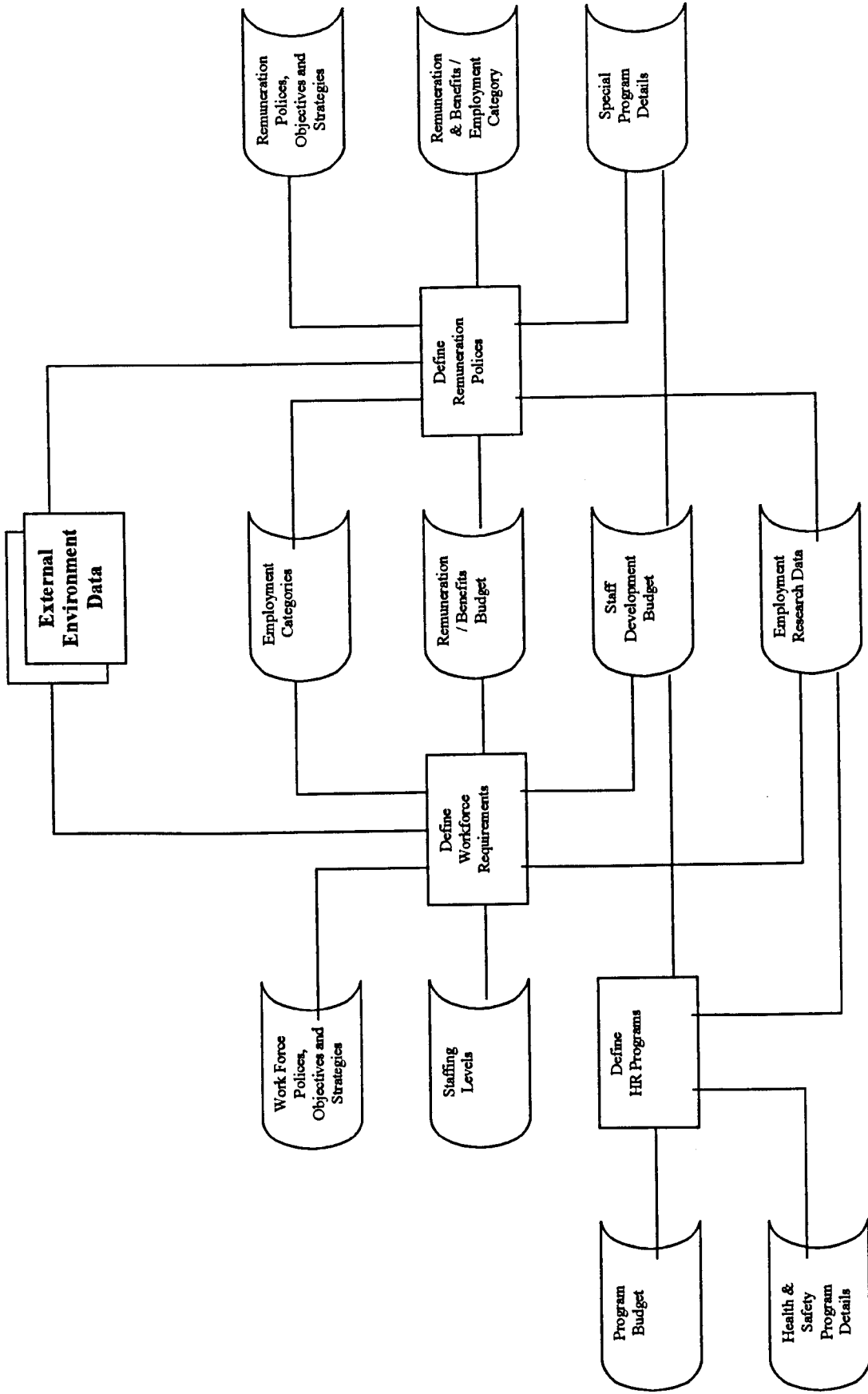


Figure 30. Information Usage Diagram of Human Resources (Set Policies, Objectives and Strategies)

Sub-Process: DEFINE WORKFORCE REQUIREMENTS

This sub-process determines the skill requirements and staffing levels that are needed to effectively carry out the activities of the MoPTT. It is contained in the SET POLICIES, OBJECTIVES, & STRATEGIES process.

Sub-Process: DEFINE REMUNERATION POLICES

This sub-process defines the MoPTT pay and benefits practices that will be followed by the organisation. It is contained in the SET POLICIES, OBJECTIVES, & STRATEGIES process.

Sub-Process: DEFINE HR PROGRAMS

This sub-process defines the requirements for special and health/safety programs that will be implemented by the MoPTT. It is contained in the SET POLICIES, OBJECTIVES, & STRATEGIES process.

Data Store: PROGRAM BUDGET

This data store contains the details of the budget that is allocated to human resource activities within the MoPTT. It is scoped within the information usage models for the processes IMPLEMENT HR PROGRAMS and SET POLICIES, OBJECTIVES & STRATEGIES.

Data Store: HEALTH & SAFETY PROGRAM DETAILS

This data store contains information description of the various health and safety programs that are planned or implemented by the MoPTT. It is scoped within the information usage models for the processes IMPLEMENT HR PROGRAMS and SET POLICIES, OBJECTIVES & STRATEGIES.

Data Store: WORK FORCE POLICIES, OBJECTIVES & STRATEGIES

This data store contains information about objectives and strategies that are related to the MoPTT's human resource programs. This data store is scoped within the information usage model for the process SET POLICIES, OBJECTIVES & STRATEGIES.

Data Store: STAFFING LEVELS

This data store contains information on the approved staffing levels of the MoPTT. It includes the number of filled and unfilled positions, expected vacancies and committed hiring requests. This data store is scoped within the information usage models for the processes **MANAGE WORK FORCE** and **SET POLICIES, OBJECTIVES & STRATEGIES**.

Data Store: EMPLOYMENT CATEGORIES

This data store contains information on the various job descriptions and job categories within the MoPTT. It is scoped within the information usage models for the processes **MANAGE WORK. FORCE** and **SET POLICIES, OBJECTIVES & STRATEGIES**.

Data Store: REMUNERATION / BENEFITS BUDGET

This data store contains the MoPTT budget allocated to salaries and benefits. It is scoped within the information usage model for the process **SET POLICIES, OBJECTIVES & STRATEGIES**.

Data Store: STAFF DEVELOPMENT BUDGET

This data store contains information on the MoPTT budget that is approved for staff development. It includes total approved budget, expenditures to date and planned expenditures. This data store is scoped within the information usage model for the process **SET POLICIES, OBJECTIVES & STRATEGIES**.

Data Store: EMPLOYMENT RESEARCH DATA

This data store contains information that is provided as a result of research into the job market and pay scales of jobs within the companies operating within the Kingdom and in the telecommunications industry. It is scoped within the information usage model for the process **SET POLICIES, OBJECTIVES & STRATEGIES**.

Data Store: REMUNERATION POLICIES, OBJECTIVES & STRATEGIES

This data store contains information on the objectives and strategies that are related to the payments of wages and benefits. It is scoped within the information usage model for the

process SET POLICIES, OBJECTIVES & STRATEGIES.

Data Store: REMUNERATION & BENEFITS / EMPLOYMENT CATEGORY

This data store contains statistics on remuneration and benefit expenditures by category of employee. It is scoped within the information usage model for the process SET POLICIES, OBJECTIVES & STRATEGIES.

Data Store: SPECIAL PROGRAM DETAILS

This data store contains information on the special programs that are planned or implemented by the MoPTT. It is scoped within the information usage models for the processes IMPLEMENT HR PROGRAMS and SET POLICIES, OBJECTIVES & STRATEGIES.

External Agent: EXTERNAL ENVIRONMENT DATA

This is information on the employee practices that are employed by other companies and governmental entities. It includes pay scales and job descriptions.

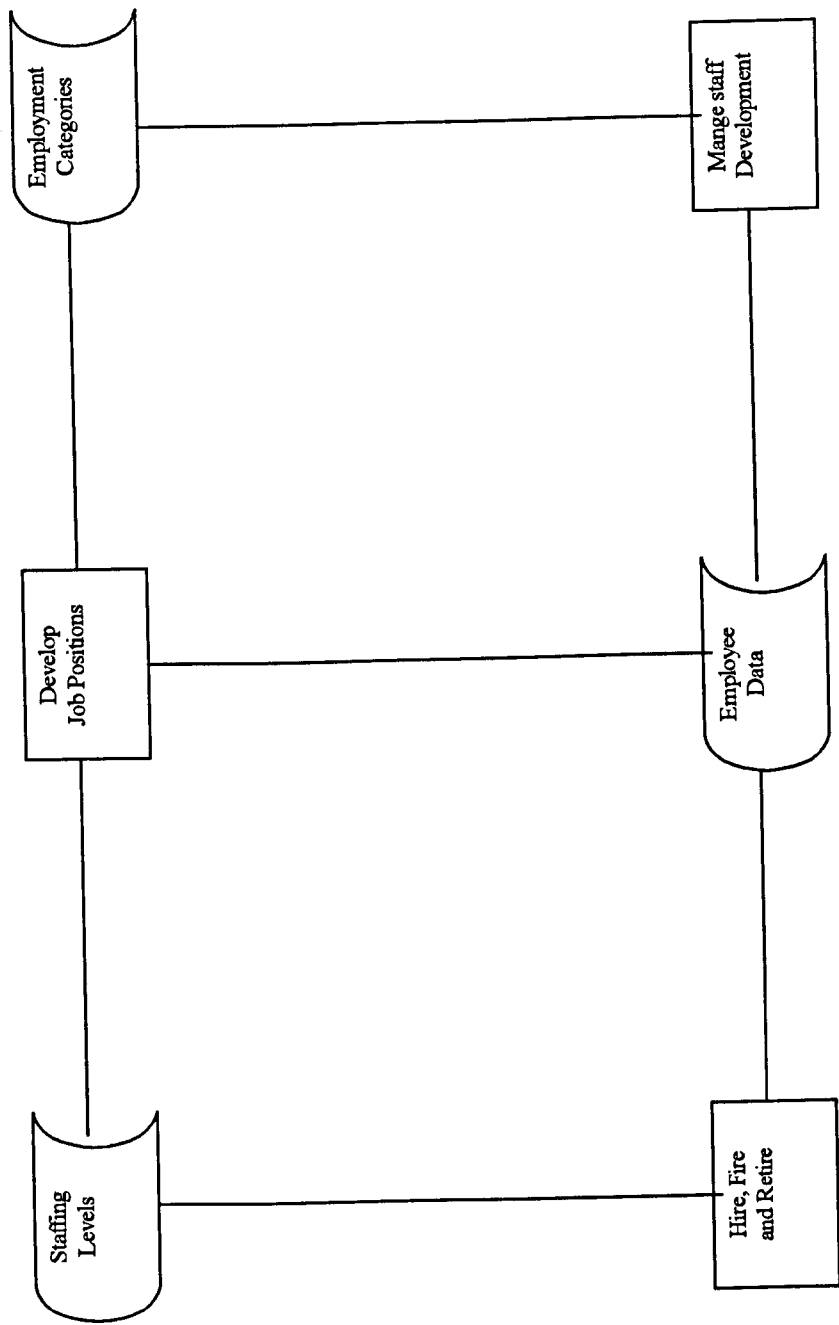


Figure 31. Information Usage Diagram of Human Resources (Manage Work Force)

Sub-Process: HIRE, FIRE & RETIRE

This sub-process deals with hiring, firing and retirement of employees. It includes carrying out redundancy (layoff) programs that are deemed necessary by the MoPTT. In addition, it insures that staff policies are followed when employees are hired, separated, retired or made redundant (laid off). This sub-process is contained in the MANAGE WORK FORCE process.

Sub-Process: DEVELOP JOB POSITIONS

This sub-process defines jobs and categories for each type of work activity that is carried out within the MoPTT. This includes defining wage and salary levels for each position, incentive and bonus programs and carrying out promotions into defined positions. This sub-process is contained in the MANAGE WORK FORCE process.

Sub-Process: MANAGE STAFF DEVELOPMENT

This sub-process manages staff career and skill development, and ensures employee productivity and satisfaction. It is contained in the MANAGE WORK FORCE process.

Data Store: STAFFING LEVELS

This data store contains information on the approved staffing levels of the MoPTT. It includes the number of filled and unfilled positions, expected vacancies and committed hiring requests. This data store is scoped within the information usage models for the processes MANAGE WORK FORCE and SET POLICIES, OBJECTIVES & STRATEGIES.

Data Store: EMPLOYEE DATA

This data store contains information on individual employee. It contains items such as name, address, pay grade, job description, date of hire and years of service. It is scoped within the information usage models for the processes ADMINISTER REMUNERATION and MANAGE WORK FORCE.

Data Store: EMPLOYMENT CATEGORIES

This data store contains information on the various job descriptions and job categories within the MoPTT. It is scoped within the information usage models for the processes **MANAGE WORK FORCE** and **SET POLICIES, OBJECTIVES & STRATEGIES**.

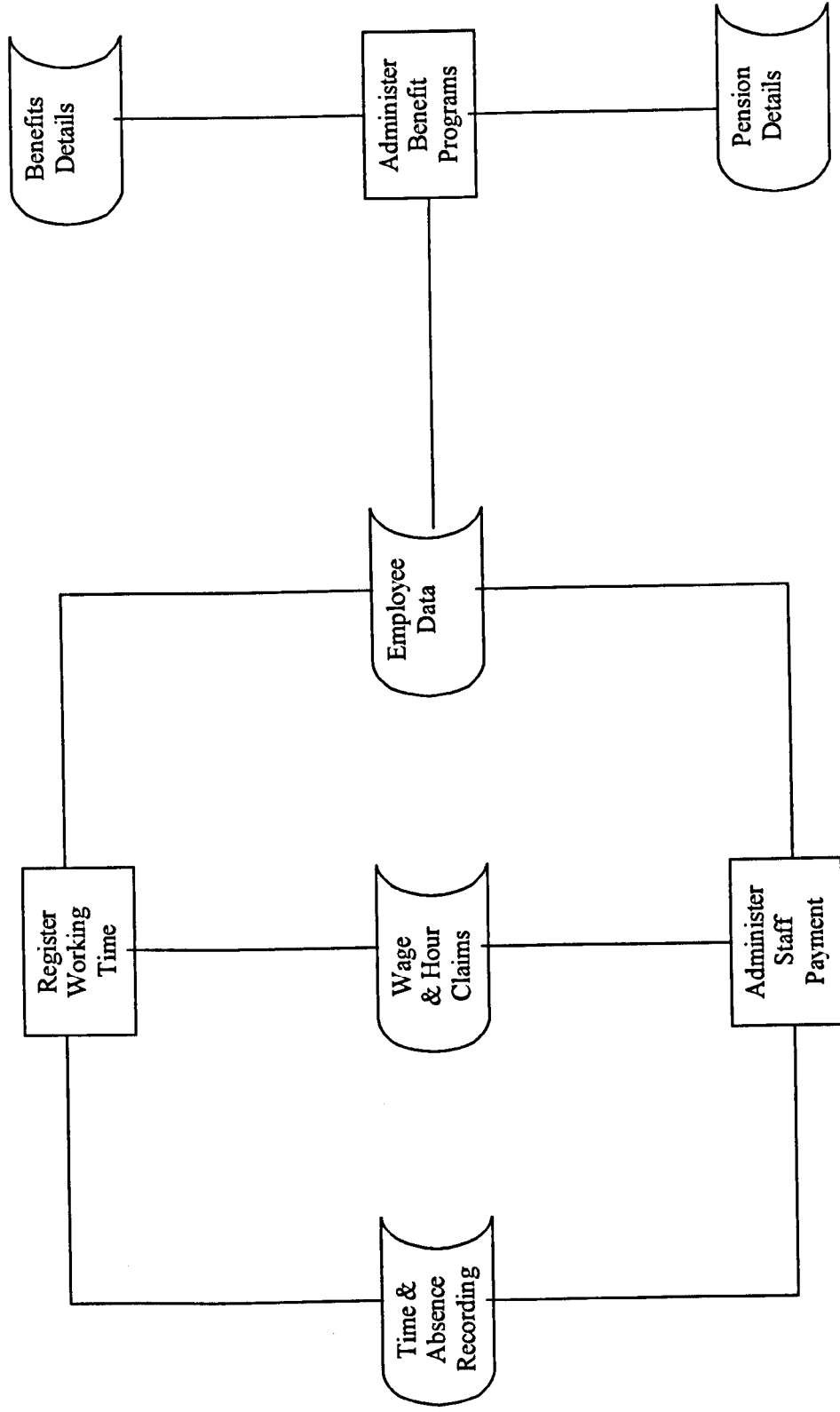


Figure 32. Information Usage Diagram of Human Resources (Administer Remuneration)

Sub-Process: REGISTER WORKING TIME

This sub-process tracks employee working times, absences and information that are needed to pay employee wages and administer wage claims. It is contained in the ADMINISTER REMUNERATION process.

Sub-Process: ADMINISTER STAFF PAYMENT

This sub-process insures that employees' wages and salaries are paid, which are due to them for the work they performed for the MoPTT. It is contained in the ADMINISTER REMUNERATION process.

Sub-Process: ADMINISTER BENEFIT PROGRAMS

This sub-process insures that employee benefits are fairly and equitably provided to employees. It is contained in the ADMINISTER REMUNERATION process.

Data Store: TIME & ABSENCE RECORDING

This data store contains time card and time recording data by employees. It is scoped within the information usage model for the process ADMINISTER REMUNERATION.

Data Store: WAGE AND HOUR CLAIMS

This data store contains information that is needed to institute payment of hourly salaried employees. This data store is scoped within the information usage model for the process ADMINISTER REMUNERATION.

Data Store: EMPLOYEE DATA

This data store contains information on individual employee. It contains items such as name, address, pay grade, job description, date of hire and years of service. It is scoped within the information usage models for the processes ADMINISTER REMUNERATION and MANAGE WORK FORCE.

Data Store: BENEFITS DETAILS

This data store contains information on the benefits plans of the MoPTT. It provides information on plan details and on the terms of coverage. This data store is scoped within the information usage model for the process ADMINISTER REMUNERATION.

Data Store: PENSION DETAILS

This data store contains the pension records of the MoPTT. It contains the history of pension payments. This data store is scoped within the information usage model for the process ADMINISTER REMUNERATION.

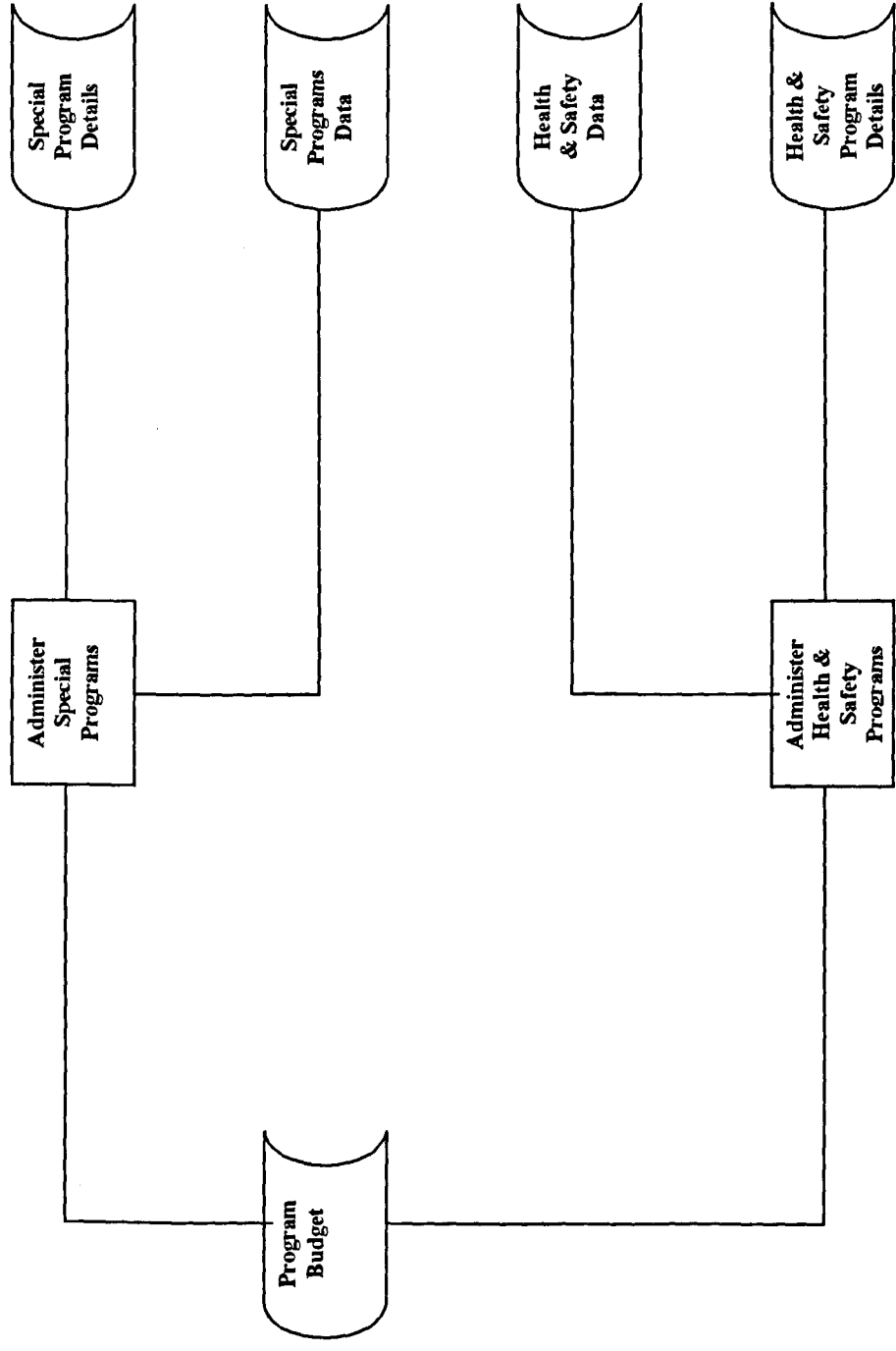


Figure 33. Information Usage Diagram of Human Resources (Implement Human Resources Programs)

Sub-Process: ADMINISTER HEALTH & SAFETY PROGRAMS

This sub-process insures that required health and safety programs are effectively carried out and administered. In addition, it insures that staff safety standards are met and that the MoPTT is in compliance of all Kingdom safety and health standards and laws. This sub-process is contained in the IMPLEMENT HUMAN RESOURCES PROGRAMS process.

Sub-Process: ADMINISTER SPECIAL PROGRAMS

This sub-process administers any special program that is required by the MoPTT and the Kingdom (e.g. Saudisation). It is contained in the IMPLEMENT HUMAN RESOURCES PROGRAMS process.

Data Store: PROGRAM BUDGET

This data store contains the details of the budget that is allocated to human resource activities within the MoPTT. It is scoped within the information usage models for the processes IMPLEMENT HR PROGRAMS and SET POLICIES, OBJECTIVES & STRATEGIES.

Data Store: SPECIAL PROGRAM DETAILS

This data store contains information on the special programs that are planned or implemented by the MoPTT. It is scoped within the information usage models for the processes IMPLEMENT HR PROGRAMS and SET POLICIES, OBJECTIVES & STRATEGIES.

Data Store: SPECIAL PROGRAMS DATA

This data store contains information that is related to the implementation of the MoPTT's special programs. It is used to monitor program effectiveness and cost. This data store is scoped within the information usage model for the process IMPLEMENT HR PROGRAMS.

Data Store: HEALTH & SAFETY DATA

This data store contains the database of health and safety information. It tracks pertinent information that is needed to administer and monitor the health and safety programs. This

data store is scoped within the information usage model for the process IMPLEMENT HR PROGRAMS.

Data Store: HEALTH & SAFETY PROGRAM DETAILS

This data store contains information description of the various health and safety programs that are planned or implemented by the MoPTT. It is scoped within the information usage models for the processes IMPLEMENT HR PROGRAMS and SET POLICIES, OBJECTIVES & STRATEGIES.

8. Material Management Function

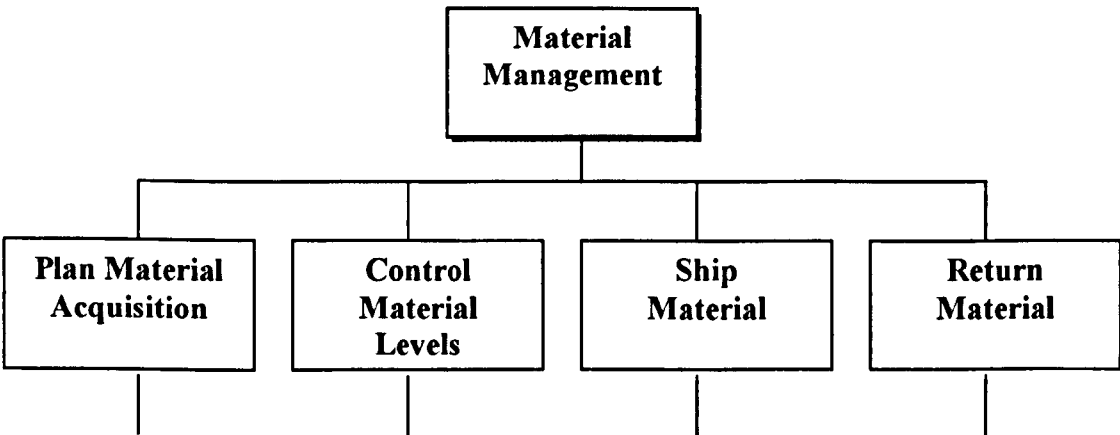
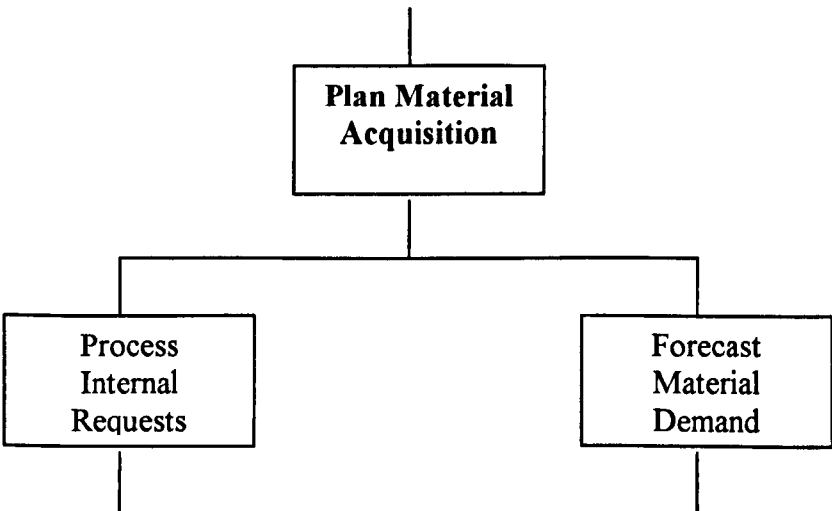


Figure 34. Functional Decomposition diagram of Material Management (Support Function)

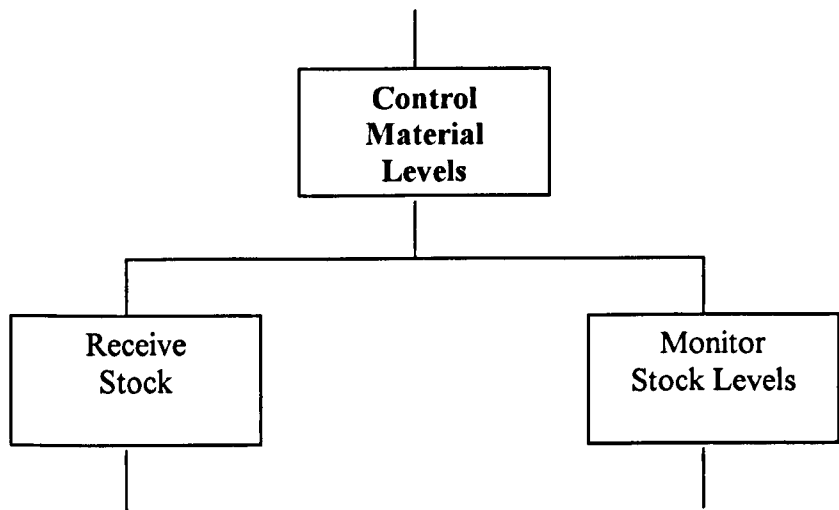
The following processes are addressed under the ‘Material Management’ function.



Process: PLAN MATERIAL ACQUISITION

This process deals with processing internal requests for material, determining acceptable vendors and issuing purchasing orders to appropriate vendors for the needed materials. In addition, it attempts to forecast demand for materials. This process contains the following sub-processes:

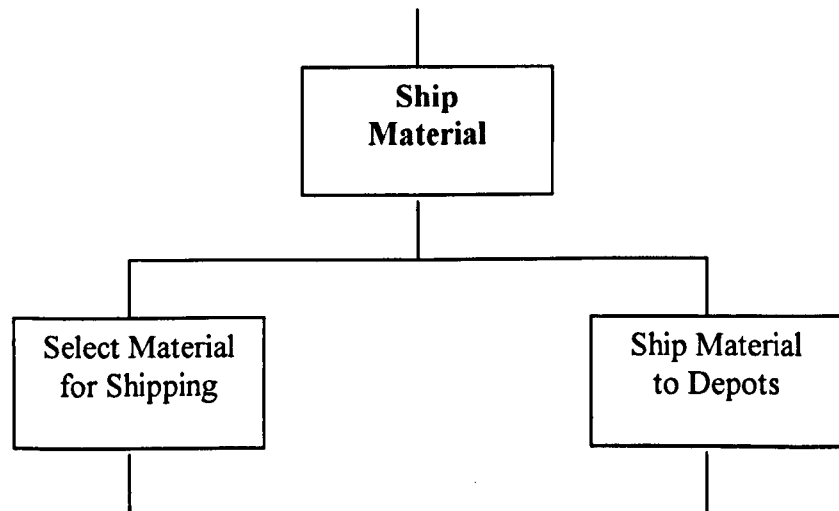
PROCESS INTERNAL REQUESTS
FORECAST MATERIAL DEMAND



Process: CONTROL MATERIAL LEVELS

This process deals with ensuring that adequate levels of inventory are kept on hand. The process receives material and inspects it for acceptance from the vendor. In addition, it monitors inventory levels to prevent excessive or out of stock conditions. This process contains the following sub-processes:

RECEIVE STOCK
MONITOR STOCK LEVEL

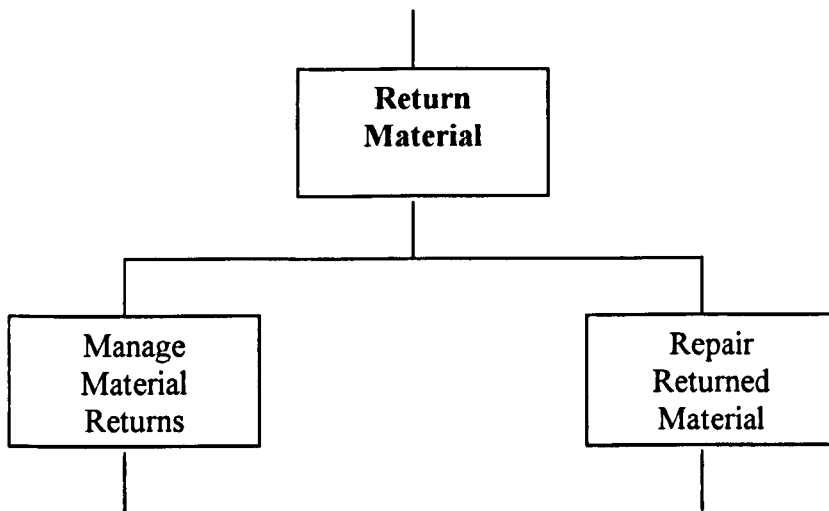


Process: SHIP MATERIAL

This process deals with the transportation of materials, either from vendors to the MoPTT locations or between the MoPTT locations. It includes selecting the material that will be shipped and dispatching items to shipper for transportation from the origination point to the destination point. This process contains the following sub-processes:

SELECT MATERIAL FOR SHIPPING

SHIP MATERIAL TO DEPOTS



Process: RETURN MATERIAL

This process manages the return of defective material, which is received from a vendor, or returning unordered goods. In addition, it deals with the repair of defective material that is currently in stock. This process contains the following sub-processes:

MANAGE MATERIAL RETURNS

REPAIR RETURNED MATERIAL

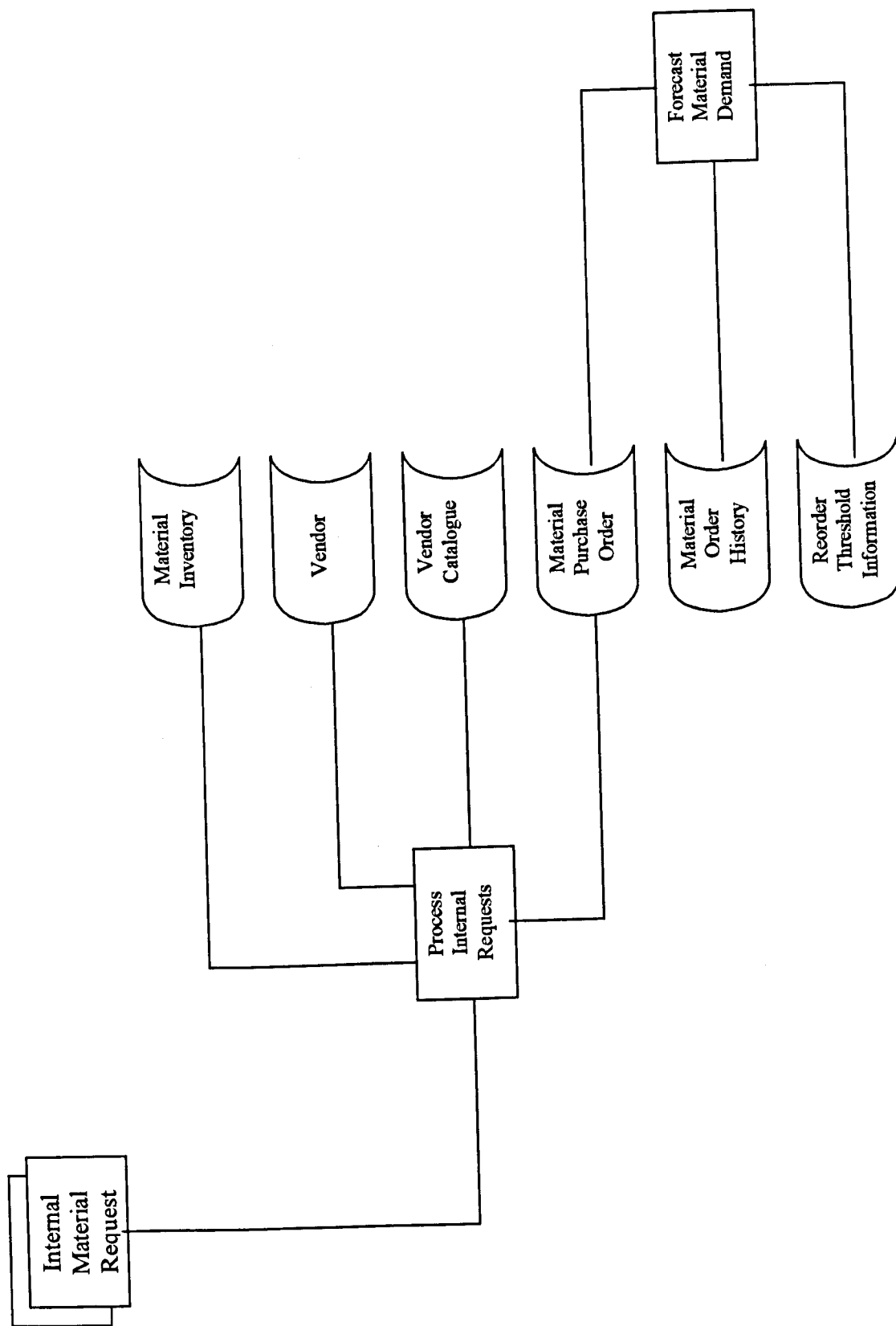


Figure 35. Information Usage Diagram of Materials Management (Plan Material Acquisition)

Sub-Process: PROCESS INTERNAL REQUESTS

This sub-process receives request for material, conducts a search for appropriate vendor, and issues purchase orders to that vendor. It is contained in the PLAN MATERIAL ACQUISITION process.

Sub-Process: FORECAST MATERIAL DEMAND

This sub-process monitors material usage and forecast & reports on requirements for material. It is contained in the PLAN MATERIAL ACQUISITION process.

Data Store: MATERIAL INVENTORY

This data store contains the identification, description and quantity of all material acquired, retained and shipped at material depots. It is scoped within the information usage models for the processes CONTROL MATERIAL LEVELS, PLAN MATERIAL ACQUISITION, RETURN MATERIAL and SHIP MATERIAL.

Data Store: VENDOR

This data store contains information on current and potential vendors of materials that the MoPTT deals with. It is scoped within the information usage models for the processes CONTROL MATERIAL LEVELS and PLAN MATERIAL ACQUISITION.

Data Store: VENDOR CATALOGUE

This data store contains identifications and descriptions of the materials that are available from vendors in the Vendor List data store. It is scoped within the information usage model for the process PLAN MATERIAL ACQUISITION.

Data Store: MATERIAL PURCHASE ORDER

This data store contains the orders to outside vendors for materials that are not currently present in the depots. It is scoped within the information usage models for the processes CONTROL MATERIAL LEVELS, PLAN MATERIAL ACQUISITION and SHIP MATERIAL.

Data Store: MATERIAL ORDER HISTORY

This data store contains information on the frequency and quantity of previous material orders for use in forecasting. It is scoped within the information usage model for the process PLAN MATERIAL ACQUISITION.

Data Store: REORDER THRESHOLD INFORMATION

This data store contains information on the necessary quantity of materials that will be maintained in order to ensure prompt delivery of items that are regularly ordered. It is scoped within the information usage models for the processes CONTROL MATERIAL LEVELS and PLAN MATERIAL ACQUISITION.

External Agent: INTERNAL MATERIAL REQUEST

This external agent represents a request from the other functions for materials in order to meet their immediate and long-term needs.

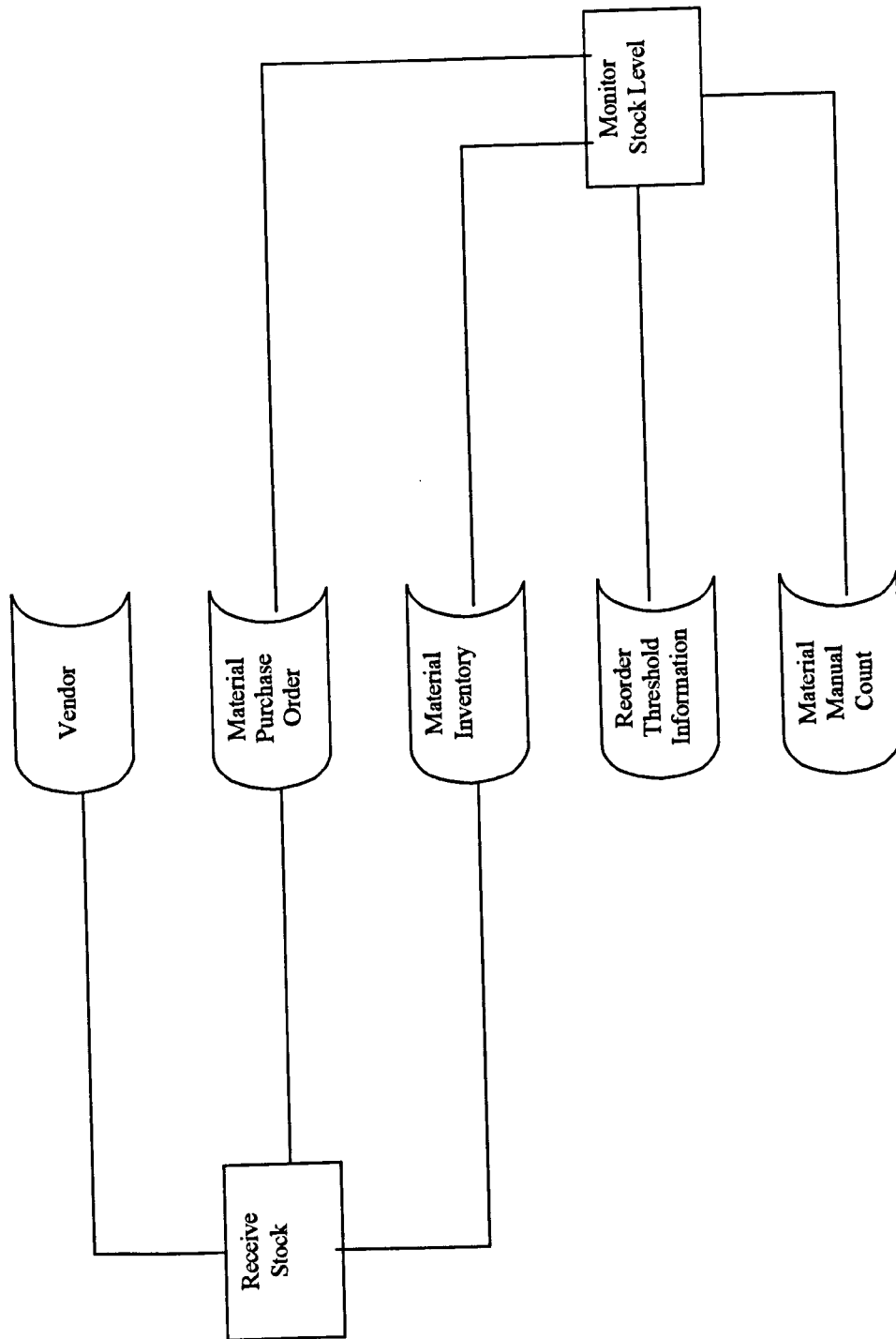


Figure 36. Information Usage Diagram of Materials Management (Control Material Levels)

Sub-Process: RECEIVE STOCK

This sub-process inspects shipments of material from vendors, and evaluates the performance of vendors. It is contained in the CONTROL MATERIAL LEVELS process.

Sub-Process: MONITOR STOCK LEVEL

This sub-process inspects the on-hand inventory, produces inventory reports and reorders material in order to maintain adequate inventory levels. It is contained in the CONTROL MATERIAL LEVELS process.

Data Store: VENDOR

This data store contains information on current and potential vendors of materials that the MoPTT deals with. It is scoped within the information usage models for the processes CONTROL MATERIAL LEVELS and PLAN MATERIAL ACQUISITION.

Data Store: MATERIAL PURCHASE ORDER

This data store contains the orders to outside vendors for materials that are not currently present in the depots. It is scoped within the information usage models for the processes CONTROL MATERIAL LEVELS, PLAN MATERIAL ACQUISITION and SHIP MATERIAL.

Data Store: MATERIAL INVENTORY

This data store contains the identification, description and quantity of all material acquired, retained and shipped at material depots. It is scoped within the information usage models for the processes CONTROL MATERIAL LEVELS, PLAN MATERIAL ACQUISITION, RETURN MATERIAL and SHIP MATERIAL.

Data Store: REORDER THRESHOLD INFORMATION

This data store contains information on the necessary quantity of materials that will be maintained in order to ensure prompt delivery of items that are regularly ordered. It is scoped within the information usage models for the processes CONTROL MATERIAL LEVELS and PLAN MATERIAL ACQUISITION.

Data Store: MATERIAL MANUAL COUNT

This data store contains the results of a manual inventory count in order to be compared with the material inventory data store tracking discrepancies. It is scoped within the information usage model for the process **CONTROL MATERIAL LEVELS**.

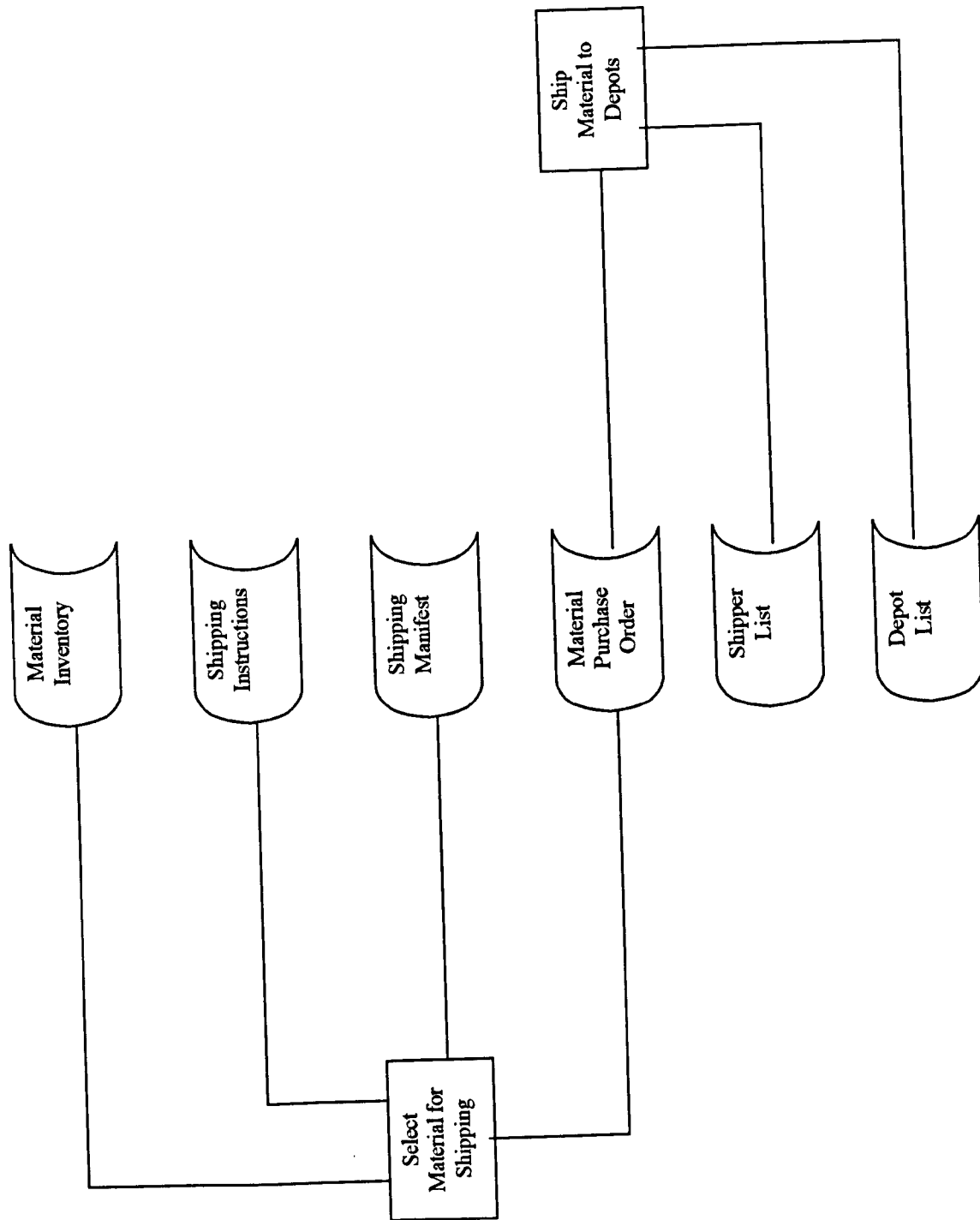


Figure 37. Information Usage Diagram of Materials Management (Ship Material)

Sub-Process: SELECT MATERIAL FOR SHIPPING

This sub-process selects inventory items for shipping to other locations. It is contained in the SHIP MATERIAL process.

Sub-Process: SHIP MATERIAL TO DEPOTS

This sub-process maintains information on shippers and dispatches items in order to be shipped to the appropriate shipper. It is contained in the SHIP MATERIAL process.

Data Store: MATERIAL INVENTORY

This data store contains the identification, description and quantity of all material acquired, retained and shipped at material depots. It is scoped within the information usage models for the processes CONTROL MATERIAL LEVELS, PLAN MATERIAL ACQUISITION, RETURN MATERIAL and SHIP MATERIAL.

Data Store: SHIPPING INSTRUCTIONS

This data store contains the procedures that are required to ship certain items by certain shippers. This includes packing and transport methods as well as restrictions for hazardous items. This data store is scoped within the information usage model for the process SHIP MATERIAL.

Data Store: SHIPPING MANIFEST

This data store contains the identification and quantity of materials that will be shipped to distant depots. It is scoped within the information usage model for the process SHIP MATERIAL.

Data Store: MATERIAL PURCHASE ORDER

This data store contains the orders to outside vendors for materials that are not currently present in the depots. It is scoped within the information usage models for the processes CONTROL MATERIAL LEVELS, PLAN MATERIAL ACQUISITION and SHIP MATERIAL.

Data Store: SHIPPER LIST

This data store contains information on shippers whom the MoPTT contracts in order to ship materials to distant depots. It is scoped within the information usage model for the process SHIP MATERIAL.

Data Store: DEPOT LIST

This data store contains information on locations and ownership of material depots. It is scoped within the information usage model for the process SHIP MATERIAL.

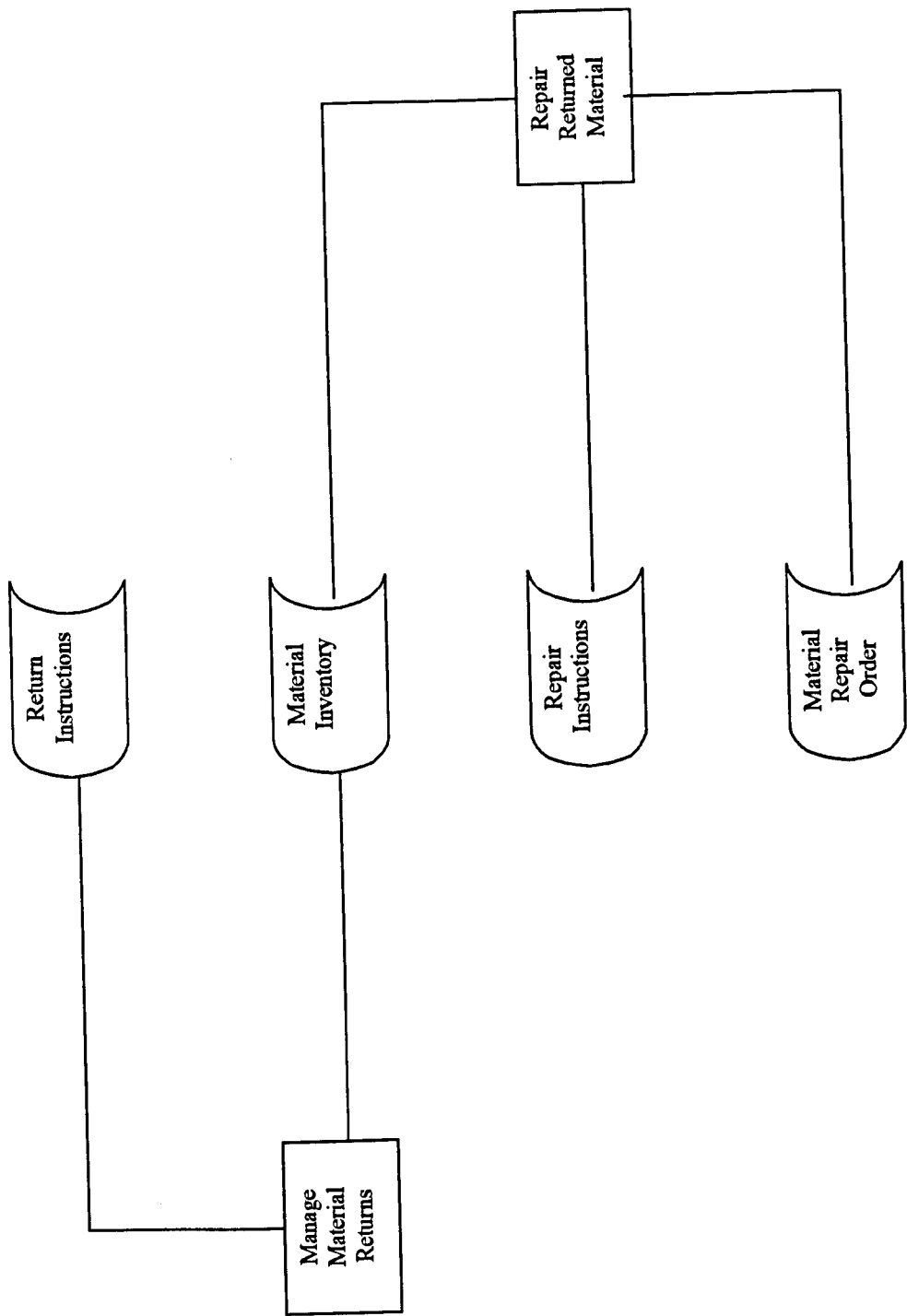


Figure 38. Information Usage Diagram of Materials Management (Return Material)

Sub-Process: MANAGE MATERIAL RETURNS

This sub-process receives returns, processes return instructions and returns the material to the vendor. In addition, it adjusts inventory levels to reflect the reruns made. This sub-process is contained in the RETURN MATERIAL process.

Sub-Process: REPAIR RETURNED MATERIAL

This sub-process prepares repair orders, and executes the order to affect the repair. In addition, it maintains repair status and adjusts inventory to account for the material under repair. This sub-process is contained in the RETURN MATERIAL process.

Data Store: RETURN INSTRUCTIONS

This data store contains information on how to return or replace certain materials that may have vendor warranties. It is scoped within the information usage model for the process RETURN MATERIAL.

Data Store: MATERIAL INVENTORY

This data store contains the identification, description and quantity of all material acquired, retained and shipped at material depots. It is scoped within the information usage models for the processes CONTROL MATERIAL LEVELS, PLAN MATERIAL ACQUISITION, RETURN MATERIAL and SHIP MATERIAL.

Data Store: REPAIR INSTRUCTIONS

This data store contains information on how to repair certain materials, as authorised by the vendor. It is scoped within the information usage model for the process RETURN MATERIAL.

Data Store: MATERIAL REPAIR ORDER

This data store contains the requests to outside vendors for material repair. It is scoped within the information usage model for the process RETURN MATERIAL.

9. *Training Function*

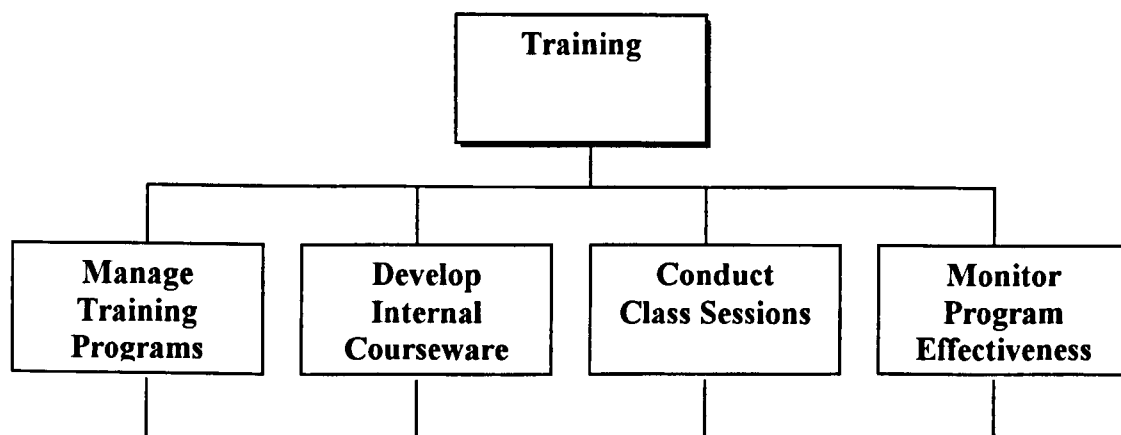
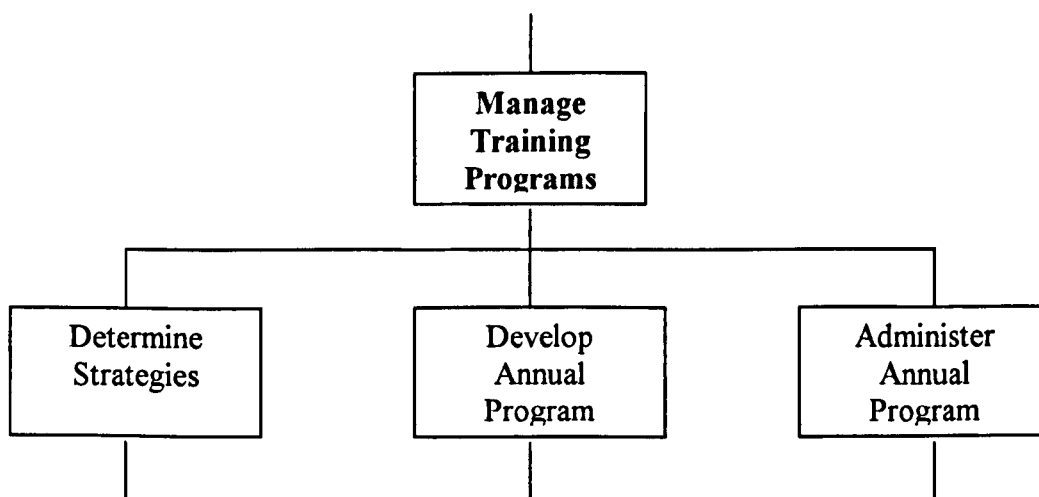


Figure 39. Functional Decomposition diagram of Training (Support Function)

The following processes are addressed under the 'Training' function.



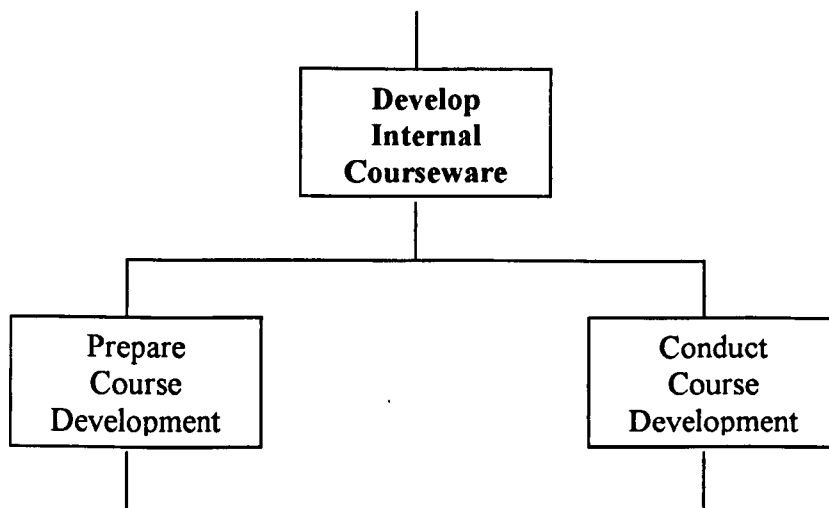
Process: MANAGE TRAINING PROGRAMS

This process manages the MoPTT training programs. The objective is to produce and deliver an annual training program. The program includes both external (training purchased from outside companies) and internal (training developed by the MoPTT) training. This process contains the following sub-processes:

DETERMINE STRATEGIES

DEVELOP ANNUAL PROGRAM

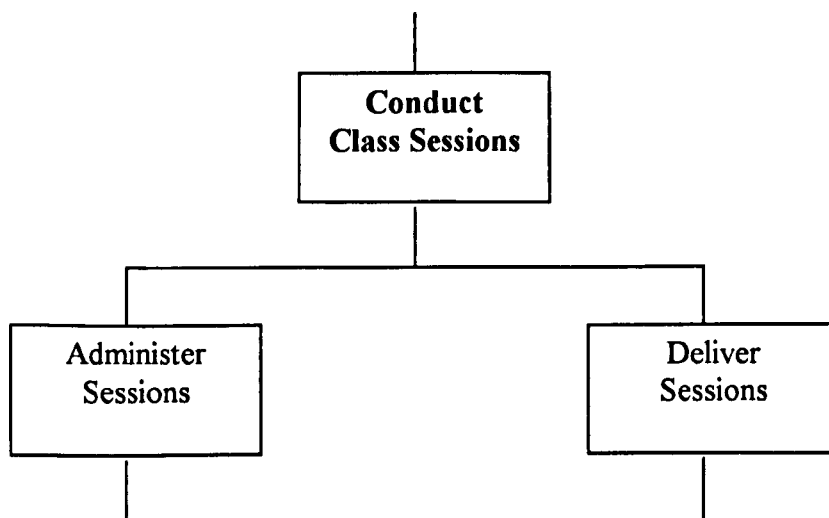
ADMINISTER ANNUAL PROGRAM



Process: DEVELOP INTERNAL COURSEWARE

This process develops and prepares instructor and student materials for courses, which are designated as internal. This process contains the following sub-processes:

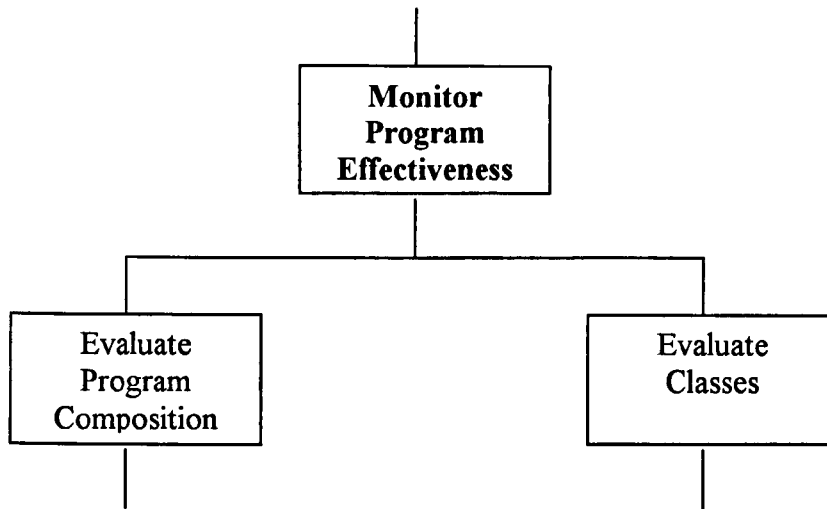
- PREPARE COURSE DEVELOPMENT
- CONDUCT COURSE DEVELOPMENT



Process: CONDUCT CLASS SESSIONS

This process deals with everything related to conducting class sessions, scheduled throughout the year, at specified dates and times. This process contains the following sub-processes:

- ADMINISTER SESSIONS
- DELIVER SESSIONS



Process: MONITOR PROGRAM EFFECTIVENESS

This process is responsible for monitoring the effectiveness of the training program. This monitoring is performed by checking the following three key questions:

- Are the training programs effective in both qualities of content and relevance to the skill needs?
- Are the instructors getting the best out of the class sessions and participating students?
- Are the students making a full use of the training opportunities that are presented to them?

Recommendations for improvements for future training programs are then made. This process contains the following sub-processes:

EVALUATE PROGRAM COMPOSITION

EVALUATE CLASSES

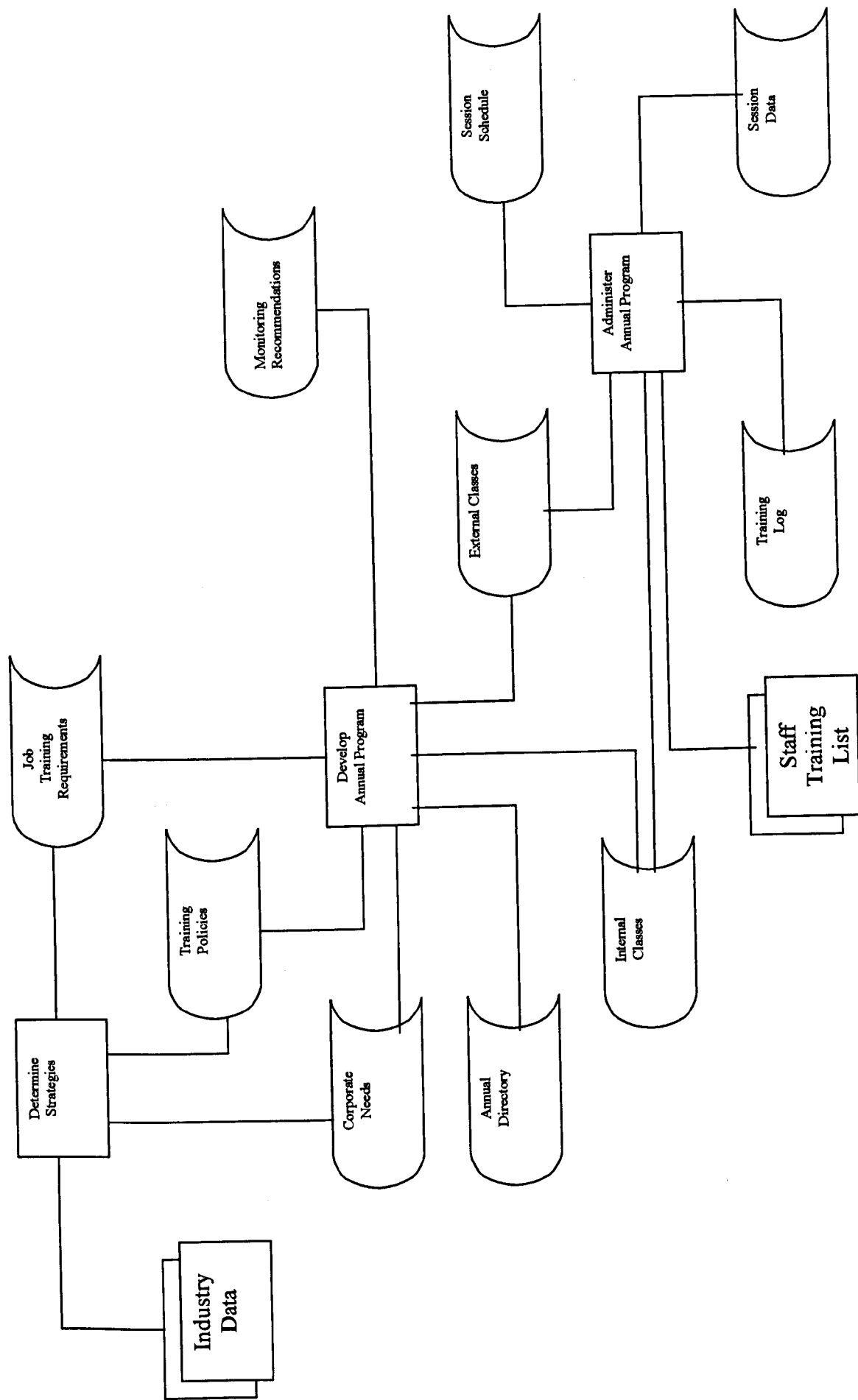


Figure 40. Information Usage Diagram of Training (Manage Training Programs)

Sub-Process: DETERMINE STRATEGIES

This sub-process determines the strategies for corporate training. After conducting study and research, corporate needs are analysed and suitable policies are developed. In addition, the training requirements for specific job functions are developed. This sub-process is contained in the MANAGE TRAINING PROGRAMS process.

Sub-Process: DEVELOP ANNUAL PROGRAM

Each year, a program of corporate training for the year is developed. This sub-process decides which classes are able to be included in the annual program. These classes are further designated as internal or external classes. This sub-process is contained in the MANAGE TRAINING PROGRAMS process.

Sub-Process: ADMINISTER ANNUAL PROGRAM

An ongoing training sub-process, throughout the year, is administration of training. This sub-process encompasses planning of resources, allocating facilities to classes allocating instructors and assigning students to classes. In addition, a training database of information about all aspects of the annual program is maintained. This sub-process is contained in the MANAGE TRAINING PROGRAMS process.

Data Store: CORPORATE NEEDS

This data store contains details of the training needs of the MoPTT, as identified by the DETERMINE STRATEGIES training sub-process. It is scoped within the information usage model for the process MANAGE TRAINING PROGRAMS.

Data Store: ANNUAL DIRECTORY

This data store contains the details of courses, which will be available for the year. It describes the courses, who will supply them, and the dates on which sessions of the courses will be run. However, this data store does not contain details of instructors or students, which is contained in the data store SESSION SCHEDULE. This data store is scoped within the information usage model for the process MANAGE TRAINING PROGRAMS.

Data Store: TRAINING POLICIES

This data store contains information on the training policies that are produced by the DETERMINE STRATEGIES sub-process. It is scoped within the information usage model for the process MANAGE TRAINING PROGRAMS.

Data Store: INTERNAL CLASSES

This data store contains details of classes that will be developed, maintained and run internally by the MoPTT. It is scoped within the information usage models for the processes DEVELOP INTERNAL COURSEWARE and MANAGE TRAINING PROGRAMS.

Data Store: JOB TRAINING REQUIREMENTS

This data store contains details about the training requirements for each job category. It is scoped within the information usage model for the process MANAGE TRAINING PROGRAMS.

Data Store: EXTERNAL CLASSES

This data store contains details of classes, which will be provided by external training suppliers. It is scoped within the information usage model for the process MANAGE TRAINING PROGRAMS.

Data Store: TRAINING LOG

This data store logs information about class sessions, students and instructors. It contains details of who, what and where. It is scoped within the information usage model for the process MANAGE TRAINING PROGRAMS.

Data Store: MONITORING RECOMMENDATIONS

This data store contains details of the training recommendations that are produced by the monitoring process. It is scoped within the information usage models for the processes MANAGE TRAINING PROGRAMS and MONITOR PROGRAMS EFFECTIVENESS.

Data Store: SESSION SCHEDULE

This data store contains the schedule of training class sessions, and their dates and times. It contains details of the instructor that is allocated to the session, and the students who will participate in this session. This data store is scoped within the information usage models for the processes CONDUCT CLASS SESSIONS and MANAGE TRAINING PROGRAMS.

Data Store: SESSION DATA

This data store contains details about each individual session that has been run. It lists who the instructor was and who attended the session. In addition, it captures the evaluation data produced for the session. This data store is scoped within the information usage models for the processes CONDUCT CLASS SESSIONS, MANAGE TRAINING PROGRAMS and MONITOR PROGRAMS EFFECTIVENESS.

External Agent: INDUSTRY DATA

This external data is about the industry and other training comparisons that are used in the training sub-process DETERMINE STRATEGIES. It is the data for the CONDUCT STUDY & RESEARCH task.

External Agent: STAFF TRAINING LIST

Human Resources produces a list of individual training requirements. This external data store, which is used by the training function, captures details of these training requirements.

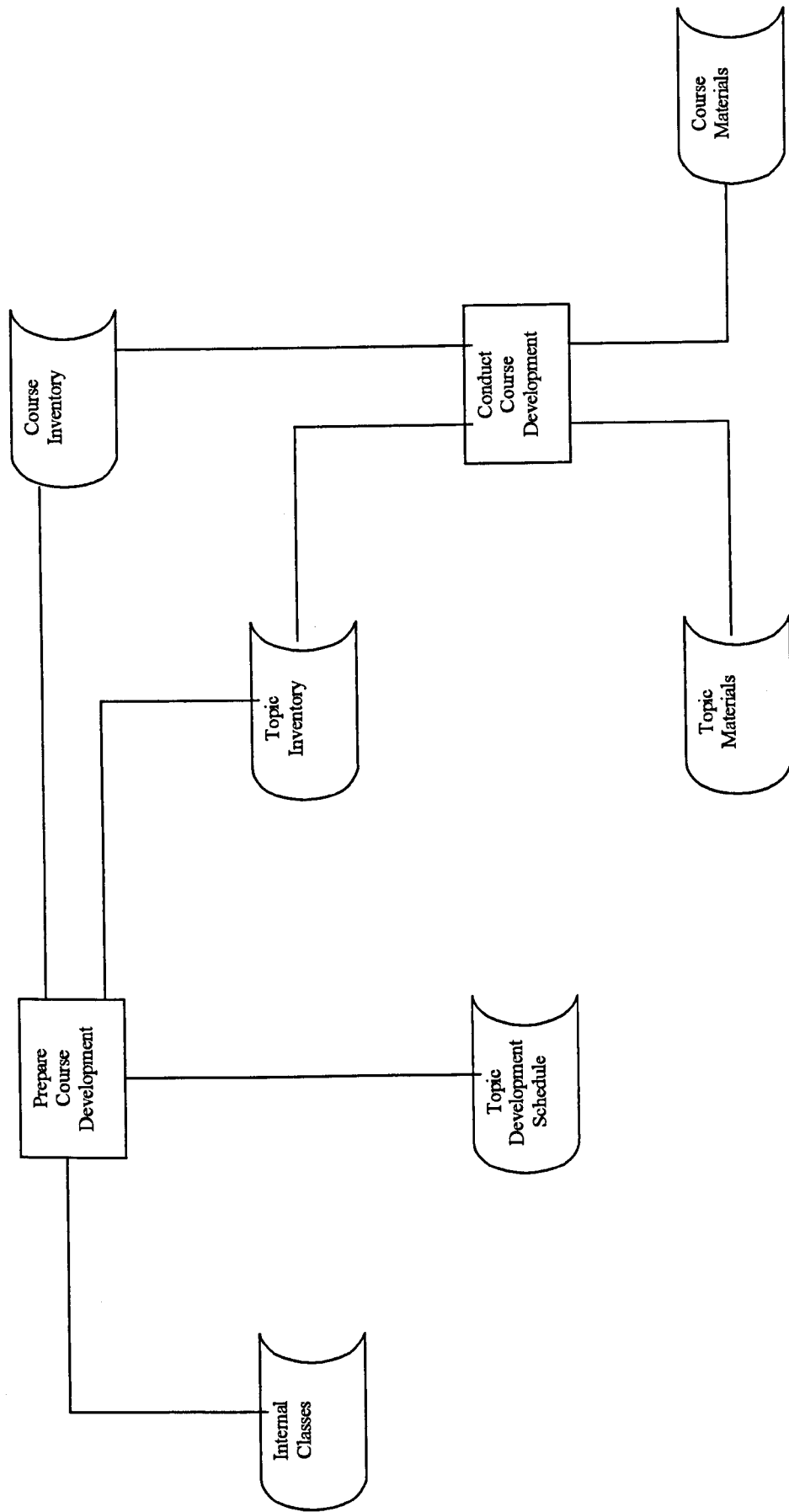


Figure 41. Information Usage Diagram of Training (Develop Internal Courseware)

Sub-Process: PREPARE COURSE DEVELOPMENT

Preparation for developing courses is covered in this sub-process. Courses are developed by topic. Initially, courses are split-up into topics, and each topic is allocated to a developer. The project planning, in terms of development time and target completion dates, is also done in this sub-process. This sub-process is contained in the DEVELOP INTERNAL COURSEWARE process.

Sub-Process: CONDUCT COURSE DEVELOPMENT

This sub-process covers the mechanics of developing the topics, and assembling them into courses. It is contained in the DEVELOP INTERNAL COURSEWARE process.

Data Store: INTERNAL CLASSES

This data store contains details of classes that will be developed, maintained and run internally by the MoPTT. It is scoped within the information usage models for the processes DEVELOP INTERNAL COURSEWARE and MANAGE TRAINING PROGRAMS.

Data Store: TOPIC DEVELOPMENT SCHEDULE

This data store contains details of who will develop the topics, and when they are targeted for completion. It is scoped within the information usage model for the process DEVELOP INTERNAL COURSEWARE.

Data Store: TOPIC INVENTORY

This data store contains details of all topics that are completed, under development, and under revision. It is scoped within the information usage model for the process DEVELOP INTERNAL COURSEWARE.

Data Store: TOPIC MATERIALS

This data store contains the electronic form of materials that are produced during topic development. It is scoped within the information usage model for the process DEVELOP INTERNAL COURSEWARE.

Data Store: COURSE INVENTORY

This data store contains details of all courses that are completed, under development, and under revision. It is scoped within the information usage model for the process DEVELOP INTERNAL COURSEWARE.

Data Store: COURSE MATERIALS

This data store contains details of the assembly process for combining topics into courses, and the electronic form of tables of contents, indexes etc. that are required by individual courses. It is scoped within the information usage model for the process DEVELOP INTERNAL COURSEWARE.

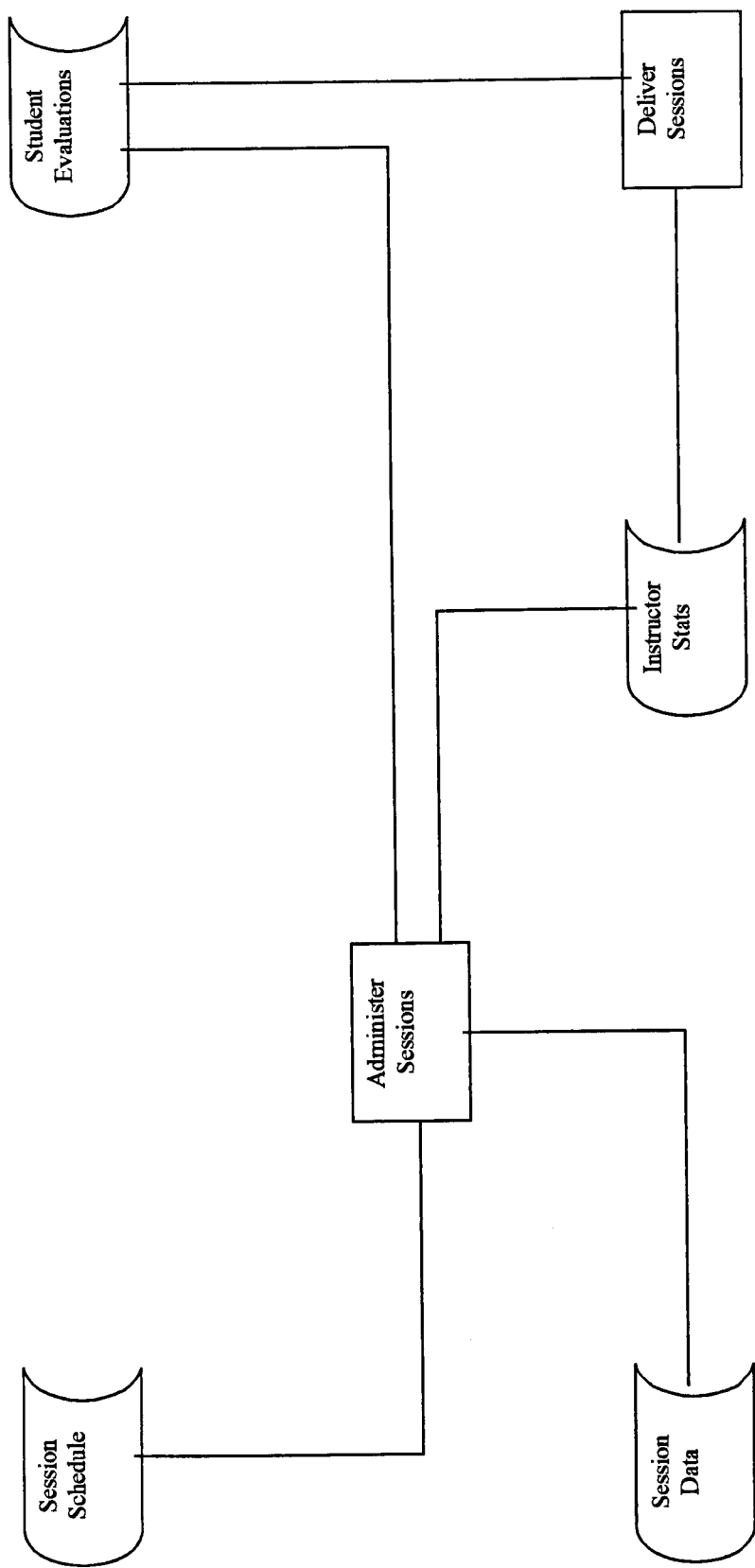


Figure 42. Information Usage Diagram of Training (Conduct Class Sessions)

Sub-Process: ADMINISTER SESSIONS

Each session of each class requires its own administration. Details of instructor and students are confirmed at the start of the class session, and evaluation materials collected at the end of it. This sub-process is contained in the CONDUCT CLASS SESSIONS process.

Sub-Process: DELIVER SESSIONS

This sub-process deals with the mechanics of delivering each class session, and then evaluating them. Evaluation here is of just the individual session. Evaluation that is more global takes place during the monitoring process. This sub-process is contained in the CONDUCT CLASS SESSIONS process.

Data Store: SESSION SCHEDULE

This data store contains the schedule of training class sessions, and their dates and times. It contains details of the instructor that is allocated to the session, and the students who will participate in this session. This data store is scoped within the information usage models for the processes CONDUCT CLASS SESSIONS and MANAGE TRAINING PROGRAMS.

Data Store: SESSION DATA

This data store contains details about each individual session that has been run. It lists who the instructor was and who attended the session. In addition, it captures the evaluation data produced for the session. This data store is scoped within the information usage models for the processes CONDUCT CLASS SESSIONS, MANAGE TRAINING PROGRAMS and MONITOR PROGRAM EFFECTIVENESS.

Data Store: INSTRUCTOR STATISTICS

This data store contains statistics of all the evaluations that are produced about each individual instructor from all the sessions that the instructor has taught. It is scoped within the information usage models for the processes CONDUCT CLASS SESSIONS and MONITOR PROGRAM EFFECTIVENESS.

Data Store: STUDENT EVALUATIONS

This data store contains details of the student evaluations that are produced by the students, after each class session. It is scoped within the information usage model for the process CONDUCT CLASS SESSIONS.

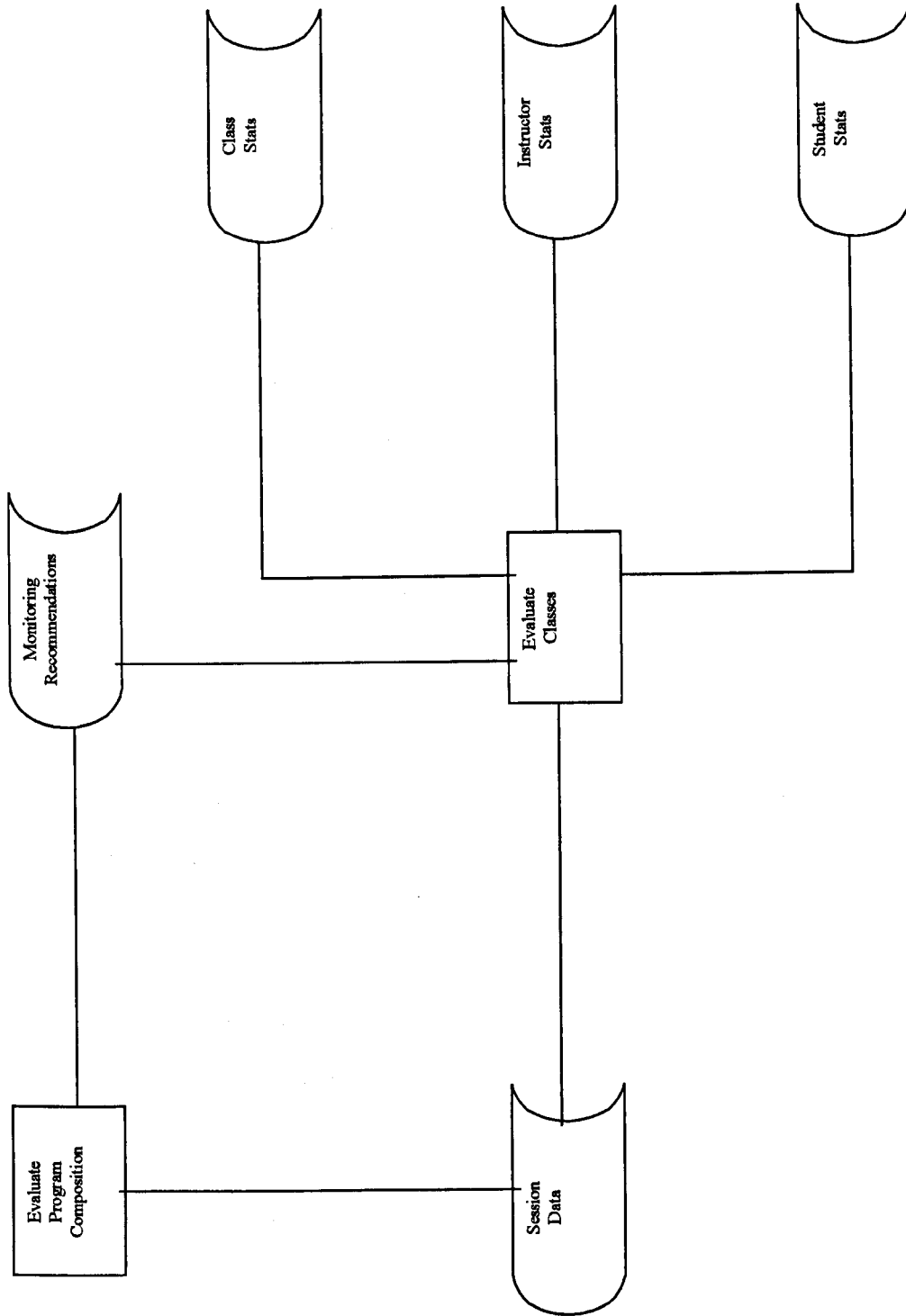


Figure 43. Information Usage Diagram of Training (Monitor Program Effectiveness)

Sub-Process: EVALUATE PROGRAM COMPOSITION

This sub-process evaluates the programs in order to check if they are meeting their training objectives. It is contained in the MONITOR PROGRAM EFFECTIVENESS process.

Sub-Process: EVALUATE CLASSES

This sub-process evaluates each type of class. The relevant information about each session of the class that was held is analysed and evaluated. This sub-process is contained in the MONITOR PROGRAM EFFECTIVENESS process.

Data Store: SESSION DATA

This data store contains details about each individual session that has been run. It lists who the instructor was and who attended the session. In addition, it captures the evaluation data produced for the session. This data store is scoped within the information usage models for the processes CONDUCT CLASS SESSIONS, MANAGE TRAINING PROGRAMS and MONITOR PROGRAM EFFECTIVENESS.

Data Store: MONITORING RECOMMENDATIONS

This data store contains details of the training recommendations that are produced by the monitoring process. It is scoped within the information usage models for the processes MANAGE TRAINING PROGRAMS and MONITOR PROGRAM EFFECTIVENESS.

Data Store: CLASS STATISTICS

This data store contains statistics of all evaluations that are related to individual classes. It is scoped within the information usage model for the process MONITOR PROGRAM EFFECTIVENESS.

Data Store: INSTRUCTOR STATISTICS

This data store contains statistics of all the evaluations that are produced about each individual instructor from all the sessions that the instructor has taught. It is scoped within the information usage models for the processes CONDUCT CLASS SESSIONS and MONITOR PROGRAM EFFECTIVENESS.

Data Store: STUDENT STATISTICS

This data store contains statistics about each individual student from all the class sessions, which the student has attended. It is scoped within the information usage model for the process MONITOR PROGRAM EFFECTIVENESS.

10. Buildings and Land Management Function

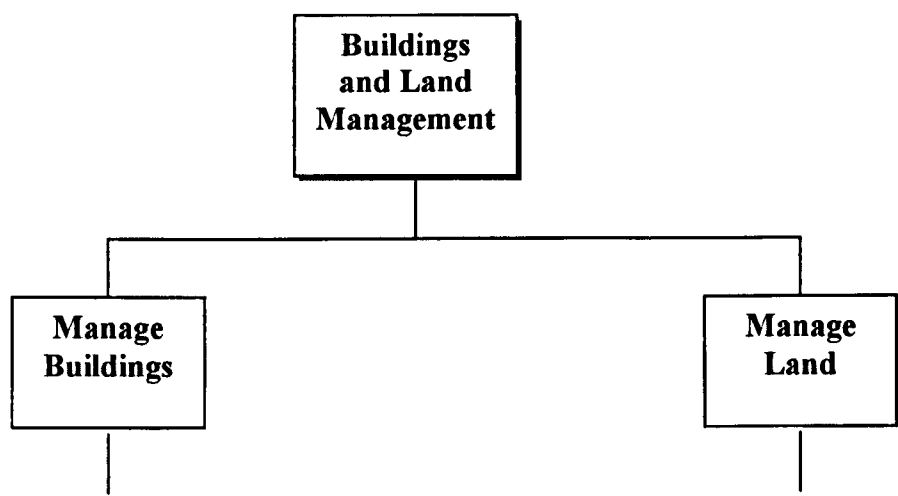
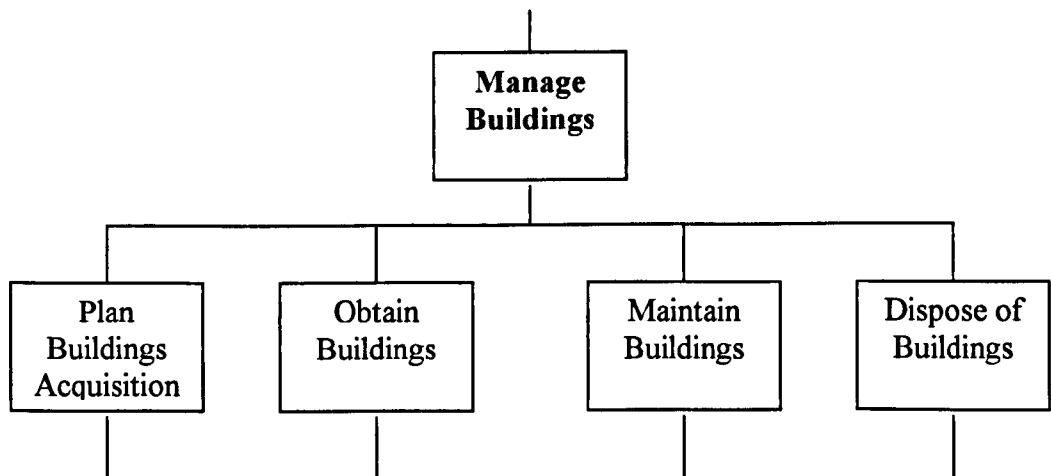


Figure 44. Functional Decomposition diagram of Buildings & Land Management (Support Function)

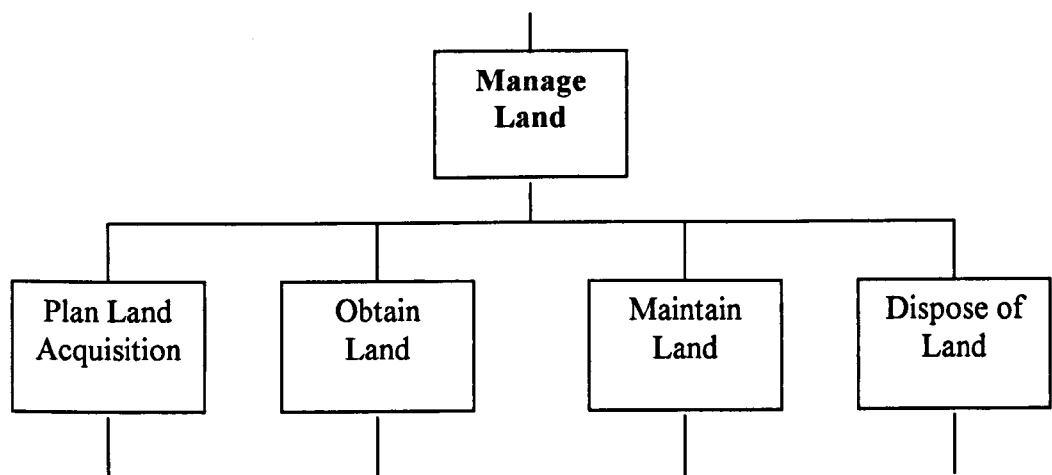
The following processes are addressed under the ‘Building and Land Management’ function.



Process: MANAGE BUILDINGS

This process begins with determining the building requirements of the MoPTT. Once requirements are determined, the process acquires the needed building and maintains it once it is acquired. In addition, the process deals with the disposal of buildings that no longer serve the needs of the MoPTT. This process contains the following sub-processes:

- PLAN BUILDINGS ACQUISITION
- OBTAIN BUILDINGS
- MAINTAIN BUILDINGS
- DISPOSE OF BUILDINGS



Process: MANAGE LAND

This process begins with determining the land needs of the MoPTT. Once requirements are determined, the process acquires the needed land, and maintains it once it is acquired. In addition, the process deals with the disposal land holdings that no longer serve the needs of the MoPTT. This process contains the following sub-processes:

- PLAN LAND ACQUISITION
- OBTAIN LAND
- MAINTAIN LAND
- DISPOSE OF LAND

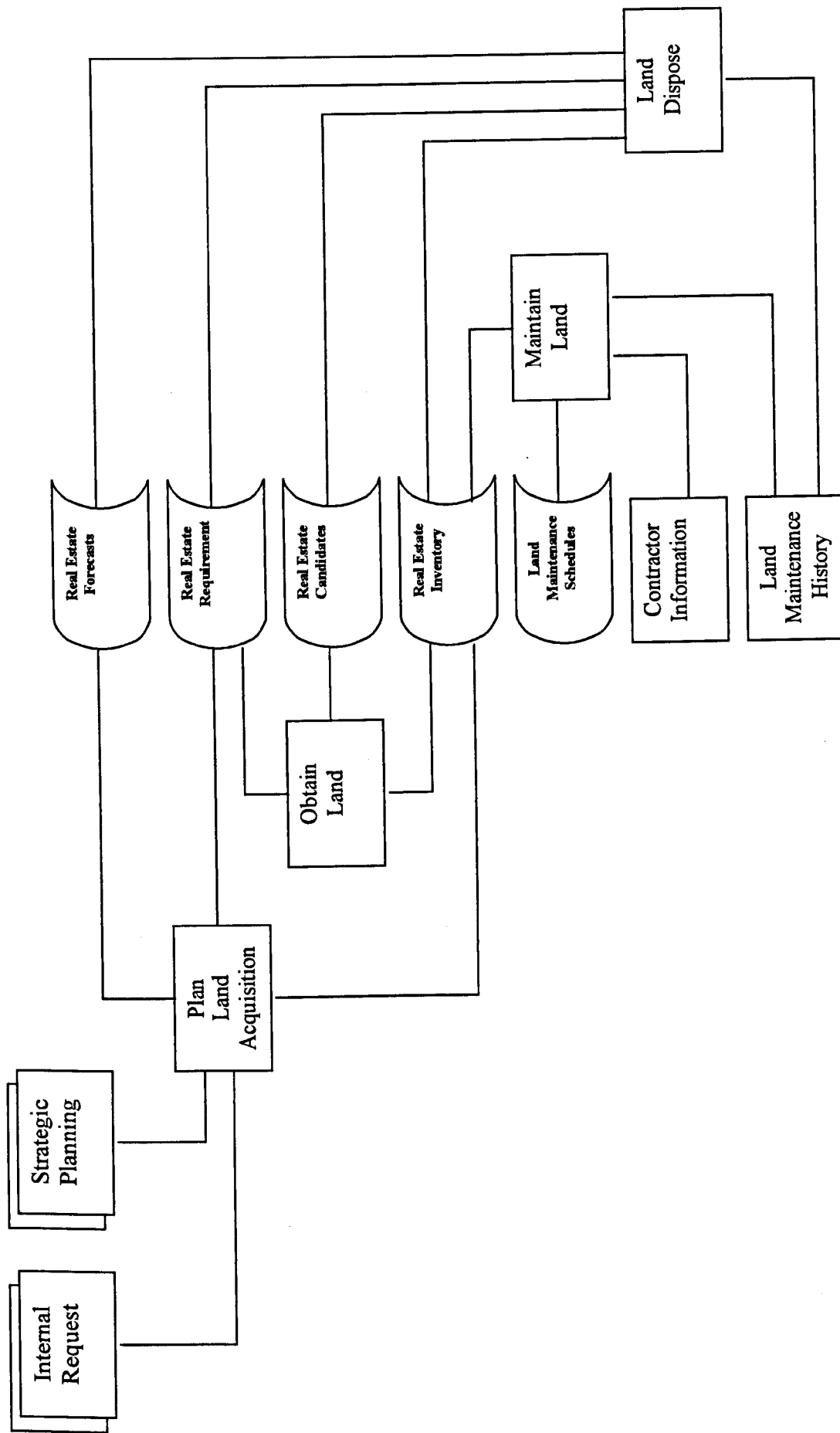


Figure 45. Information Usage Diagram of Buildings and Land Management (Manage Land)

Sub-Process: PLAN LAND ACQUISITION

This sub-process determines the land needs of the MoPTT. It defines priorities, determines cost of acquisition, and determines affordability. In addition, it forecasts land needs and processes requests for land acquisition. This sub-process is contained in the MANAGE LAND process.

Sub-Process: OBTAIN LAND

This sub-process carries out searches for appropriate properties and initiates the purchase, or leasing of the property. It is contained in the MANAGE LAND process.

Sub-Process: MAINTAIN LAND

This sub-process carries out land improvements, performs landscaping and maintenance. In addition, it provides outside security. This sub-process is contained in the MANAGE LAND process.

Sub-Process: DISPOSE OF LAND

This sub-process carries out tasks that are related to the disposal of a piece of land property that no longer fits the needs of the MoPTT. It is contained in the MANAGE LAND process.

Data Store: CONTRACTOR INFORMATION

This data store contains information about companies that the MoPTT wants to consider for the building or refurbishing of structures on the MoPTT properties. It is scoped within the information usage models for the processes MANAGE BUILDINGS and MANAGE LAND.

Data Store: LAND MAINTENANCE HISTORY

This data store contains details of scheduled and incidental repairs that are completed at the MoPTT properties. It is scoped within the information usage model for the process MANAGE LAND.

Data Store: LAND MAINTENANCE SCHEDULES

This data store contains dates about when maintenance should be completed at the MoPTT properties. It is scoped within the information usage model for the process MANAGE LAND.

Data Store: REAL ESTATE CANDIDATES

This data store contains information on possible locations for new offices or depots, including landowner information and real estate agencies. It is scoped within the information usage model for the process MANAGE LAND.

Data Store: REAL ESTATE FORECASTS

This data store contains predictions of when land will be needed for expansion and helps in determining whether land should be rented out, leased, sold to other organisations or retained for future use. It is scoped within the information usage model for the process MANAGE LAND.

Data Store: REAL ESTATE INVENTORY

This data store contains location information on properties owned, leased or rented by the MoPTT. It is scoped within the information usage models for the processes MANAGE BUILDINGS and MANAGE LAND.

Data Store: REAL ESTATE REQUIREMENTS

This data store contains details of current real estate needs that are used to determine if land should be obtained or disposed. It is scoped within the information usage model for the process MANAGE LAND.

External Agent: INTERNAL REQUEST

This external agent represents a request from another function for new land, buildings or a structural enhancement to an existing building.

External Agent: STRATEGIC PLANNING

This external agent represents the rules for the procurement or enhancement of land and buildings, as prescribed by the Strategic Planning.

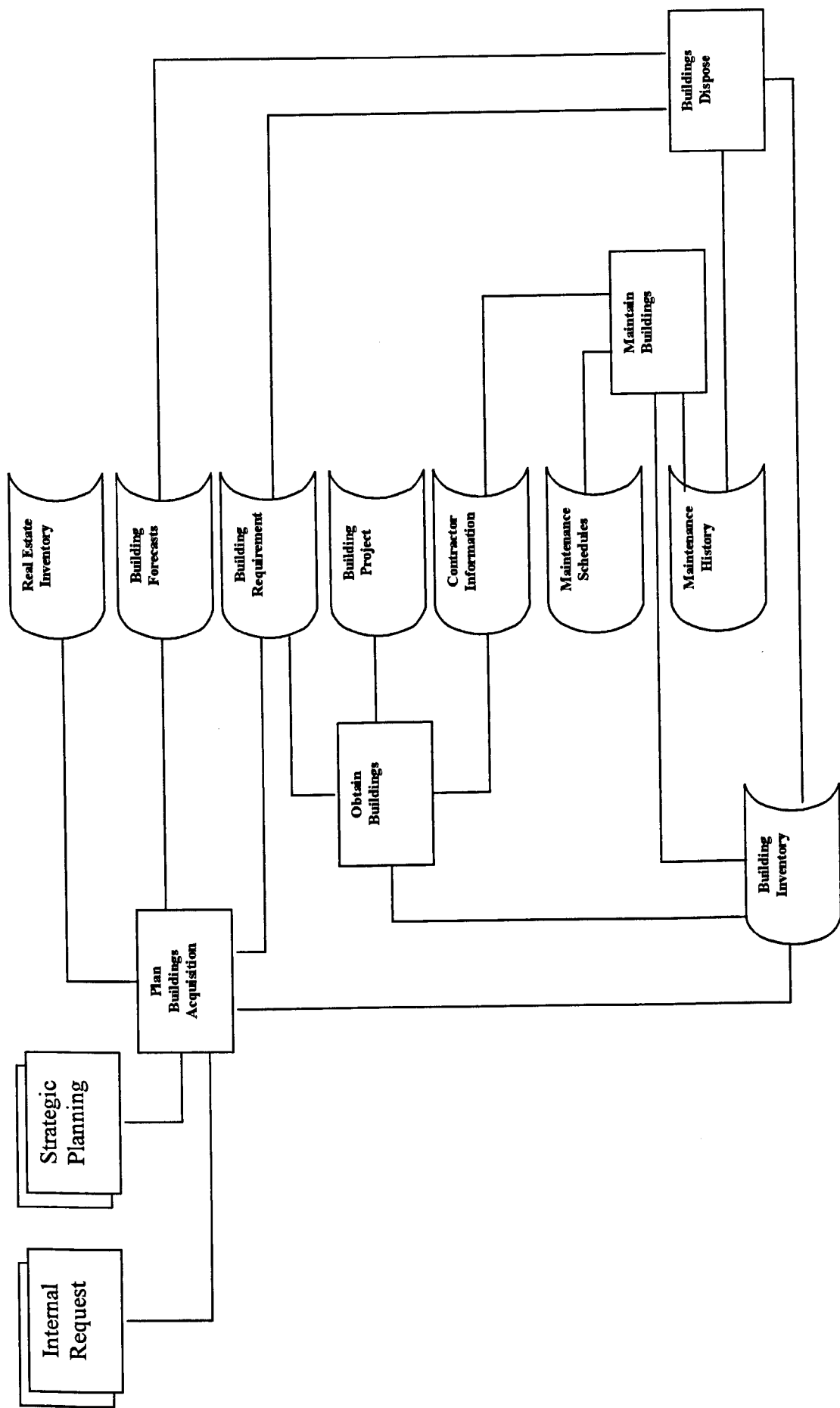


Figure 46. Information Usage Diagram of Buildings and Land Management (Manage Buildings)

Sub-Process: PLAN BUILDINGS ACQUISITION

This sub-process determines the building needs of the MoPTT. It defines priorities, determines cost of acquisition, and determines affordability. In addition, it forecasts building needs and processes requests for building acquisition. This sub-process is contained in the MANAGE BUILDINGS process.

Sub-Process: OBTAIN BUILDINGS

This sub-process carries out searches for appropriate properties and initiates the purchase or leasing of the building. It is contained in the MANAGE BUILDINGS process.

Sub-Process: MAINTAIN BUILDINGS

This sub-process carries out maintenance, housekeeping and security for buildings that are owned or leased by the MoPTT. It is contained in the MANAGE BUILDINGS process.

Sub-Process: DISPOSE OF BUILDINGS

This sub-process carries out task related to the disposal of a piece of buildings that no longer fits the needs of the MoPTT. It is contained in the MANAGE BUILDINGS process. This sub-process reads the following data stores:

BUILDING FORECASTS

BUILDING REQUIREMENTS

MAINTENANCE HISTORY

Data Store: BUILDING FORECASTS

This data store contains predictions of when buildings will be needed for expansion, and helps in determining whether buildings should be rented out, sold to other organisations, or retained for future use. It is scoped within the information usage model for the process MANAGE BUILDINGS.

Data Store: BUILDING INVENTORY

This data store contains structural details on all company owned, leased or rented property. It is scoped within the information usage model for the process MANAGE

BUILDINGS.

Data Store: BUILDING PROJECT

This data store contains details of the tasks that are necessary to construct or refurbish a structure on the MoPTT property. It is scoped within the information usage model for the process MANAGE BUILDINGS.

Data Store: BUILDING REQUIREMENTS

This data store contains details of current building needs that are used in order to determine if buildings should be obtained or disposed. It is scoped within the information usage model for the process MANAGE BUILDINGS.

Data Store: CONTRACTOR INFORMATION

This data store contains information about companies that the MoPTT wants to consider for the building or refurbishing of structures on the MoPTT properties. It is scoped within the information usage models for the processes MANAGE BUILDINGS and MANAGE LAND.

Data Store: MAINTENANCE HISTORY

This data store contains the maintenance records of all scheduled and incidental repairs that are completed at every building. It is scoped within the information usage model for the process MANAGE BUILDINGS.

Data Store: MAINTENANCE SCHEDULES

This data store contains dates about when certain regular maintenance functions should be performed at every building. It is scoped within the information usage model for the process MANAGE BUILDINGS.

Data Store: REAL ESTATE INVENTORY

This data store contains location information on properties owned, leased or rented by the MoPTT. It is scoped within the information usage models for the processes MANAGE BUILDINGS and MANAGE LAND.

External Agent: INTERNAL REQUEST

This external agent represents a request from another function for new land, buildings or a structural enhancement to an existing building.

External Agent: STRATEGIC PLANNING

This external agent represents the rules for the procurement or enhancement of land and buildings, as prescribed by the Strategic Planning.

11. Vehicle Management Function

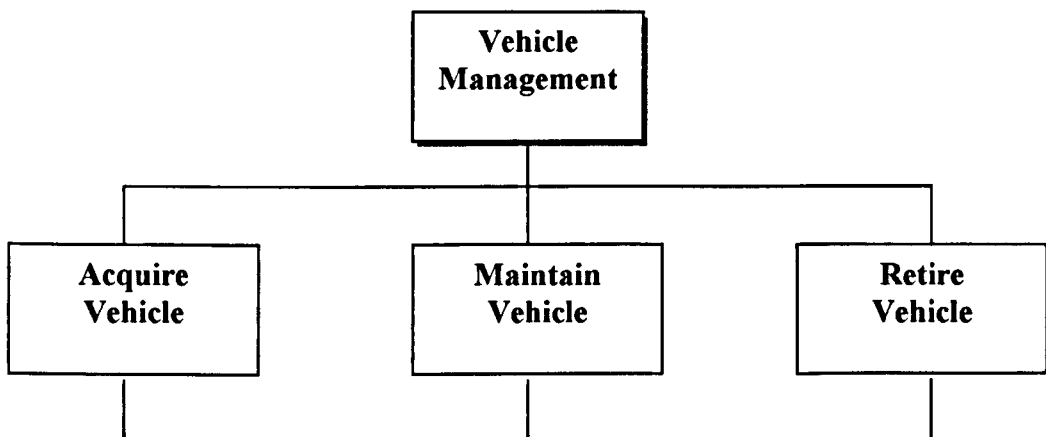
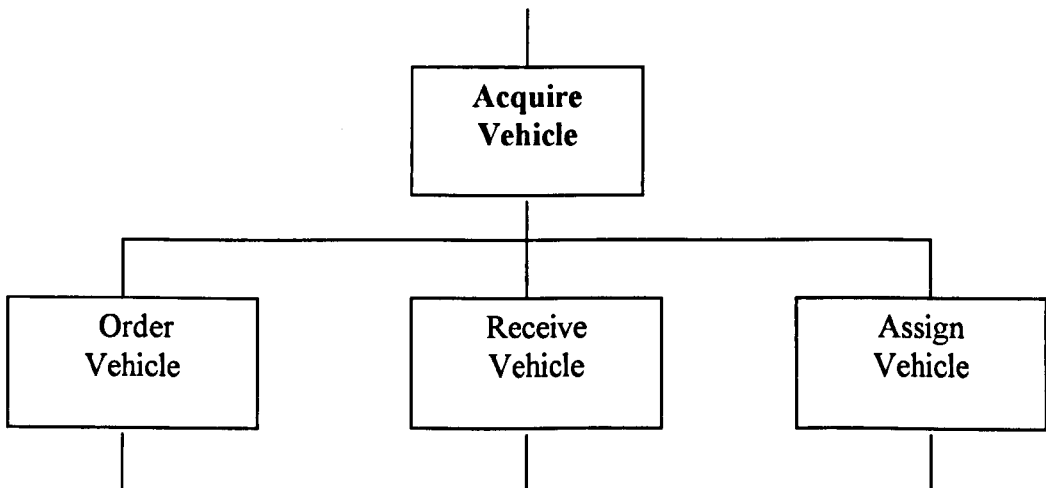


Figure 47. Functional Decomposition diagram of Vehicle Management (Support Function)

The following processes are addressed under the 'Vehicle Management' function.



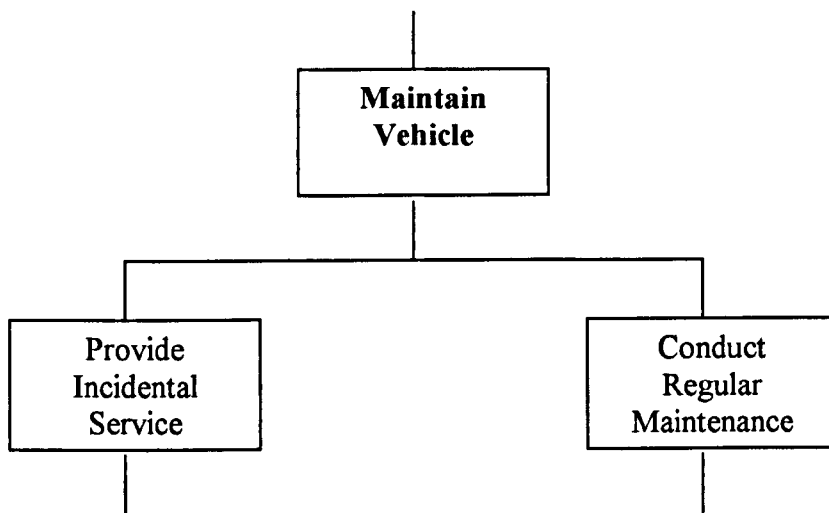
Process: ACQUIRE VEHICLE

This process deals with the ordering of new vehicles. It includes all the sub-processes that are needed to purchase a vehicle from a selected vendor and receiving the vehicle into the fleet inventory. In addition, it includes assessment of the new vehicle to the MoPTT employee, who will use the vehicle. This process contains the following sub-processes:

ORDER VEHICLE

RECEIVE VEHICLE

ASSIGN VEHICLE

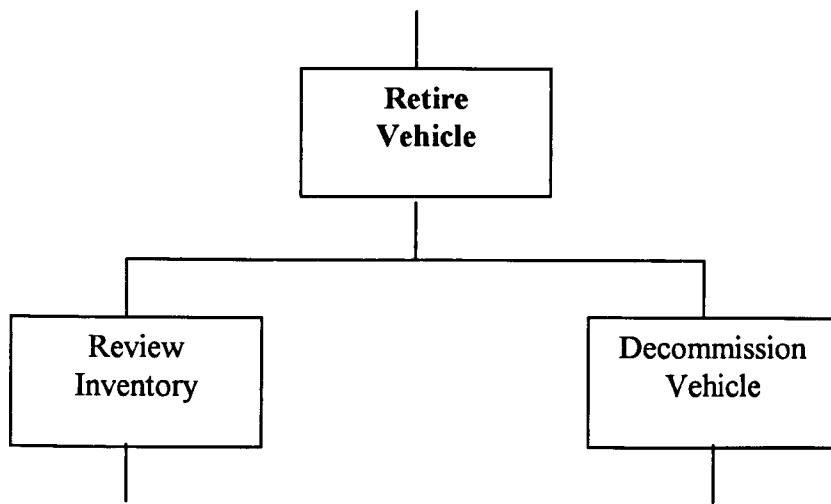


Process: MAINTAIN VEHICLE

This process carries out scheduled maintenance and repairs on vehicles in the MoPTT fleet. It schedules regular maintenance and tracks service schedules for all vehicles in the fleet. This process contains the following sub-processes:

PROVIDE INCIDENTAL SERVICE

CONDUCT REGULAR MAINTENANCE



Process: RETIRE VEHICLE

This process deals with selecting vehicles that have outlived their usefulness or are very expensive to maintain in the fleet. The process initiates and carries out procedures to dispose of the vehicle in a cost-effective way. This process contains the following sub-processes:

REVIEW INVENTORY

DECOMMISSION VEHICLE

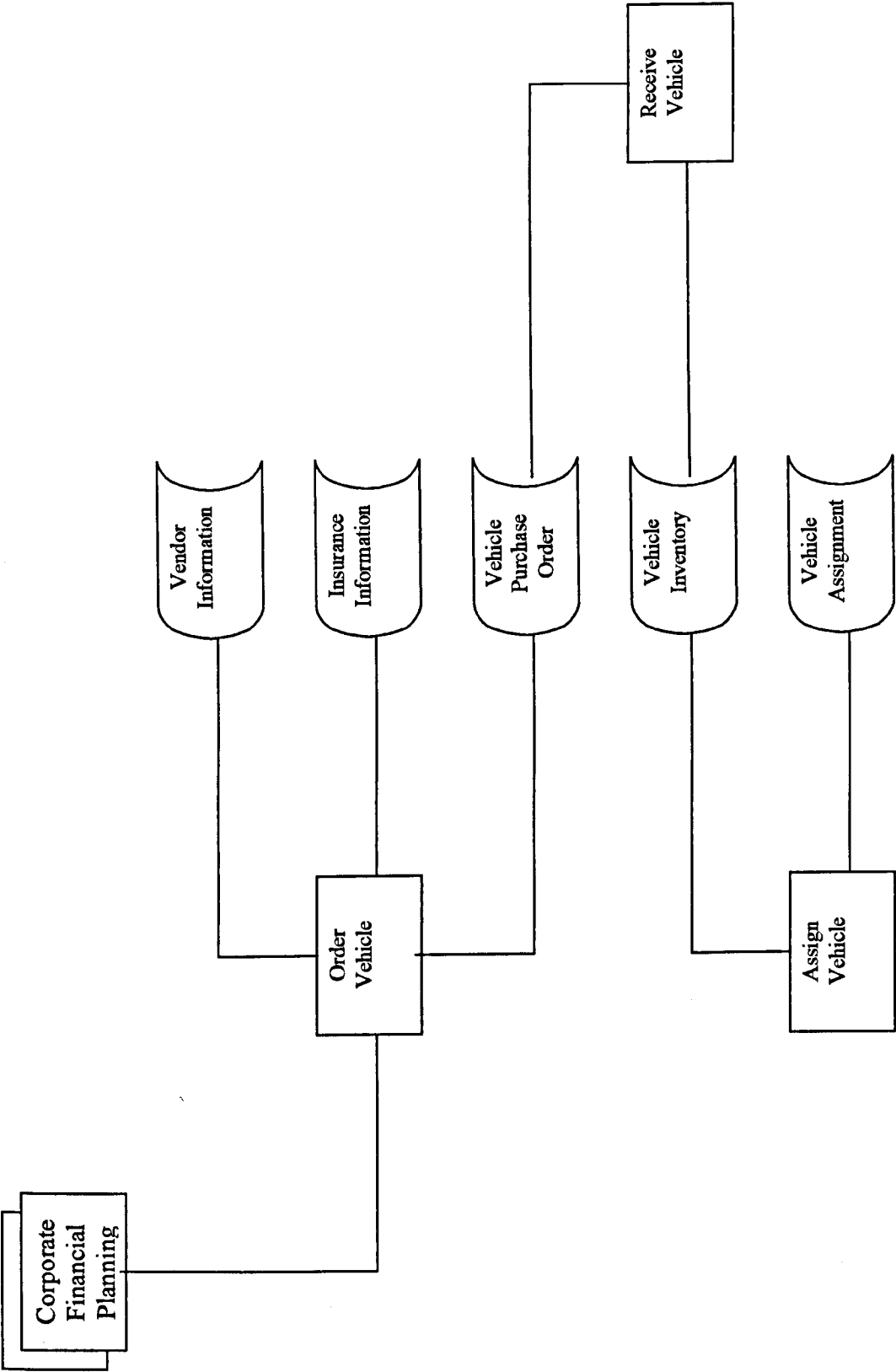


Figure 48. Information Usage Diagram of Vehicle Management (Acquire Vehicle)

Sub-Process: ORDER VEHICLE

This sub-process determines priority of requests for vehicle determines costs, and affordability and issues of purchase order or lease request to the appropriate vendor. In addition, it purchases insurance for the new vehicle. This sub-process is contained in the ACQUIRE VEHICLE process.

Sub-Process: RECEIVE VEHICLE

This sub-process takes delivery of a new vehicle, inspects it for defects, and adherence to bid specifications. The appropriate information on the vehicle is added to the fleet inventory records, once the vehicle is accepted into the fleet. This sub-process is contained in the ACQUIRE VEHICLE process.

Sub-Process: ASSIGN VEHICLE

This sub-process assigns or transfers assignment of a vehicle to the MoPTT employee. It is contained in the ACQUIRE VEHICLE process.

Data Store: VENDOR INFORMATION

This data store contains information about vehicle dealers and the vehicles they supply to the MoPTT. It is scoped within the information usage model for the process ACQUIRE VEHICLE.

Data Store: INSURANCE INFORMATION

This data store contains information about the policy and Insurance Company for each vehicle. It is scoped within the information usage models for the processes ACQUIRE VEHICLE and RETIRE VEHICLE.

Data Store: VEHICLE PURCHASE ORDER

This data store contains information that will be sent to a vehicle dealer, when an order is placed. It is scoped within the information usage model for the process ACQUIRE VEHICLE.

Data Store: VEHICLE INVENTORY

This data store contains information about each vehicle that is owned, leased or rented by the MoPTT. It is scoped within the information usage models for the processes ACQUIRE VEHICLE, MAINTAIN VEHICLE and RETIRE VEHICLE.

Data Store: VEHICLE ASSIGNMENT

This data store contains details about to whom each vehicle is assigned. It is scoped within the information usage model for the process ACQUIRE VEHICLE.

External Agent: CORPORATE FINANCIAL PLANNING

This external agent represents the rules to follow for purchasing new vehicles, as prescribed by the Strategic Planning.

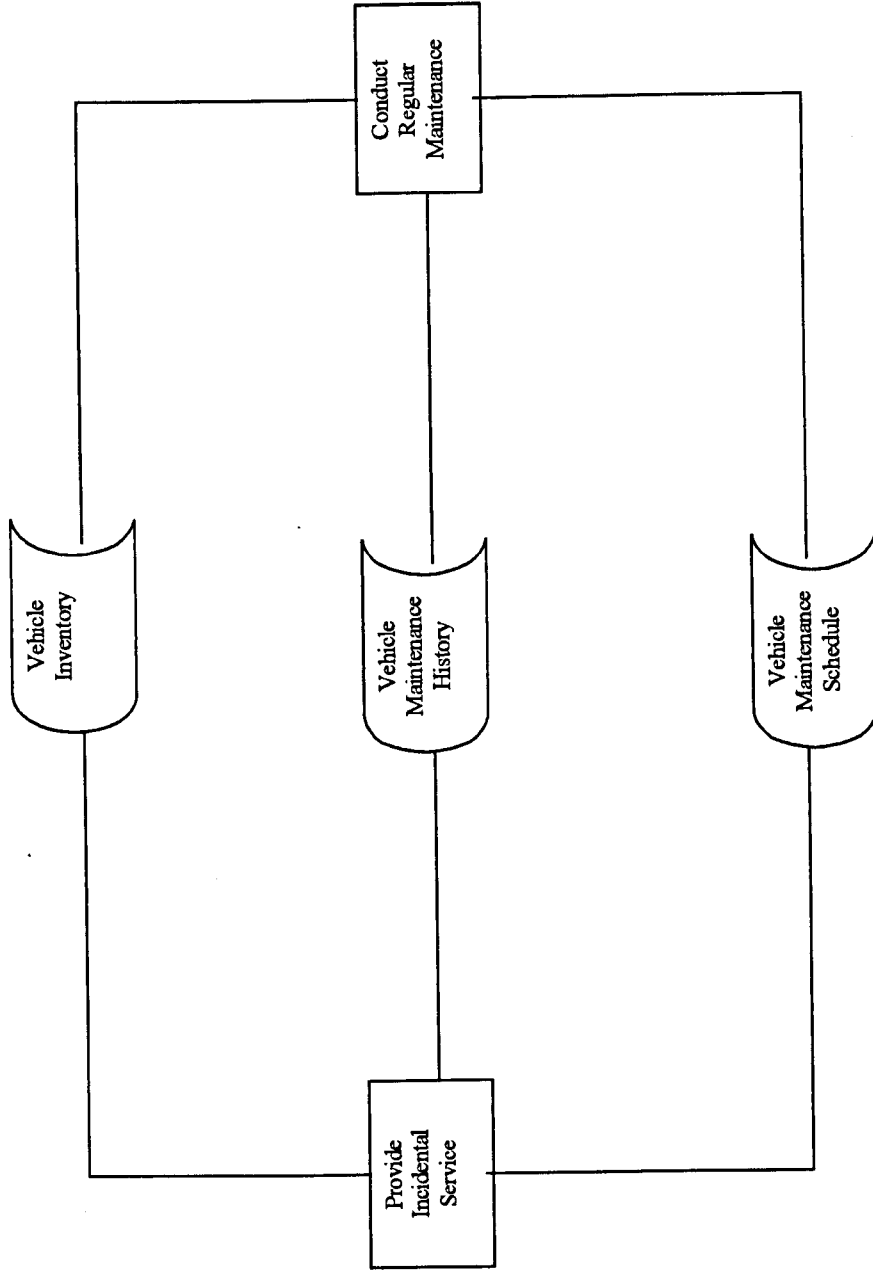


Figure 49. Information Usage Diagram of Vehicle Management (Maintain Vehicle)

Sub-Process: PROVIDE INCIDENTAL SERVICE

This sub-process records repair requests and schedules repair service. In addition, it records when repair is completed. This sub-process is contained in the MAINTAIN VEHICLE process.

Sub-Process: CONDUCT REGULAR MAINTENANCE

This sub-process schedules and tracks regular required maintenance on a vehicle. It is contained in the MAINTAIN VEHICLE process.

Data Store: VEHICLE INVENTORY

This data store contains information about each vehicle that is owned, leased or rented by the MoPTT. It is scoped within the information usage models for the processes ACQUIRE VEHICLE, MAINTAIN VEHICLE and RETIRE VEHICLE.

Data Store: VEHICLE MAINTENANCE HISTORY

This data store contains the record of scheduled and incidental maintenance for each vehicle. It is scoped within the information usage models for the processes MAINTAIN VEHICLE and RETIRE VEHICLE.

Data Store: VEHICLE MAINTENANCE SCHEDULE

This data store contains dates on when regular maintenance should be performed for each vehicle. It is scoped within the information usage model for the process MAINTAIN VEHICLE.

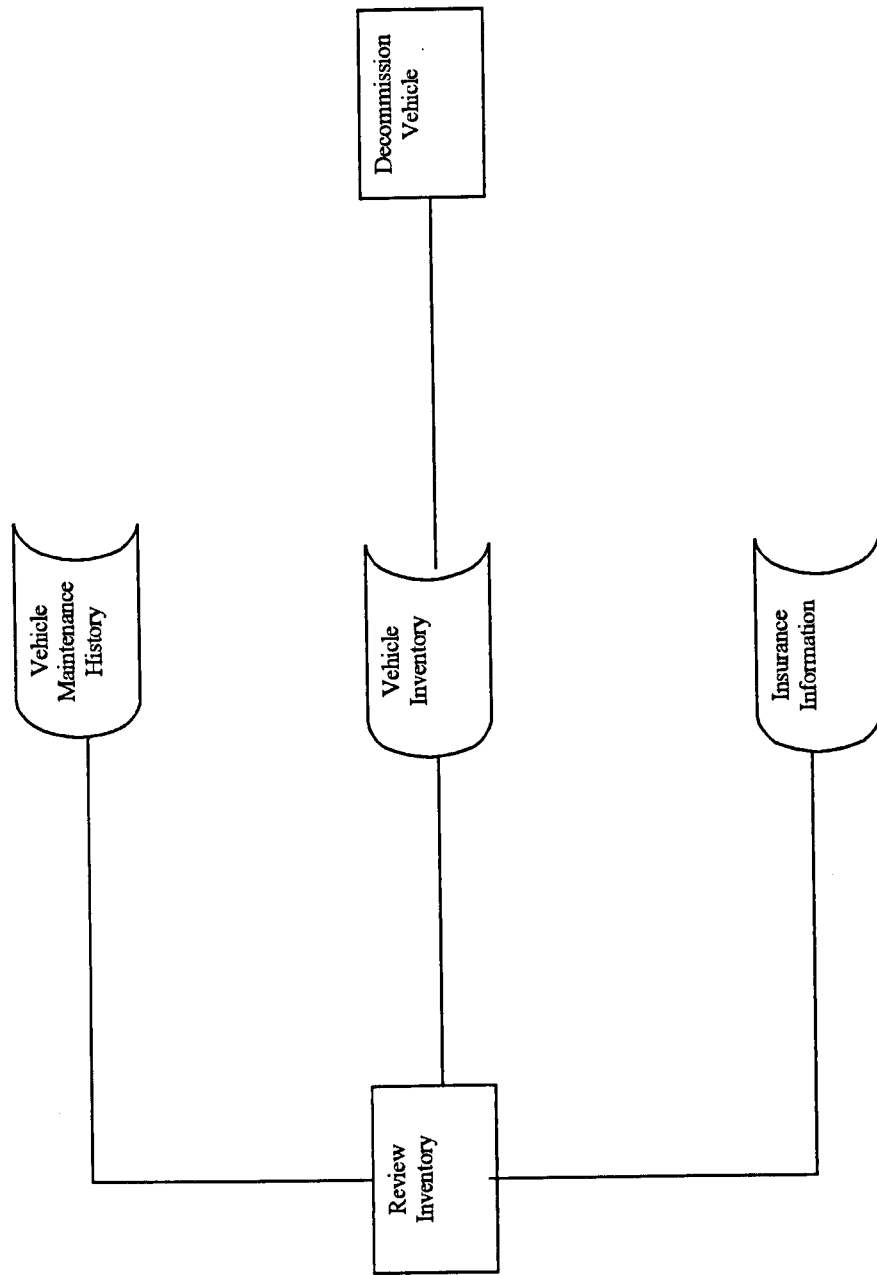


Figure 50. Information Usage Diagram of Vehicle Management (Retire Vehicle)

Sub-Process: REVIEW INVENTORY

This sub-process reviews the inventory of vehicles in the fleet, and selects candidates for disposal. In addition, it obtains approval for disposal of the vehicle. This sub-process is contained in the RETIRE VEHICLE process.

Sub-Process: DECOMMISSION VEHICLE

This sub-process determines the most cost-effective method for disposing of a vehicle, and invokes that method of disposal. In addition, it adjusts the fleet inventory records, once the vehicle is disposed. This sub-process is contained in the RETIRE VEHICLE process.

Data Store: VEHICLE MAINTENANCE HISTORY

This data store contains the record of scheduled and incidental maintenance for each vehicle. It is scoped within the information usage models for the processes MAINTAIN VEHICLE and RETIRE VEHICLE.

Data Store: VEHICLE INVENTORY

This data store contains information about each vehicle that is owned, leased or rented by the MoPTT. It is scoped within the information usage models for the processes ACQUIRE VEHICLE, MAINTAIN VEHICLE and RETIRE VEHICLE.

Data Store: INSURANCE INFORMATION

This data store contains information about the policy and Insurance Company for each vehicle. It is scoped within the information usage models for the processes ACQUIRE VEHICLE and RETIRE VEHICLE.

Appendix C

1. MoPTT Skill Assessment

Table 1 reflects the areas in which skills are considered to be available within the MoPTT for the main IS processes. The ratings are the based on information gathered from the researcher’s consultations with the Assistant Directors, in the light of their own assessment of their staff. Individual assessments show a large variance in level of expertise. Compared to industry standards a more realistic picture would emerge if the ratings were reduced by an average of 1 or 2 points.

What the table does show effectively is the relative strengths between available skills; for example, the staff is 2 levels better at maintenance than at planning.

Rating scheme						
1	2	3	4	5	6	7
little insufficient novice			average			much sufficient expert

ITD Process	Skills expert level (1-7)	Skills
Applications Development	5	Cobol, VSAM, DB2, Natural, ADW, Windows, Clipper
Applications Maintenance	6	Cobol, VSAM, DB2, Natural, IMS, Telex Service Order) TSO
Applications Support	4	Information Engineering, Application Management, TQM
Planning	4	Technology, Corporate Modelling, Business Planning, Training
Technical Support	4	RACF Management, PC/LAN
Data/Database Administration	4	DB2 program & Administration, IMS, Natural
Network Management	5	Saudi Arabian Service (SAS), OMEMAGON, NetMaster
Capacity Planning	6	SAS
Data Centre Operations	4	console operations, backup/restore
End-user Computing	5	PC's IBM comp., Novell, Clipper
Administrative Support	4	MS Office products

Table 1. Skills and skill levels per Process

In consultations with the researcher, personnel in the Planning and Applications unit expressed concern about new development tools, methodologies and support of client/server architecture. During the skill assessment, the following skills were mentioned as deficient in specific areas:

	What skills are missing in this area?
Planning & Applications (general)	Office Automation implementation. Communication of ideas and knowledge sharing. Technical skills, in particular distributed processing and decision-making tools and techniques.
Planning	Architecture management tools. New environment specialisation. Training packages (UNIX, PC, etc.). Decision Support System. Standards specialisation.
Application Maintenance	UNIX Expertise. Oracle, Communication and security expertise. Distributed processing expertise.
Application Development	UNIX, Oracle, Case & IE expertise. CASE DBA, OS2 expertise. LAN Administration expertise.
Application Support	Functional points expertise. Quality assurance.

Table 2. Skills deficiencies

The other Technical Support and Operations units expressed the need to back-up experts with additional personnel, and the need to build up an IS knowledge base within the Ministry.

2. *IS Unit Management Practice Assessment*

The following assessment of the policies and practices is rated according to the scheme below.

Rating scheme						
1	2	3	4	5	6	7
least favourable						most favourable
little						much
insufficient						very sufficient
bad			sufficient			very good

The assessment below of policies and practices with their associated ratings results from input from consultations with executives in the ITD. If policies are covered by the STTPs, they are mentioned.

2.1 Policies

IS Areas	IS Polices	Implement- ation	Practio- ability	Accept- ance	Degree of Use
IS planning	Being established	5	4	3	3
	Supported corporate indicators	3	4	N/A	1
Project management	The STTP defines application project management	5	5	4	3
Organisational communication	None				
Organisational change management	Change management committee. Corporate modelling	5	4	4	4
Business process redesign	None according to Navigator				
IS resource acquisition	All resources are planned and available by the outsourcing contact	6	3	4	6
Human resources	None (out of control)				
Application development Testing	All applications have to adhere to standards defined in STTPs	5	4	4	5
Change control	Major activities provide recovery procedures	5	5	6	4
	Manage and document all changes	4	4	3	4
Methodologies	The TQM procedure / management	3	5	4	3
Standards (naming, documentation, SW)	The STTPs	6	6	6	6
Quality assurance	Ensure standards are adhered to in the production environment	6	6	6	6
Data management and security	Provide secure access to data	6	6	5	6
Backup / recovery	Application recovery	6	5	5	5
	External tape library	6	6	6	6
	System redundancy	4	3	6	3
Disaster recovery	Responsibility of Jeddah office	1	1	7	1

Table 3. Current IS Policies

Organisational communication was associated with no policy. This expresses the lack of established communications procedures, which is a major issue within the MoPTT. Currently, business process redesign is not established, and may get some impetus from the Corporate Modelling exercise.

The high ratings of STTPs and quality come from Technical Support and the Operations

Branch, where the majority of the STTPs in use define the working environment. Many working procedures have to be standardised and followed to ensure an adequate maintenance service.

2.2 Practices

IS Areas	IS Practices	Implementation	Practicability	Degree of Use
IS planning	ITD functional specific plan	6	5	5
	Analysis of key indicators	5	5	1
Project management	Project managers are assigned for development programs	5	4	3
Organisational communication	None			
Organisational change management		4	3	3
Business process redesign	None			
Human resources	Provide human resources through outsourcing	0	0	0
	Provide special programs for salary structure	6	5	4
IS resource acquisition	Participating in user projects with equipment	5	4	3
	Defining resources in outsourcing contract	N/A	N/A	N/A
Application development	Monthly user meetings to define priorities	6	5	5
	CSR: defined procedure and project specifications	6	5	4
Change control	Weekly meetings	6	6	6
	Weekly meetings, non-automated paper operation	4	4	6
Methodologies	PITs (Process improvements teams)	3	5	3
	Navigator for SW development cycle	4	3	2
Standards (naming, documentation, SW)	STTPs; Strategic Resources	6	6	6
Quality assurance	Validation of all projects in hold	6	6	7
	Production environment	4	3	3
Data management and security	STTPs	6	6	6
Backup / recovery	Operational procedure	6	6	6
Disaster recovery	DRP plan (Technical Support)	1	1	1
Overall rating	Planning and Applications	5	5	5
	Technical Support	5	5	6
	Operation	5	5	6
	Resources	4	4	4

Table 4. Current IS Practices

Quality assurance has a wide range in the ratings, while disaster recovery cannot be put fully into operation as the resources for a complete implementation are missing. The low rating of human resources through outsourcing is indicative of the attitude to the budget cuts in the current outsourcing contracts, and the limited supply of skilled resources being provided.

The overall rating of the practices is average. The degree of use shows that management of the Technical Support and Operations branches view the use of the practices in their area as more applicable than in the other branches.

2.3 Alignment of IS Policies with IS Principles

This section deals with current IS principles and how they are reflected in the policies of the MoPTT.

The policies covering the operating environment of the mainframe support the current IS principles, but the servicing of end-user requirements and the support of the distributed systems do not measure up to them.

As far as projects are concerned, a deficient communication infrastructure with the organisational units is the reason for difficulties in this area.

In general terms a lack of resources in terms of budget restrictions and a shortage of skilled personnel make the implementation of the policies of the MoPTT very problematic. For example, the enforcement of standards and the introduction of new development products and technologies is difficult with unskilled people.

It is this lack of resources that make staff abandon their efforts to follow policies. They try to meet schedules and work around problems, but they are often unable to attack the source of the problem so that quality suffers and policies get ignored. Examples are the limited updates to application documentation, and the lack of realisation of the disaster recovery plan.

2.4 Alignment of IS Practices with IS Policies

The policies seem to be commendable, but are not addressed very well by the practices. The unskilled staff does not follow the rules very well and the policies are often ignored to make work easier. Indeed, there are also almost no means to enforce policies even if the will to do so existed and shortages in both budgets and human resources also do not allow the personnel to be equipped with the tools necessary to follow policies.

Operation of the mainframe and Technical Support are areas where practice and policy seem better aligned than elsewhere, but on the whole quality management within the application environment is of such a low standard that it is too easy to bypass rules. Objectives cannot be combined with incentives, which means that motivating staff to follow policies is deeply problematic. The lack of resources may result in the emphasis falling on enforcing project deadlines, rather than on delivering quality.

Another hindering factor is the lack of established communication between units within the MoPTT. Improved communication channels could, on the one hand, enhance the service delivery of the IS units by providing a fuller appreciation of what is needed, and could, on the other hand, present a better understanding of the reasons for the funding of the service units.

Other practices in the areas of the TQM and planning are still being introduced, and can gain better ratings in the future if they get the necessary attention.

2.5 Data Management

Generally, the Human Resources unit does not assess the performance of staff on a regular basis. Performance is hardly rewarded and, therefore, not seen as a significant issue. Comments during the assessment of the skill levels of staff showed that the skills of each person are not known to management. The lack of staff accountability means that staff cannot relate the success or failure of an operation to the effort that has been put into it. The end-user does not consider the efforts of the staff either. This already has had the result that the ITD is not notified as soon as possible about development work intended to stop or to incorporate changes.

3. *Map of Saudi Arabia*



Appendix D

1. Applications

1.1 Categorisation of Applications

Finance/Business (FI) covers the development and marketing of the business, and planning and tracking of financial and business goals and results for the MoPTT. The functions in FI are:

- financial management – management of sources and uses of finances
- centralised purchasing – management of corporate purchasing
- strategic planning – determination of long-range business goals and tracking of the organisation's achievement of goals
- sales and marketing – administration of marketing campaigns and of large customer sales and service
- service and product development – development and enhancement of new products to be marketed (business).

Customer Service (CS) covers the functions related to serving the MoPTT's customers, as well as administration of operational expenses and billing functions related to customers. The functions of CS are:

- service order creation – including creation of customer and service profiles
- service provision – preparation of orders for circuit work and service installation / maintenance and administration of existing service orders
- service activation – distribution of work orders, work and materials management
- service assurance – surveillance of performance of provided services, scheduling of fault repair orders, management of maintenance and repair work
- service support – administration of order control status, customer assistance, and administration of free telephone numbers
- billing – calculation and distribution of subscriber invoices, administration of the payment and collection processes
- directory – publication and distribution of directories, operator assistance.

Network & Engineering (NE) covers the planning and maintenance of the physical network, including the engineering efforts needed to carry out these tasks. The functions of NE are:

- fundamental planning – evaluation and planning of future network configurations
- engineering – design of physical networks, preparation of orders for plants, administration of work and materials
- network provision – preparation of orders for logical networks (design), management of work schedule changes due to trouble or rearrangements
- network activation – distribution of physical (plant) and logical work orders, construction work management, monitoring of use and availability of materials
- network assurance – surveillance of network performance, scheduling of fault repair orders, and administration of network maintenance and repair work
- network support – control of flow of work orders, administration of inventory records and inventory assignments (to work orders).

General Support (GS) covers central, corporate-wide functions of a general nature that benefit the whole organisation without specifically being associated with the business of the organisation. The functions of GS are:

- asset (non-plant) management, administration of any non-plant resources, including human resources
- internal and external affairs, administration of internal communications and external relationships.

Finally, the physical network is the collection of cables, trunks, switches, phones, etc., which makes up the Kingdom-wide telephone network.

In Table 1 the applications found in the Deputy Ministry of Operations and Maintenance Affairs (the O&M Division of the MoPTT) have been categorised according to the above structure, using the categories FI, CS, NE, and GS. The applications operated by the Telex organisation are either related to Telex (TX) or to the AI-Waseet network (TA). The applications operated by the F&A Division of the MoPTT are all for financial or budget purposes. They are categorised as MO.

1.2 The MoPTT Applications per Category

The applications within the MoPTT are distributed as shown in Table 1.

Deputy Min./Area application category	The MoPTT (O&M) (FI)	The MoPTT (O&M) (CS)	The MoPTT (O&M) (NE)	The MoPTT (O&M) (GS)	The MoPTT Telex TX,TA	The MoPTT (F&A) (MO)
Applications	21	26	21	5	27	17
Data collections	Around 350				Around 50	Around 50
Platform	IBM 3090 MVS/ESA mainframes (2 in Riyadh and 1 in Jeddah) 3270 and PC data entry front-ends (WANG and NCR platforms used for a few applications) Stand-alone PC systems					
Location of applications	Mainframe parts: in Riyadh Data Centre, except for two in Jeddah Data entry front-ends and PCs in regions and districts					

Table 1. Distribution of applications within the MoPTT

The majority of the systems listed in Table 1 are mainframe-based, with 3270 terminal or PC front-ends. PCs are, however, used for stand-alone applications throughout the MoPTT as well as in the Districts and Regions. Such PC systems belong in one of the following two categories:

- mainframe data analysis systems which download data from the mainframe and produce reports not available from the mainframe systems
- stand-alone systems, holding corporate data not found on the mainframe.

Finally, the MoPTT uses a separate VAX-based system to manage payphones.

1.3 The MoPTT Information Systems Application

A system is a group of applications and data collections which work together and, taken together, form an information system for a given business area. A system presents a set of services to the user within a given functional category, helping the user to accomplish his work.

This section describes and assesses the information systems used by the MoPTT. The systems are structured according to the categorisation presented above.

Diagrams are used to show the major applications, the major data collections, and the data flow between users and applications, and internally between applications. Very little real-time inter-process communication takes place between applications. They mostly communicate through ‘shared data’, either stored in files/tables, or passed from one application to another via transaction files, in batch mode.

1.3.1 Finance/Business Systems (The O&M Division of the MoPTT)

1.3.1.1 Financial Management

This function manages the sources and uses of finances. The O&M Division of the MoPTT has a large portfolio of systems in support of this area. The interrelationships of these systems are very closely related, even entangled, with some direct interfaces and many minor files and tapes being passed between systems. They are logically centred on three main databases:

- the accounting distribution database, which holds all information on investments, costs, and manpower accounting distribution affecting the O&M Division of the MoPTT.
- the employee database (also known as EMF – employee master file), which holds information on employees and payrolls.
- the material database, holding a standard reference of the material from the O&M Division of the MoPTT, identified by material item code.

Corresponding to this structure, the financial systems can be divided into general accounting, payroll/personnel, materials management, and finally engineering order tracking systems.

The following diagram gives an overview of how these systems work together.

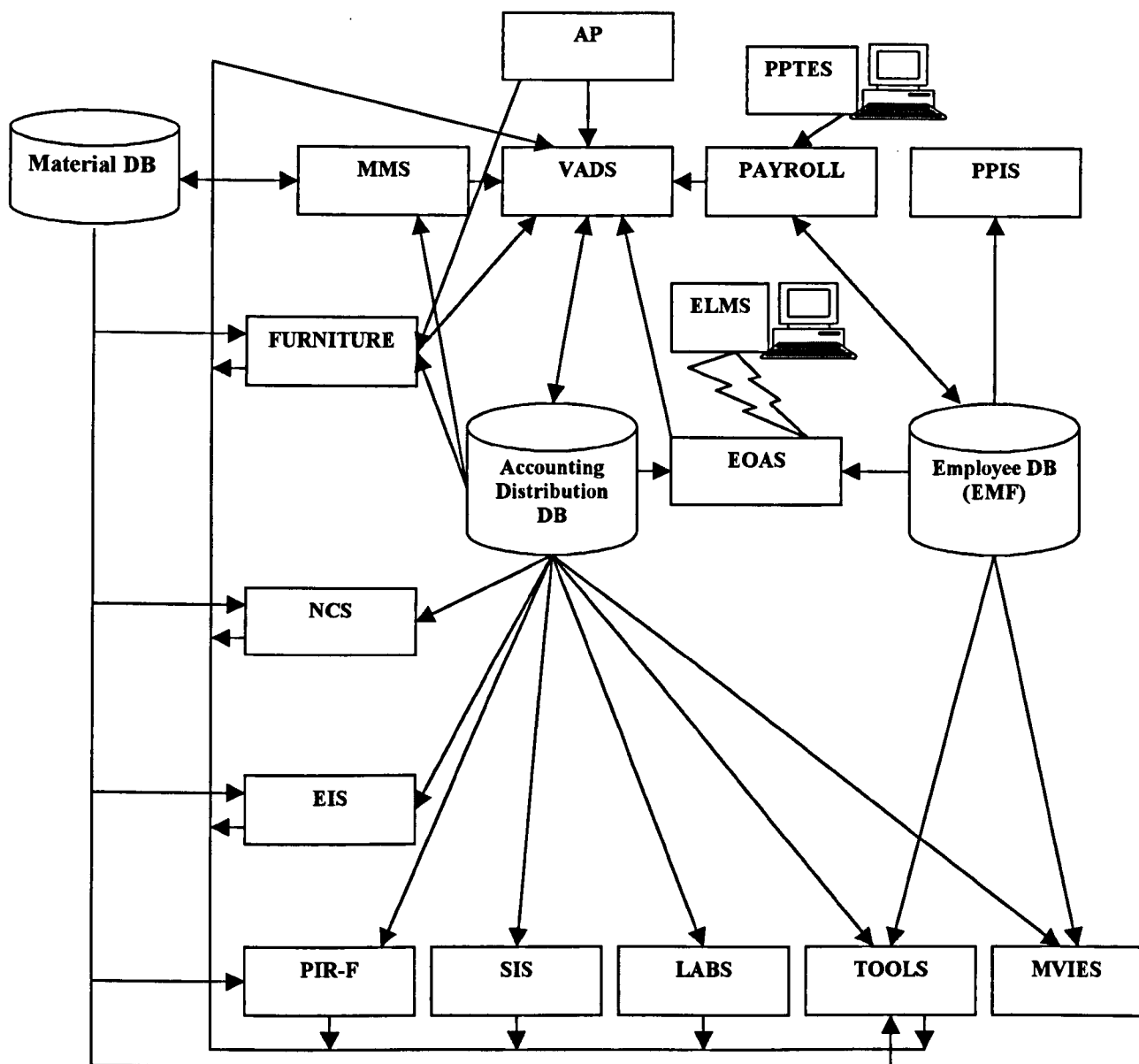


Figure 1. The MoPTT O&M Division Financial Systems

General Financial Systems

AP (Accounts Payable) tracks all the O&M Division's accounting data (paid and payable), except employee salaries. This data is held in a supplier database. AP receives input payment voucher data on tape and produces payment advice records which authorise payment to suppliers. On payment, the payment advice records are cancelled and payment-related data is archived. AP supplies monthly updates to VADS (Validation and Accounting Distribution System), and produces reports on supplier payments and payables.

VADS serves as the system to maintain the central Accounting Distribution database (DB)

on investments, costs, and manpower accounting. VADS receives input from PAYROLL and AP, as well as from EOAS, MMS, FURNITURE, and several other systems (as described below). These systems typically extract the relevant data from the Accounting Distribution DB, process update information from the Districts, and feed it back to VADS update files to be incorporated in the Accounting Distribution DB. VADS produces a District salary analysis report, and accounting summaries by account, ID code, District and Region, and for the whole Kingdom.

Material Management Systems

MMS (Material Management System) maintains in the material DB a standard reference of the O&M Division material, identified by material item code. MMS monitors purchase orders from a new inventory, from order through until field placement. Input to MMS is a tape of receipts and corrections. The other materials management systems read data from the material DB. MMS produces reports on inventory listings and purchase orders.

NCS (Network Control System) tracks the O&M Division's investment in all outside plant equipment in use. Each month, NCS extracts the network investment asset accounts from the Accounting Distribution DB, and reads a tape with updates. NCS validates these updates against the material codes in the material DB, and produces an update file to VADS, as well as some investment reports.

EIS (Exchange Investment System) tracks the MoPTT's investment in exchange equipment. Each month the VADS extracts information on exchange activities from the Accounting Distribution DB, and reads a tape with data from the Districts on new exchange information and error corrections. From this, EIS creates an update file to VADS, and produces reports on the exchange inventory (quantities, asset value, age, and location) and a summary of major contractor (joint venture) transactions.

SIS (Subscriber Investment System) maintains an investment and activity record of subscriber equipment for the plant and controller departments. The record includes telephones, coin sets, booths, PB-X equipment, and radio sets. Each month, SIS extracts all transactions affecting subscriber equipment from the Accounting Distribution DB, reads a tape with data from the Districts on new disconnections and reconnections, creates an update file to VADS, and produces reports on movements of subscriber equipment.

PIR-F (Perpetual Inventory Record Field System). This system maintains a permanent inventory of major network material and subscriber material held in District storerooms. PIR-F reads the relevant data from the Accounting Distribution DB, including information on material shipments of network and subscriber material (provided by MMS), and local purchase orders for network and subscriber material (provided by AP). In addition, the system reads a tape with data on material issue vouchers and adjustments from the field storerooms. PIR-F validates material item codes against the material DB, and produces an update file to VADS, as well as inventory, financial and control reports.

FURNITURE (also known as FIS) maintains a record of furniture and office equipment owned by the O&M Division of the MoPTT. FURNITURE reads furniture data from the Accounting Distribution DB, reads a tape with furniture updates from users, receives department codes from MVIES (Motor Vehicle Investment & Expense System) and District descriptions from AP. FURNITURE then writes an update file for VADS and produces reports summarising furniture investment and the existing location of data by District and Region.

LABS (Land and Buildings) tracks operating costs of the O&M Division's land and buildings, and keeps detailed records of these. Each month LABS reads lands and building investment and cost transactions from the Accounting Distribution DB, and a tape with adjustments (e.g. on payments) from the users. LABS verifies the adjustments and produces an update file for VADS, as well as reports on the investment and operating cost of each property.

TOOLS (Tools Management) maintains an inventory of tools costing more than SR 600 (£100). TOOLS identifies each tool with the location, associated cost centre, and responsible employee. TOOLS reads the tools data in the Accounting Distribution DB, reads a tape of changes to the tool information, reads the material DB and employee DB for verification of employees that request tools, and produces reports on the tools inventory.

MVIES (Motor Vehicle Investment & Expense System) manages the motor vehicle and equipment fleet, maintained in a separate database. Each month MVIES reads a tape on expenses related to the cars, validates this data against information from VADS, the Accounting Distribution DB and the employee DB, and produces reports on the car

inventory, on expenses and on the spare parts consumption.

The structure of the mainframe-based inventory systems is somewhat disorganised, with exchange of information for verification and update taking place between the systems frequently. The inventory systems described above have common and serious weaknesses. For example the input procedures are batch, where updates are filled onto paper forms, keyed onto tapes (sometimes through cards), then read by the proper system and processed. Only then are updates applied to the proper database. This process is slow and protracted, and does not allow for the immediate confirmation and rectification of data entry errors.

Because the updates are only applied monthly the inventory is never up to date, and day-to-day central management is not possible. Further, the users cannot access on-line inventory information, but have to wait for the monthly batch cycle to receive updated reports.

The term 'ICS' (Inventory Control System) is used for two systems:

- A system under development, planned to replace some existing systems. This system is still only in the analysis phase.
- A local, PC-based system that provides some inventory control in each District. Such systems vary from District to District, but their role seems to be to maintain a partial copy of the information locally in the central material management systems.

The inconvenient times corporate inventory data appears and its inaccuracy can explain the presence of local PC-based inventory systems. Apart from PC systems which hold copies of mainframe data, stand-alone PC systems are also used to complement the systems described above. The following systems are used in some Districts: MVSPS, which maintains a vehicles parts catalogue, PC_CIS, which tracks car insurance, PC_PMS, which monitors some project contracts, and PC_SCS, which contains inventory control standards and measurements, and monitors some supplies.

For further details of these systems see Section 1.3.7.1.

Payroll and Personnel Systems

PPTES (Payroll/Personnel Transaction Entry System) is used by Districts and Regions to enter payroll and personnel transactions like time reports and adjustments. Transactions are written to a file and sent to PAYROLL (see below) for processing.

PAYROLL (Payroll/Personnel) generates monthly payment advice slips, identifying details of the salaries for each employee. It maintains details on employees and payrolls in the employee DB (also known as EMF). The input to **PAYROLL** consists of the time reports and adjustments from **PPTES**. **PAYROLL** also produces reports on employee numbers, movements and salary totals.

PPIS (Payroll/Personnel Inquiry System) enables Headquarters, Districts and Regions to query on-line employee and payroll information held in the EMF database of the batch **PAYROLL** system.

Engineering Order Systems

ELMS (Engineering Labour and Material System) is an on-line data entry system for **EOAS** (see below). The Districts use **ELMS** in order to key in data on engineering orders, labour and engineering time, and construction work reports. This data is then transmitted over a dial-up line to Riyadh, where the DB2 part of **ELMS** on-line validates data and passes this as batch input to **EOAS**.

EOAS (Engineering Order Administration System) maintains a record of authorisations and status of engineering orders and estimates, assisting in monitoring the progress of construction work. The system receives data on job orders and labour time from **ELMS**. **EOAS** reads the employee DB for cost and charge account codes of employees involved in projects. **EOAS** supplies to **VADS** information on the value of hours and materials used in projects and generates reports on expenditures and clearing account charges.

Considered together **ELMS/EOAS** handle approximately 17,000 transactions a month. The on-line data entry and error correction that **ELMS** provide make a significant improvement over the key punching data entry method. However, some Districts still use the key punching, which results in a turnaround time of a week before data returns and can be corrected. If **ELMS** were fully implemented in all Districts this would allow the **EOAS** batch system to be run more than once a week. In addition, **EOAS** should ideally supply **VADS** with data on contractor costs.

JRNLS-RPTS receives journal update transactions from **PAYMENTS** (see Section 1.3.2.7) and **BILLING** (see Section 1.3.2.6) systems, edits data sends it to various general ledger and

journal files, and generates reports on accounting revenue and closing balance.

1.3.1.2 *Centralised Purchasing*

Centralised Purchasing manages corporate purchasing. There are no information systems found in the O&M Division of the MoPTT supporting this function.

1.3.1.3 *Strategic Planning*

Strategic Planning establishes long-term business goals and follows the organisation's achievement of those goals. There are in place budget and accounting systems to deal with the financial side of strategic planning. However, but there are no information systems to store information about and measure the progress of non-financial corporate goals and objectives, although it is possible to support strategic activities such as total quality management or strategic architectures through information systems.

Even although units like Strategic Planning in the O&M Division of the MoPTT may hold strategic plans and objectives on PCs, there are no corporate-wide systems or networks in place to communicate these plans and objectives and monitor their implementation.

1.3.1.4 *Sales and Marketing*

This section supports marketing campaigns and large-scale customer sales and services.

MERS helps marketing management to determine how the market is developing, and how the demand of services in relation to the supply affects the business of the MoPTT. The batch/TMS front-end of MERS runs every month, collecting data from the BILLING system, and loading accumulated totals onto the MERS DB2 back-end. MERS utilises this information to produce reports on the top 500 customers by service, on revenue by service, and on performance of national and international calls by service. These reports are sent to the Regions and to Business Planning. On-line inquiry is under development so that users can access the mainframe data from PCs.

COMM-DIR extracts data from the directory system to produce a list of commercial customers listed in the yellow pages. This list is provided to a sub-contractor who uses it as a help in order to sell advertising space in the Yellow Pages.

The MoPTT (O&M) has only a few information systems supporting the sales and marketing area, and MERS is restricted to the pre-defined reports as outlined above. On-line access to mainframe data would be a step forward, allowing business analysts to extract trends and statistics needed for targeted campaigns.

1.3.1.5 Service and Product Development

This area of activity develops and enhances new products to be marketed. However, the MoPTT (O&M) has no information systems supporting this area. In a more deregulated and competitive market, service and product development are essential if an organisation is to flourish, and this would be inconceivable without the aid of information systems.

1.3.2 Customer Services Systems (O&M) Division of the MoPTT

1.3.2.1 Service Order Creation

Service order creation is the business of receiving service orders and creating customer and service profiles. The O&M service order creation systems and their interrelationships are indicated in Figure 2.

SASOS (Saudi Arabian Service Order System) is the main service order entry and distribution system. It is on-line and used Kingdom-wide.

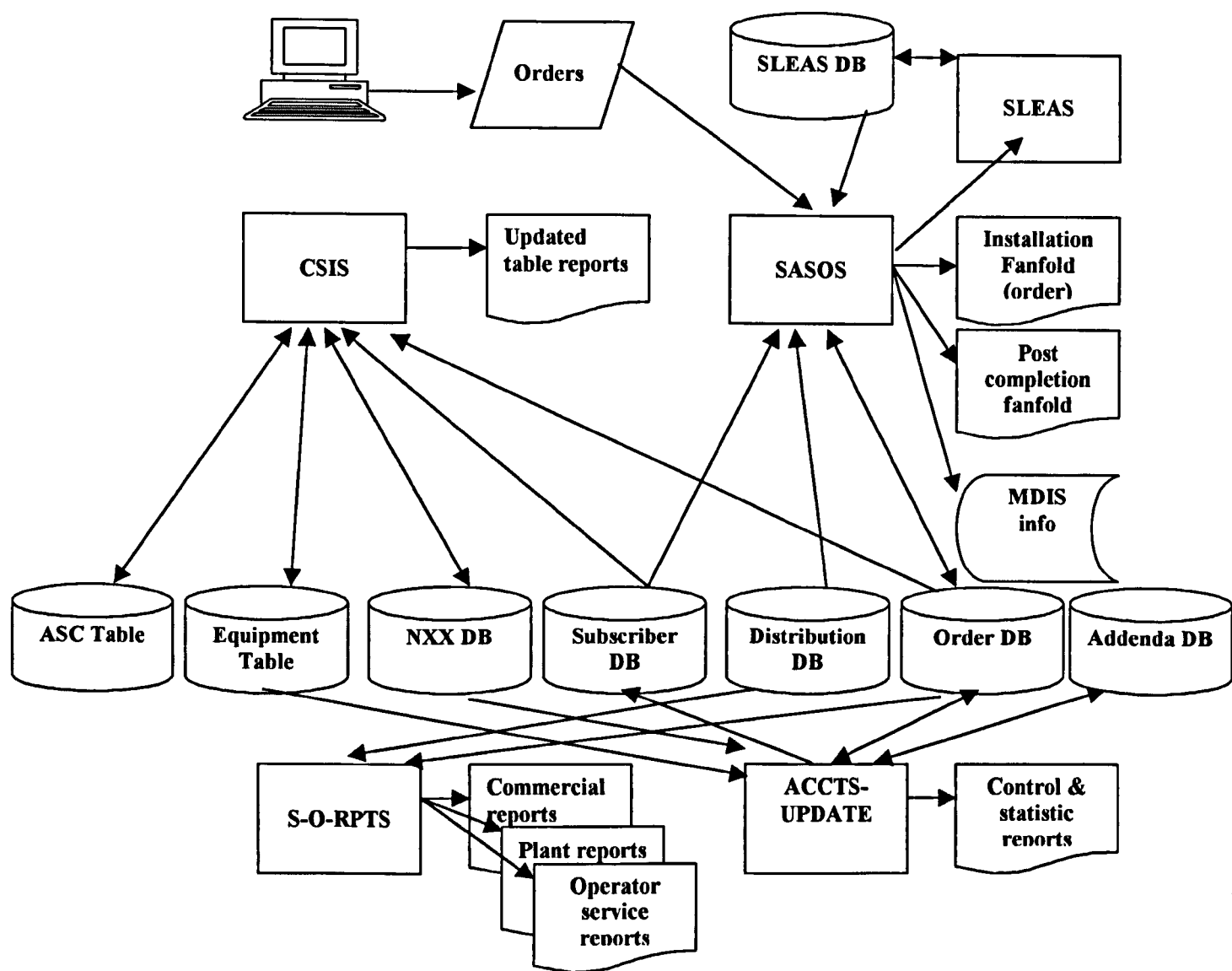


Figure 2. The O&M Division Service Order Creation Systems (SASOS)

An explanation of some of the new systems and units in the above diagram is given in the following paragraphs.

CSIS verifies and updates data used by other customer services systems (SASOS, BILLING, ACCTS-UPDATE, etc.). This data includes location codes, billing dates, geographical information for toll rating, District and assignment centre codes for each NXN, and equipment data. CSIS produces reports following all update jobs.

SASOS takes as input service orders (for telephones and special circuits), entered and validated on-line, and sent over private lines to the IT Division. It reads the SLEAS (see Section 1.3.3.2) line equipment and telephone number inventories and attaches this

information to create a service order (called an ‘installation fanfold’). SASOS prints these fanfolds remotely in the Regions. In addition, SASOS extracts data for updating SLEAS and MDIS in batch mode. When the service order is completed, SASOS produces post completion fanfolds, and notifies SLEAS directly, at which time SLEAS updates the line and telephone number inventories.

ACCTS-UPDATE accesses the service order batch database daily, and applies updates from SASOS to the subscriber database on new subscribers, number changes, disconnections, and other updates from SASOS. In addition, the system calculates fractional charges for services installed between billing periods. It produces statistical and control reports for the system operation.

It is an advantage for the organisation to have centralised subscriber information such as the subscriber database. SASOS does not capture all important information for special services orders, leading to manual handling of this information. Furthermore SASOS is not well integrated with the CSHOR (Computerised Subscriber Held Order Service System) held order system, and the line assignment process is awkward. Due to the key role of SASOS, a replacement of this application implies a replacement of most of the downstream applications.

1.3.2.2 Service Provision

This prepares orders for circuit work and service installation and maintenance, and administers service orders held.

SASOS prepares service orders (see description above)

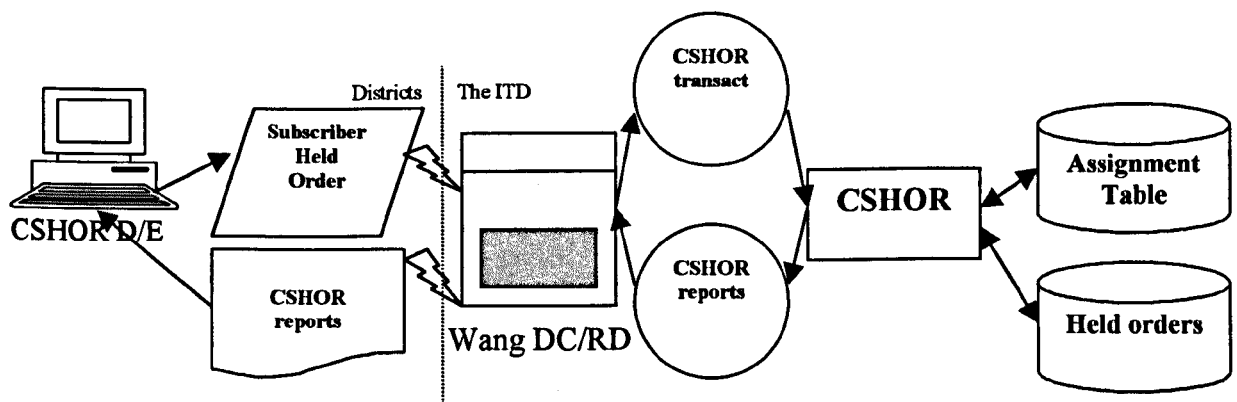


Figure 3. The O&M Division Held Order (CSHOR) System

CSHOR D/E is a PC system used by Assignment Control Centres in the Districts to enter on-line held order information from District subscription offices and from engineering cable repair units. These held orders are transmitted to CSHOR.

CSHOR receives held orders, and produces detailed reports on the availability of service. These reports are sent back to assignment control centres, allowing these centres to manage held orders and held applications in served and un-served areas, and to manage cable repair and construction workloads.

Held orders are administered separately from the service orders recorded in SASOS although ideally the held order transactions should be an integral part of the service order system. No automated interfaces exist between SASOS and CSHOR, and this means that at times data must be entered into both systems. The DCRD mechanism with tapes being loaded from Wang to the IBM mainframe and back is a protracted process and leads to a long turnaround time. In conclusion, the CSHOR system thus seems to be ready for replacement.

A PC system is used for service provision. PC_JOB (see Section 1.3.7.2) holds data related to pending engineering orders for the maintenance of the network. The Districts have built small service order provision systems as a supplement to the corporate systems.

1.3.2.3 Service Activation

Service activation distributes work orders, and handles work and materials management. Work orders to Districts are distributed by SASOS (see description above).

A PC system, PC_DSI (Daily System Installation), is used for service activation in Riyadh, monitoring daily requests for services. It sorts out the type of services requested in the evening, and distributes the load among technicians next morning. This gives the Districts an immediate data access and response not provided by the mainframe systems.

1.3.2.4 Service Assurance

This examines the performance of provided services, schedules fault repair orders, and manages maintenance and repair work.

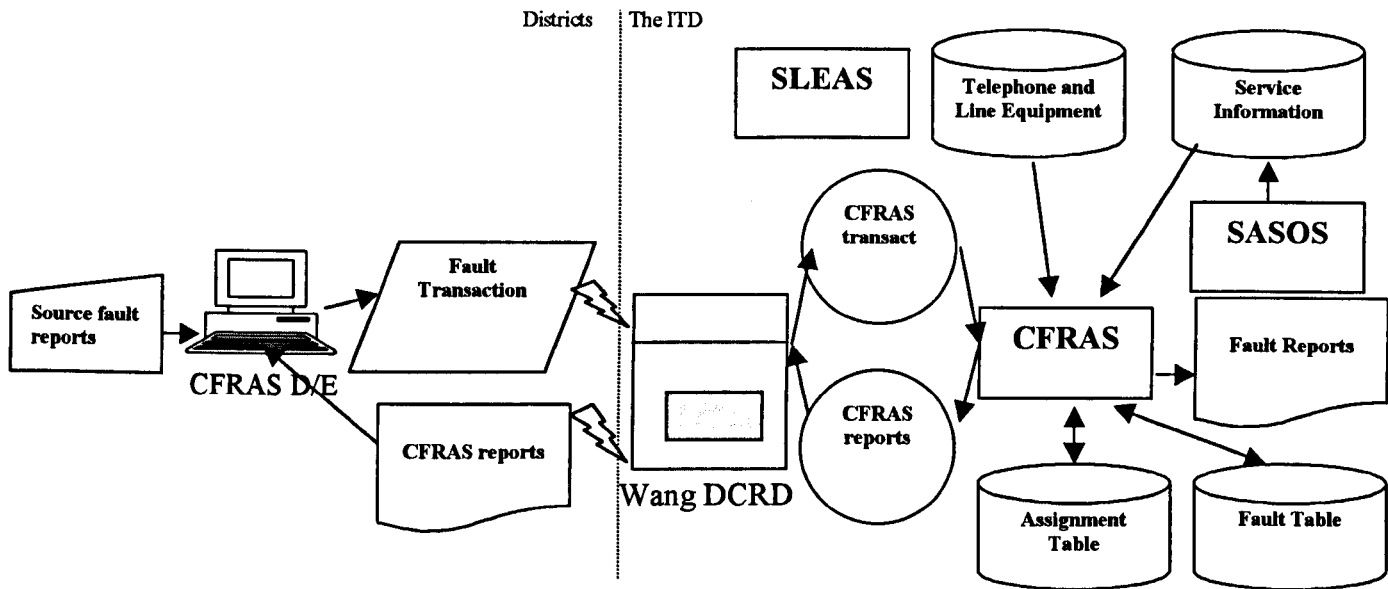


Figure 4. The MoPTT O&M Division Fault Reporting (CFRAS) System

CFRAS D/E is a PC-based system (with the same platform as CSHOR D/E) for the entry of regular fault reports, and it is located in the Repair Service Centres in the Districts. The fault reports are sent to the mainframe CFRAS application using DCRD (Data Collection Report Distribution).

CFRAS administers regular fault reporting. It receives fault reports daily from Repair Service Centres via DCRD. CFRAS accesses SLEAS data for switching equipment codes, and SASOS data for subscriber and service information, and then generates scheduled and on-request fault reports. These are used for analysis and management of plant or personnel faults, and transmitted back to the Districts.

SSMARS (Special Service Maintenance Analysis Reporting System, not shown) is used to manage faults for special circuits. The Repair Service Centres in the Districts use the same PC as for CFRAS D/E to send special circuits fault reports to the mainframe back-end. The SSMARS back-end produces the daily, monthly and summary reports, including rate, clearing time, and repeats reports used in the analysis of the faults for special and private circuits.

Additionally, there is a stand-alone PC-system, PC_CAT, which maintains the status of cabinets of the sub-Districts and holds data related to the catalogues in the cabinets.

As for CFRAS, the DCRD distribution mechanism is time consuming and based on old hardware no longer supported, and CFRAS and SSMARS are not integrated. Moreover, related to service assurance, there are also the network assurance systems described under Network and Engineering systems. These systems are not integrated, with much data held on PCs and not available within the organisation as a whole. For example, this is true for the stand-alone cable bad-pair analysis system, CBARS, found in all Districts. The fault management and analysis function is lacking because of isolated data, and there is a great need for integration.

1.3.2.5 Service Support

This deals with order control status, customer assistance and free telephone numbers.

Within this area CSHOR plays a part in answering subscribers' inquiries on held orders, through the reports it distributes via DCRD to the subscription offices.

S-O-RPTS extracts service order information and statistics from the SASOS database at the end of each day. Data is accumulated to weekly, monthly and yearly statistics. S-O-RPTS also generates reports, such as the service provision measurement plan, monthly orders processed, missed appointments, service order quality measurement, etc.

In addition to the above, there is a stand-alone PC system, PC_CLT (Cutover Line Transfer), which handles the changes related to the general main facilities of that District's phone network, including phone number changes within the frame and cut over from switch to switch.

1.3.2.6 Subscriber Billing I- Calculation/Distribution of Invoices

Through this system the calculation and distribution of subscriber invoices is carried out. Invoices or bills consist of a subscription part (rental of equipment, features) and a usage part (calls, directory assistance). The central applications in the billing preparation are the TOLL (CF01) system, which reads the various toll records and produces a file of billable tolls, and BILLING (CE01), which uses this file to produce the billing invoices and to update the subscriber accounts.

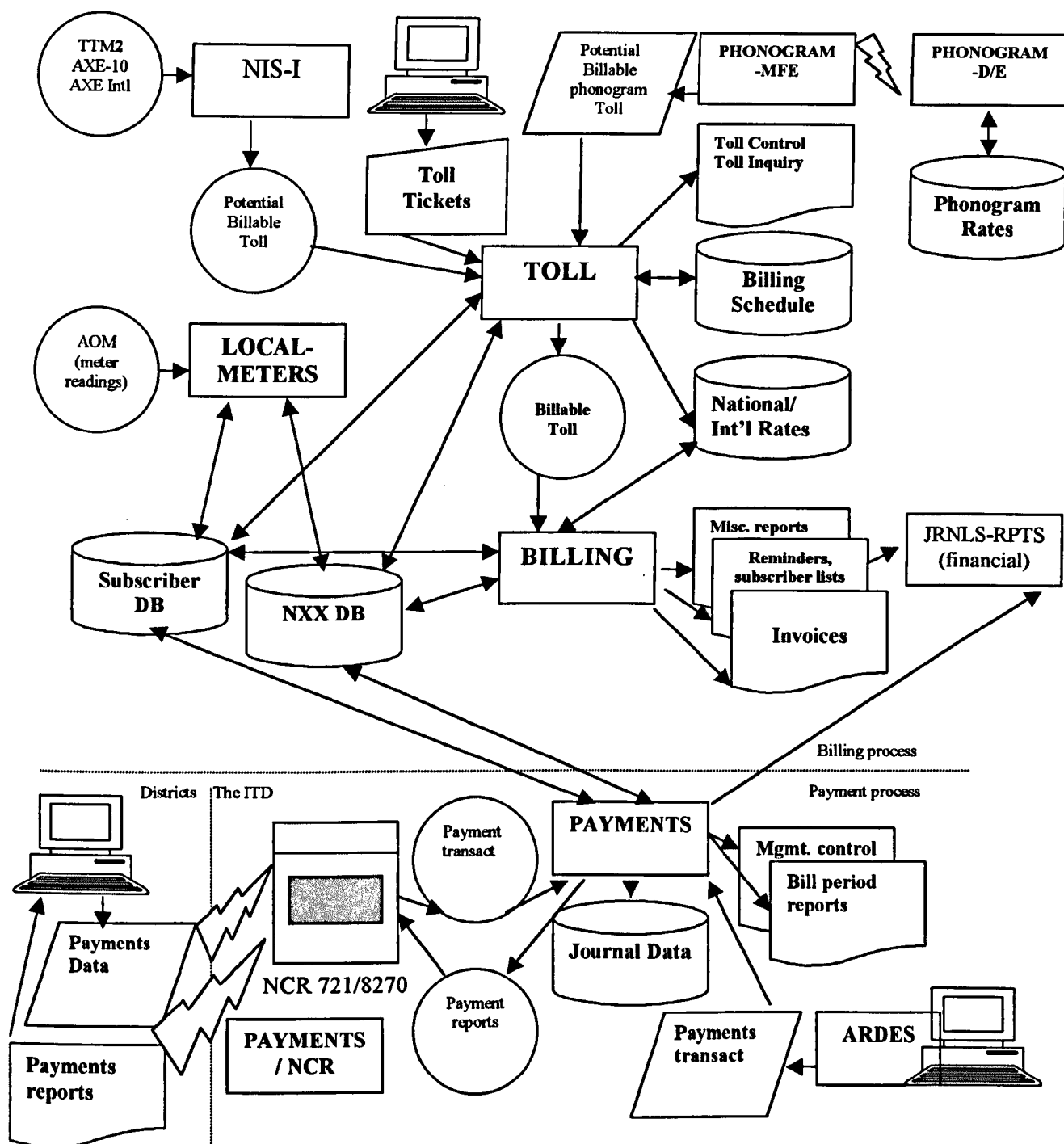


Figure 5. The MoPTT O&M Division Billing and Payment Systems

NIS-I reads daily toll billing records (for long-distance calls) from the network switches (AXE-10, AXE Intl, and TTM2) and from operator input. It validates these records and produces a potential billable toll tape for TOLL.

LOCAL-METERS reads the AOM tape of local call meter readings from the exchange each billing period. It calculates the quarterly meter usage charges, and posts this and the reading

for each subscriber to the Subscriber DB. This data is read by TOLL to bill local calls as well.

PHONOGRAM consists of a PC-based data entry (D/E) front-end, located in Jeddah Data Centre, and a Mainframe Front End (MFE) located in Riyadh Data Centre. The D/E part is used by the Jeddah phonogram office to send billing transactions for Telex and telegrams to MFE, where they are processed to a file of phonogram toll billing records, for TOLL.

TOLL reads the potential billable toll tape and operator-generated toll tickets. TOLL verifies these toll records against the Subscriber DB to ensure the originating telephone service is active. Unmatched toll records are put on a toll control/inquiry file for investigation. Matched toll records are rated subscriber and service data appended, and put on a billable toll tape for BILLING.

BILLING reads the billable toll tape, substantiates that all billing data is there and is accurate, and produces invoices with details like subscription charges, tolls, meter readings, and directory inquiries. BILLING provides data to JRNLS-RPTS through a mechanised interface, updates the Subscriber DB, and generates reminder notices and subscriber lists for overdue accounts, as well as various management reports.

JRNLS-RPTS is a financial system that takes the accounts receivable into consideration when generating reports on accounting revenue and on closing balances.

A minor program, STIP, allows Telex to use the same laser printers to print out invoices, but apart from this there is no integration with the Telex billing process.

The toll information delivery is non-automated. Ideally this is something that should be done automatically using modern technology. The entire billing process involves the extensive use of large number of manuals and time-consuming tasks like reading tapes it does not give the MoPTT much flexibility in choosing individual billing periods for groups of subscribers.

1.3.2.7 Subscriber Billing II- Payments/Collection Process

This administers the payment and collection processes, including the collection and recording of the incoming funds. It also has a link to the financial systems through the reports generated by the JRNLS-RPTS system of the payments received.

PAYMENTS/NCR enquires on a daily basis of more than 100 payment offices throughout the country for subscriber payment information. This data is transmitted to Riyadh over the NCR network, and written to tape, to be processed by the PAYMENTS system. PAYMENTS/NCR later receives a tape with management control reports, which it sends to the 19 Districts by means of the NCR network.

PAYMENTS (also known as CASH PAYMENTS) receives payment notices, adjustments, and refund transaction data for telephone and Telex accounts from PAYMENTS/NCR (via tape). The system also receives transactions and error corrections from the centralised accounting input group. Based on this, PAYMENTS produces reminder notices and treatable subscriber lists. It also prepares management control and error reports, which are put on tape for PAYMENTS/NCR to transmit to the NCR network. The updates to the Subscriber DB allow BILLING to issue new invoices for unpaid bills. PAYMENTS has a mechanised interface to the financial JRNLS-RPTS system. Telex payments are written to a tape and dispatched to the Saudi Telex system for processing.

The features of another system, ARDES (Accounting Revenue Data Entry System), include an on-line PC-based D/E function used to key in the Ministry area payments and adjustments, as well as updates to reference tables over payment office. This data becomes DB2 transactions and these are converted to sequential files for PAYMENTS by the batch component of ARDES.

CCS (not shown) auto-dials subscribers and delivers reminder messages for overdue accounts.

COLLN-RPTS (not shown) manages revenue collection and minimises revenue loss due to accounts that cannot be collected. It takes as input collection files from PAYMENTS (billed subscriber data) and BILLING (subscriber transfers, NXX transfers) and it produces billing period and quarterly collection reports (collection and status of all accounts by category) for each NXX.

BLINK (Bank LINK or 'Attaruf', not shown) is a pilot system to allow banks to upload payment data directly to the MoPTT's ITD. The system is currently under test in the Saudi American bank. BLINK consists of a PC in the bank, which stores customer payment information; a mainframe component then dials the PC using a modem, collects the payment

data, and transfers it to PAYMENTS.

Al-Badeel (or IRIS, Invoice Record Information System, not shown) maintains an image copy of the commercial copy of subscriber invoices (from two billing periods). The system allows Districts to access invoice copies, replacing the manual process of reproducing lost bills, and it assists in resolving bill disputes.

JRNLS-RPTS is a financial system that reports payment received and generates reports on accounting revenue and closing balances.

The PAYMENTS system is successfully carries out its role of tracking paid bills for telephone accounts. However, the entire range of functions of billing, payments and financial reporting systems is rather loosely integrated, with much of the data transfer done manually on tapes, which means a long turnaround time. In addition, the Telex payments handling should ideally be integrated into a new payments system.

1.3.2.8 Directory

This produces a telephone directory based on the subscriber database and provides an on-line directory used by the assistance operators.

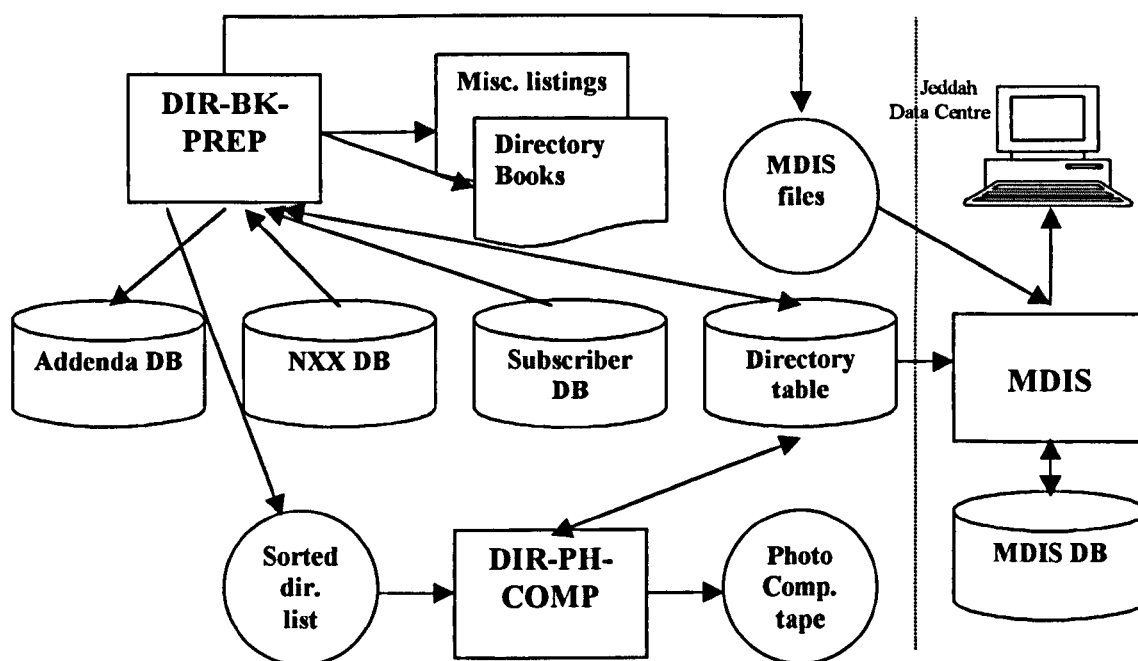


Figure 6. The MoPTT O&M Division Directory Systems

DIR-BK-PREP extracts data from subscriber database for printing subscriber telephone directories. It formats and prints Traffic Information Directories, and prepares updates to MDIS. It contains a lexicon table (AD) for the translation of Arabic names to English. The system provides reports and statistics of updates, used to manage directory production, and inputs sorted data to DIR-PH-COMP.

MDIS is an on-line directory information system used by operators in order to provide the directory assistance (905 service) to users. MDIS is located in the Jeddah Data Centre, and updated with data downloaded twice a week from the DIR-BK-PREP system. On an ad-hoc basis (typically every second month), the directory is totally refreshed. The directory assistance operators use MDIS from terminals located at Jeddah, Riyadh and Dammam.

DIR-PH-COMP receives sorted directory listings from the DIR-BK-PREP system and produces formatted subscriber telephone directories on tape; these are later used for the publication of the directory by means of special photo-composition equipment.

Related to the directory is the business COMM-DIR system, which extracts a list of all commercial customers whose businesses appear in the commercial directory (Yellow Pages) from the directory information. This list is used to help selling advertising space in the Yellow Pages.

The MDIS system is located separately from the directory system/database, and the tedious update procedures which it involves are not ideal. The current structure seems to be a result of free disk space and CPU power in the Jeddah Data Centre rather than a planned design. The MDIS system itself is running out of entries, and will need a comprehensive rewriting to handle new subscribers; pager numbers, for example, need to be added. In addition, the current system suffers from the fact that the regular updates only add new entries; deletion of obsolete entries is only done when the total refresh is made every second month. On the operational side, 30-50% of the calls to directory assistance are unsuccessful, and there exists for the MoPTT an opportunity to increase revenue from this service by increasing the number of operators. In fact, the MDIS as presently structured actually prevents the operators from passing accurate information to the customers

1.3.3 Network and Engineering Systems (O&M Division of the MoPTT)

The Network and Engineering systems consist of the SLEAS system, the integrated FAS (Facilities Administration System) portfolio, and a number of stand-alone systems. The figure below shows an overview of FAS; each system is described in its subsection below.

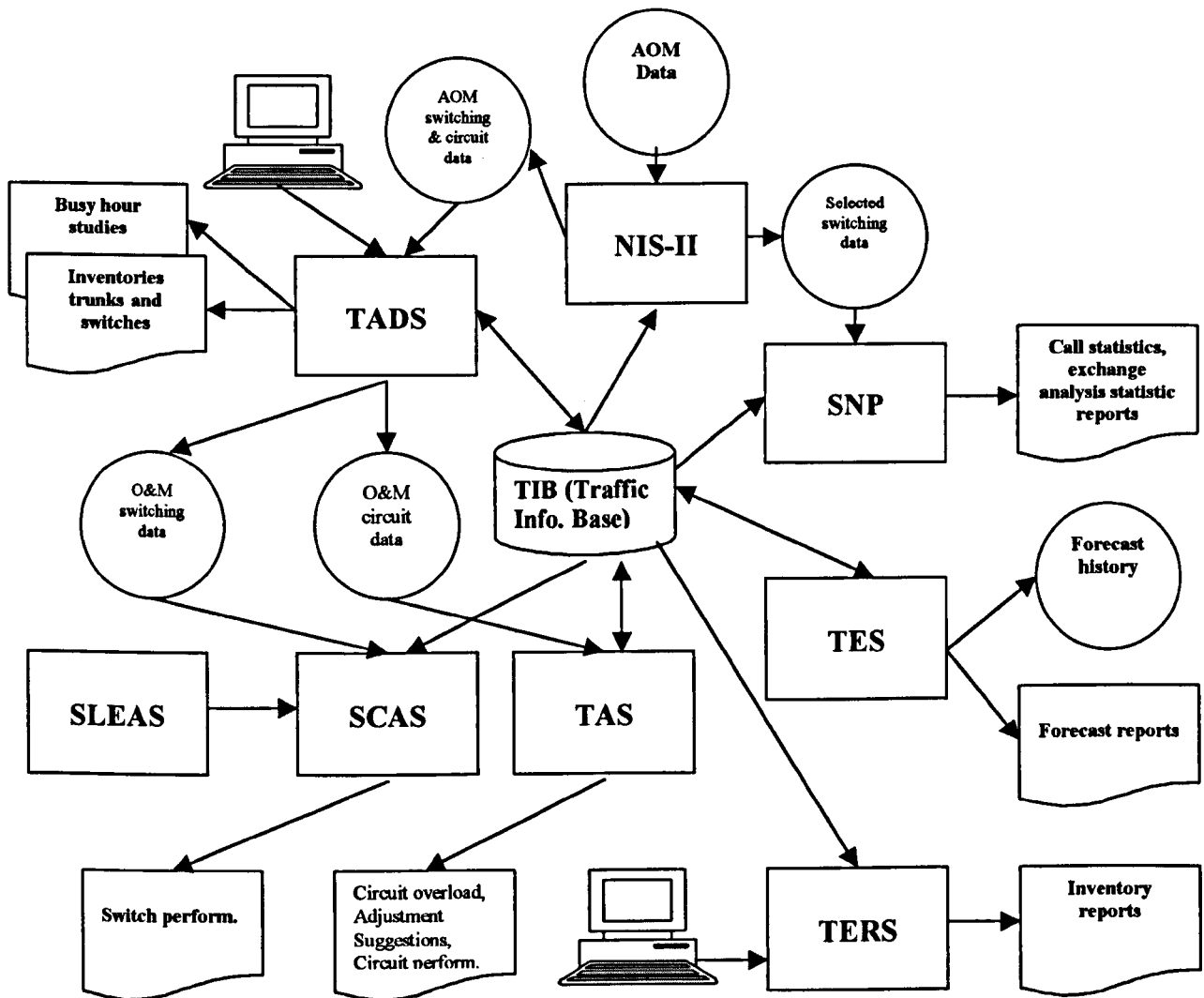


Figure 7. The MoPTT O&M Division Facilities Administration System (FAS)

The FAS systems take care of various aspects of the network management. They are centred on the TIB database which contains information on all circuit groups, the types and numbers of switching components, and administration and control matters.

NIS-II and TADS are input systems receiving and formatting OM (operational measurements) data. TIB is primarily updated through the TADS system.

SCAS, TAS, and TES are planning systems. SCAS reports switch use, TAS reports trunk (circuit) use, and TES forecasts trunk loads.

SNP is a network assurance system, diagnosing the causes of failures.

TERS is a network support system, maintaining an inventory of trunks.

Related to the Network & Engineering systems are the fault reporting systems CFRAS and SSMARS, described in Section 1.3.2.4 above.

1.3.3.1 Fundamental Planning

This is the matter of evaluating and planning future network configurations.

TAS (Trunk Administration System, part of FAS) receives trunk traffic loads from TADS, and trunk group characteristics from TIB. It analyses this information, identifies overload conditions, suggests adjustments to appropriate circuit groups, and tracks performance history for the circuits.

SCAS (Switching Centre Administration System, part of FAS) receives switch traffic loads from TADS (see Section 1.3.3.5), and switch characteristics from TIB. It validates this information and produces reports similar to TAS on switch performance.

TES (Trunk Engineering System, part of FAS) reads circuit group traffic data from TIB, and uses this and its own earlier forecasts for new trunk forecasting. TES produces forecast reports for future loads and circuit group requirements and stores this OB tape for future use.

NESP (stand-alone, not shown) stands for Network Estimating and Scheduling Program. The dial-up on-line front-end of NESP makes a cost study of work orders entered, and delivers detailed project data of individual work operations by material, construction, and engineering labour costs. The batch back-end of NESP accumulates and summarises work orders, providing reports on expenditures, labour hours, quantity, category of cable to be placed, and quantity of major items of major plant to be placed.

FORT (stand-alone, not shown) forecasts telephone demand in villages and remote locations. Based on site details, growth and penetration rates for 5,000 sites, the system produces general forecasts of demand per year for the next 5 years, per village, site, District, Region,

and for the whole country; it also makes forecasts for residence and business requirements, main services, coin, PBX, and mobile phones. FORT maintains some permanent databases.

1.3.3.2 Engineering

This is concerned with the design of the physical network, the preparation of orders for plants, and the administration of work and materials.

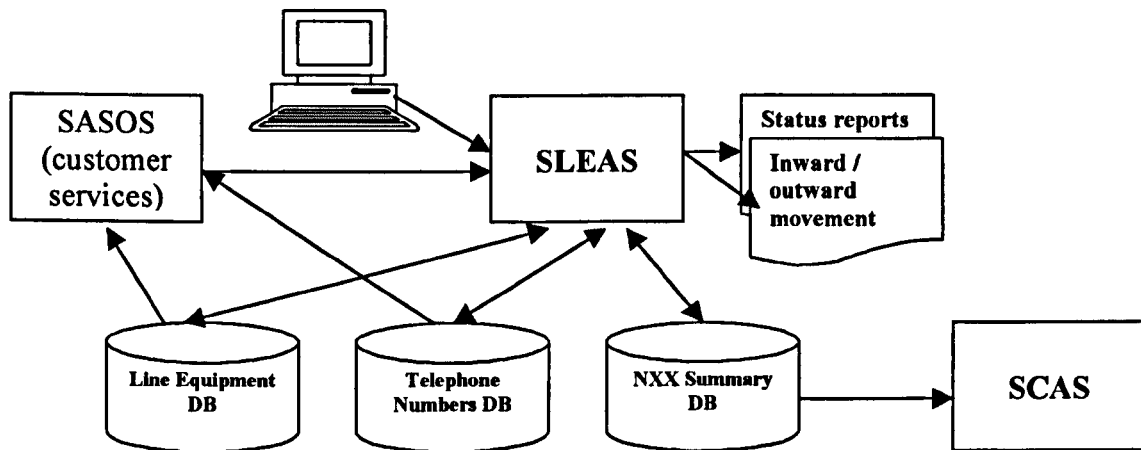


Figure 8. The MoPTT O&M Division SLEAS System

SLEAS (Subscriber Line Equipment Assignment System) is an on-line system which maintains the inventories of telephone numbers and line equipment. SLEAS assigns line equipment in a way that loads switches evenly. SLEAS makes free numbers available to SASOS, which in turn feeds back assigned numbers for SLEAS to update the inventories. SLEAS generates batch reports on current inventory and movement of lines by class of service. The system is also used by the Traffic Forecasting And Administration Group. The system, which was developed as long ago as 1974, has been heavily modified and needs to be replaced.

PLOP (Project Listing Outside Plant, stand-alone, not shown) takes job orders and a cost table as input, and provides project schedules, work load schedules, and labour hour distribution of outside plant construction for District management.

SMAC (Study Method for Analysis of Cables, stand-alone, not shown) is an interactive system used by network engineering designers to forecast and improve primary pair use. The input information relates to the physical layout and characteristics of primary routes and

primary area cable count. The output is an inventory of cable counts and the use of cable pairs, used to identify congestion problems and deficiencies at critical design points along the primary route.

CCLI (stand-alone, not shown) is an interactive system to maintain Common Code Location Identification (CCLI) codes used by engineering design.

TOPPS (stand-alone, not shown) analyses the cost of alternative outside plant engineering designs. Its input is engineering designs and the cost of labour and material and produces an estimate of the cost of the outside plant engineering plans.

CONLEN (stand-alone, not shown) takes cable information (weight, type of duct, information on straight and curved segments) as input and produces reports indicating the cable pulling tensions. The output is used to identify the optimal locations of pulling equipment and underground dual structures.

SLEAS is currently functioning as intended, but it could form an integral part of a future service order system.

The stand-alone systems indicated above are all mainframe based, and although many of them have an interactive part, access to them from Districts requires dial-up. None of them maintains any corporate data. These systems could easily be replaced by PC systems, giving easier access, faster response time and a much-improved graphical user interface.

1.3.3.3 Network Provision

Network provision prepares orders for logical networks (design) and manages work schedule changes due to hitches or rearrangements. The O&M Division of the MoPTT does not provide any mainframe systems in support of this area. There is an absence of corporate information systems to manage network design orders, and the Districts are responsible for this themselves.

1.3.3.4 Network Activation

This distributes physical (plant) and logical work orders, manages construction work, and monitors use and availability of materials.

The only mainframe systems in support of this area are the financial systems ELMS and EOAS, but these are concerned with budgeting rather than the actual progress of the construction work. A stand-alone PC-based system (PC_CRPR) exists, which manages the productivity of cable repair technicians and foremen.

1.3.3.5 Network Assurance

This relates to the surveying of network performance, the scheduling of orders for work on faults, and administering network maintenance and repair work.

NIS-II (Network Input System II, part of FAS) receives from the AOM computer operational measurements (OM) of the traffic flow through all switches (AXE, ARE, PRX, 5ESS) and through the trunk groups. NIS-II re-formats and summarises this data into formats expected by TADS and SNP (see below). NIS-II also produces control reports.

TADS (Traffic Administration and Data System, part of FAS) is a data collection facility for TAS and SCAS, analogous to the TOLL system. It receives and validates OM data from NIS-II and manual OM data. It passes circuit (trunk) data to TAS, switching data to SCAS. In addition, it updates TIB and receives updated inventory information. TADS produces busy hour studies and inventory reports on circuit network and exchange data.

SNP (Switched Network Performance, part of FAS) helps in identifying the causes of network failures. It receives traffic measurement data from NIS-II in respect of performance and service quality, and produces analyses and diagnosis reports and statistics on successful and unsuccessful calls. This information is used to trace the causes of faults and to identify potential network degradation and errors.

ROUTINE-682 (stand-alone, not shown) is a system to handle field complaints or suggestions of a technical or administrative nature submitted by field employees. The system stores and tracks the status of such complaints and issues reports; it can be accessed on-line.

The MoPTT did have a system to report PBX exchange performance, PEPS, but this is no longer used. The mainframe-based systems focus on monitoring of operational measurements from the switches and trunks, not on tracking actual defective cables. This latter function is carried out by the stand-alone PC-based systems CBARS and CARS, which are used in all Districts (see Section 1.3.7.3). The information they contain, on cable routes

and manholes, various data about the cables, and previous repair and maintenance history, are not corporately available. In one District another PC-system, PC_DCS, is used to record cable jobs that need digging by an outside contractor. There can be little doubt that other Districts maintain such information related to network assurance and maintenance electronically on PCs, but details of operations of this sort are so specific to the local environment that they are not available without intensive local research.

1.3.3.6 Network Support

This function controls the flow of work orders and administers inventory records and inventory assignments in relation to those orders.

TERS handles the inventory and assignment records for the long-distance trunk network. It provides on-line update on and inquiries about multiplex and voice frequency equipment, and batch updates and reports in that connection.

SKIS (stand-alone, not shown) maintains an inventory of all special services circuits designed by special engineering services. These include foreign exchanges, off-premises extensions, tie trunks, data circuits, private voice lines, broadcast services, and alarm circuits. The system's input is comprised of completed service reports. The output is in the form of inventory reports and summaries of all special services work for each customer.

AMTS (stand-alone, not shown) maintains a detailed record of the O&M Division's owned mobile telephone units over the whole Kingdom. Billing for these units is handled in same manner as non-mobile units. AMTS produces management reports summarising quantities, types, and geographic distribution of mobile phones.

It would be advantageous if SKIS, at least, were integrated with the SSMARS fault report system. AMTS could be considered as a financial system, but is not integrated with any other inventory systems.

1.3.4 General Support Systems in the O&M Division of the MoPTT

The following general systems are in use:

CSR-TRACK tracks all active Computer System Requests (CSRs) and reports completion and resource use statistics about CSRs and programming staff.

PROSS schedules computer batch jobs.

DCRD (Data Collection Report Distribution) is a utility for the transmission of data between the Districts and the Riyadh mainframe, based on the Wang platform. It receives data from the workstations in the Districts and writes this data to a tape, which is then manually carried to the mainframe and read. Similarly, reports generated from the mainframe are written to tape, read into the Wang platform and sent to the remote workstations by DCRD. This process is rather time consuming in comparison to a direct link. DCRD is used by the CSHOR, CFRAS, and SSMARS applications only.

SRS records and tracks the training and the training needs of Saudi employees in the IT Division, and offers training and budget analysis. The SRS system, however, is not systematically used to plan training needs, and covers only a small part of the operations of the MoPTT.

Apart from SRS, the systems described are internal to the ITD. Very little information systems support for human resources functions could be identified, other than for training. For instance, there are no systems to assist in career development plans, for setting and following up on personal objectives, for monitor staffing and skills requirements or for making recruiting plans. This last function in particular could support the MoPTT in the management of its multi-national staffing profile and Saudisation objective.

There is no internal communications infrastructure within the MoPTT, no internal electronic mail systems, no newsgroups or bulletin boards, and no way to electronically share information, other than by distributing disks manually. Although, the MoPTT may not want to set up an organisation-wide electronic mail system in one step, it may be advantageous to introduce some kind of electronic communication means, at least within departments or between users who carry out similar functions throughout the Kingdom. A financial department could use this to distribute financial estimates and results, the repair force could share experiences and seek the help of colleagues elsewhere, and so on.

1.3.5 Telex and Al-Waseet Systems

The Saudi Telex applications and databases support two major systems: the Telex and the Al-Waseet systems.

1.3.5.1 Telex System

The Telex system contains all normal functions grouped into four categories:

1. Finance systems, which are concerned with inventory management and asset administration. The ASS system takes care of asset administration, SPP takes care of spare parts, and MOD is a module inventory.
2. Customer Services systems are mainly concerned with billing. BIL is a monthly billing system, ACC maintains subscriber's accounts, TLG handles telegram charges, and COM handles subscriber complaints. Also in the Customer Services group are the systems LCB, LCI and LCO, which handle the billing for leased circuits. A further system, TSO, handles information on new subscribers' connections and on modification of subscriber equipment. Finally, PTM is the system for billing settlements in the Ministry.
3. Network and Engineering systems fall into two groups: operations of Telex, and operations of the exchange system. Telex operation is covered by the TRA, NET (Network Operations), TDS, and PTN applications. TRA is a major application which prepares billing information, dispatches billing and statistical data to the central computer, prepares information for statistical reports, and generates statistical traffic reports. Exchange systems are covered by the SUB application, which maintains and prints the subscriber directory, and supplies subscriber information for billing.
4. General Support is provided by ASO, an Application Support application.

1.3.5.2 Al-Waseet System

Al-Waseet network is operated and maintained by applications within the usual four categories:

1. Finance systems: PTG provides reports regarding international calls (incoming and outgoing) both in numbers and in monetary terms. PTG, an accounting system or financial reports on spare parts inventory, is no longer used.
2. Customer Services systems: PTB holds and manages all information relating to subscribers and their history. PTA is the billing system; it provides the invoice and a list of itemised calls (both national and international) for subscribers. PTC, the payment system, enters the subscriber payments at the payment office and updates the subscribers account, while PTI provides information regarding subscriber services and complaints.

3. Network and Engineering systems: PTE is a traffic system that contains all information from the exchange on all successful and unsuccessful calls. PTF registers all subscribers' complaints and handles fault clearance. PTH is a network system that produces reports on successful and unsuccessful calls and is used for planning and statistical purposes.
4. General Support is provided by PTD, an application support system that maintains fixed data tables.

The Telex and Al-Waseet systems give a reasonably good support for the Telex services (which are declining in number of users). The systems use relational database technology, which makes them easier to modify, with the potential to migrate. Common functions such as the customer services, the billing process, and the payment process are not integrated with the corresponding functions in the O&M Division of the MoPTT.

1.3.6 The Computing Department Financial Systems of the F&A Division of the MoPTT

The F&A Computing Department systems are all mainframe-based and physically located in and operated from the IT Division. They perform accounting and budgeting functions for the MoPTT Deputy Ministries for Telegraph, Finance and Administration, Telephone, and Post. Some of the systems depend on data from the IT Division and Telex systems. In this present study Post is not covered: the applications for the other Deputy Ministries fall into the major groups described below.

1.3.6.1 Budget and Planning

The systems BDG (Budget Control System) and EBD (Expected Budget System, a subsystem of BDG) provide budget information for the current year and the previous year, monitor budget and expenditure, compare actual spending with allocated budget, and make annual budget estimates for the new fiscal year.

BDG stores the general budget for the MoPTT after approval, monitors all spending on all ongoing projects and financial settlements of all the MoPTT projects, keeps the spending aligned with the previously approved plan, carries out queries and generates reports about spending and the approved plan.

EBD estimates future project spending and financial settlements for the MoPTT and

generates the expected budget for the MoPTT, which is sent to the Ministry of Finance for approval.

TUFT (Telephone Follow-up System) processes information about telephone projects and makes forecasts about this area.

1.3.6.2 General Accounts

GAR (Government Accounting System) is used by the Department of Finance to prepare and track all government-related accounting. This covers all the government accounting for all departments in the MoPTT. The functions performed by GAR are:

- to update, delete, and add new government accounts
- to identify outstanding accounts and areas which borrow money from the Ministry
- to store all codes for incoming funds
- to store all international country codes
- to store information about banks with which the Ministry does business
- to prepare all general ledger related operations
- to generate all accounting reports
- to prepare accounting documents associated with daily funding, open accounts, general departments, money orders, and transactions related to Ministry cash boxes.

1.3.6.3 International Accounting

International Accounting manages accounts related to international cable and wireless calls and transmissions, including telephone, telegraph, Telex, radio, TV, maritime radio, and wireless licences. The systems provide billing of such services and cover other aspects such as maintaining government-level agreements regarding international calls (on e.g. tariffs and rates). The applications used in these activities are as follows:

AXT (International Telephone Accounts) processes the telephone call records supplied monthly on tape by the O&M Division, extracts all international calls, and outputs monthly bills for each foreign country. In addition, it generates detailed reports to be used at billing time.

TXT (Telex Tracking System) processes data from international Telex calls, providing

information needed to create international Telex bills for other countries. The system also generates various reports and statistical information needed by management to assess the use of Telex systems by other countries.

TSS (Traffic Settlement System) is a management information system for all traffic accounts relating to international telegraph, telephone, and Telex calls, for proper settlement. TSS provides net cost or profit information.

AFT (Tariff Agreement System) maintains international rates for outgoing telephone and telegraph calls, as well as for outgoing and incoming Telex services.

LXT (Telephone, Telex, and Telegraph Statistical System) provides statistics on telephone calls (both through operator and direct) made from the Kingdom to outside countries.

TTS (Transit Tariff System) provides the user with accurate and instant information on each transit tariff record.

FBS (Frequency Billing System) provides billing of TV and radio services to other countries. The system uses information that is collected on tape at the ITD and generates a separate bill for each country.

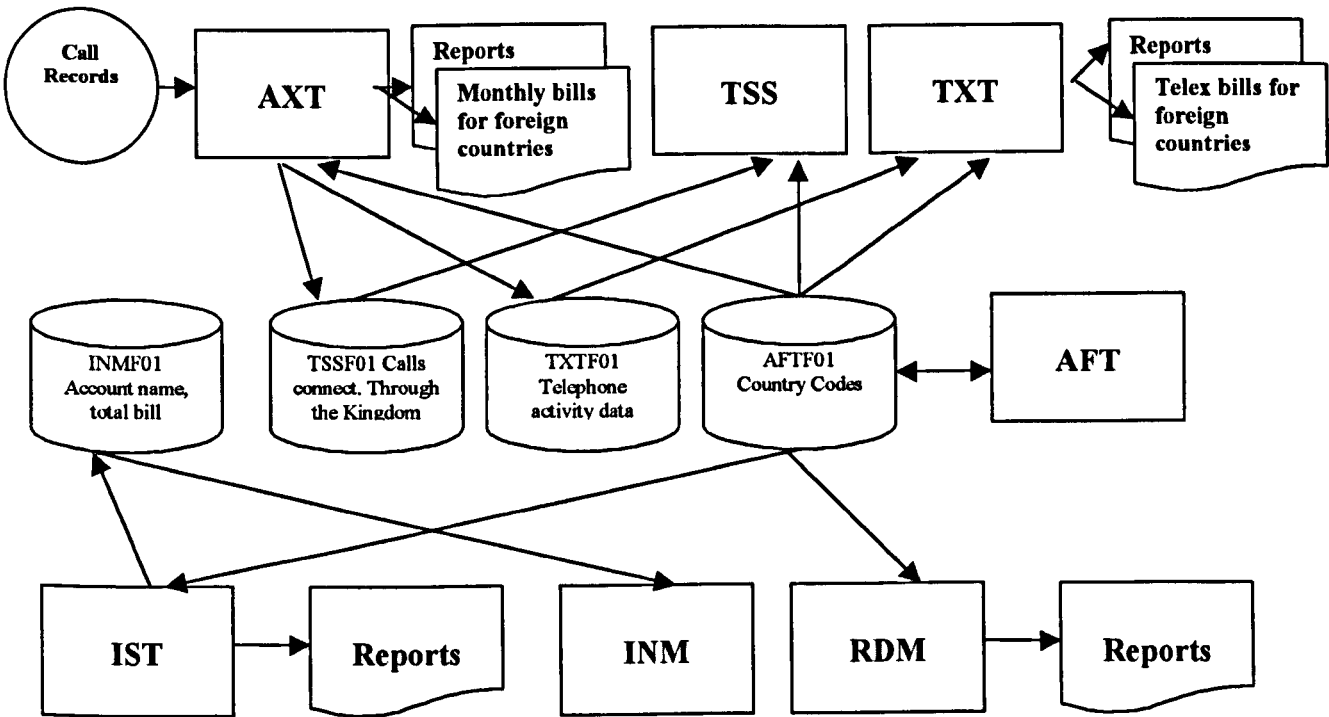


Figure 9. The MoPTT F&A Division International Accounting Systems

IST (International Maritime Satellite) tracks the use of all the *Inmarsat* satellite stations and coastal stations by other countries. It stores information about the transaction every time a station is used, provides information of all unpaid local and international accounting authorities, creates bills for each account, and provides various reports.

INM (*Inmarsat* Follow-Up System) is a payment and monitoring system of payments made by ship sponsors in any given year.

RDM (Radio Maritime Follow-Up System) is an extension of the billing system which keeps an up-to-date record of the payments made by each ship sponsor and monitors those accounting authorities which are not up to date with their payments.

ALT (Wireless Licenses System) tracks all wireless communication licence operations and generates bills for these licences. It stores licence information for every owner of a wireless licence, tracks expiry dates and generates bills for expired licenses; it also generates various reports and handles on-line queries about licenses. ALT is used by the Wireless Department, a part of International Accounting.

The systems in use in the F&A Division of the MoPTT give every indication of being reliable, and the MoPTT for F&A maintains that the data they hold is accurate. However, many of the systems do have a slow data entry process and no instant access to the data. The F&A Division reports that the IST and INM systems are very poorly designed and do not work well.

1.3.6.4 Organisational Planning and Personnel

PXT (Ministry Payroll System) processes the MoPTT payroll, and calculates the salaries of each employee every month. In addition, it produces various reports and personnel lists. JXT (Job Analysis System) processes and tracks all positions within the MoPTT; it is used when there is need to assign, promote, terminate, transfer and inquire on jobs within the MoPTT. JXT produces a number of reports for all personnel management levels at the Ministry.



Figure 10. The Personnel Systems of the F&A Division of the MoPTT.

1.3.7 PC-Based Systems

The MoPTT's PC-systems fall into one of the following three categories of increasing independent from the mainframe.

Mainframe terminal front-ends: such PC systems are used to view mainframe data or to enter data which is then sent to the mainframe over a modem or fixed line, or indirectly through disk. Many of the mainframe applications have PC data entry front-ends, or PCs acting as 3270 terminals.

Mainframe data analysis systems: systems in this category download data from the mainframe using a manual process. They then process this data and generate reports not available from the mainframe. They have only little, if any, separate data and need to download data frequently to stay updated. These systems do not update the mainframe.

Stand-alone systems with their own data: these may be used by a single department or by all Regions or Districts. They may originally have been based on mainframe data, but have since developed to maintain important data not found on the mainframe, and they do not update the mainframe. The data they held may be of limited comparative importance, but nevertheless it is still corporate data.

The existence of mainframe data analysis systems demonstrates that the mainframe generated reports are not always adequate for the users or that they take too long to appear. There is nothing wrong with processing mainframe data on PCs; on the contrary, PCs can often quickly generate reports and graphs customised to meet the needs of the specific user. Problems only arise if the access to the mainframe data is not easy. This seems to be the case for the MoPTT's PC systems used for analysis of mainframe data; these do not have on-line access to the mainframe data, and their users have to download it for the most part manually.

The existence of stand-alone systems with own data shows that the turnaround from the time data is entered into the mainframe to the time processed data is delivered back to the user may be unacceptably high. Day-to-day tasks (like scheduling and monitoring of repair orders) require instant access to data to avoid unnecessary delays. Again, there is nothing inherently wrong with using PCs in such situations; it may often be the most cost-effective solution. The problems arise if the data held on the PCs are indeed corporate data that other

sections need to access and that, therefore, should be standardised and accessible across the entire organisation.

The introduction of PC systems in the MoPTT in itself is of great value. PCs provide a fast on-line data entry and access to data, a much improved user interface compared with terminals, and often an ability to create user-designed, graphical reports. The problems with the MoPTT's PC-based systems are that they are not always integrated where appropriate with organisation-wide systems, that they are often not well-documented or their existence even known about outside a small group of users, and that there is no MoPTT-wide standard enforced for the PC environment.

1.3.7.1 PC-based Systems for Financial Management

The following four systems are all used for financial management by Support Services.

MVSPS (Motor Vehicle Spare Parts Standardisation) maintains a vehicles spare parts ID catalogue. It is used to identify vehicles spares for inventory and stock control purposes. It does not itself, however, maintain the control of stock.

PC_CIS (Car Insurance System) is a Macintosh stand-alone system that maintains the list of car insurance details for each vehicle. In addition it is used to calculate the depreciation value of the car fleet; it is not integrated with MVIES.

PC_PMS (Project Monitoring System) monitors contracts, e.g. those related to petrol, and expenditures related to stationary such as copiers, mail, etc., and performs project follow-up.

PC_SCS (Stock Control System) contains inventory control standards and measurements. PC_SCS monitors stock, for instance stationary, cleaning supplies, etc.

In addition, Financial Results and Methods use a PC-based system to produce financial reports. The section uses SITER emulation software to download data from the PAYMENTS, JRNLS-RPTS and COLLN-RPTS mainframe systems. The system modifies this data and merges it with data on the PC to produce the required financial reports.

1.3.7.2 PC-based Systems for Customer Services

The following Customer Services systems are used by the Assignment Control Centre

(ACC), Customer Services in Riyadh City District. The systems are only used in Riyadh, but other Districts have developed similar systems.

PC_CAT (CATalogue) is a stand-alone PC-based system for service assurance. It maintains the status of cabinets for sub-Districts such as Olaya, Murabah, etc., and keeps data related to the primary and secondary catalogues in each cabinet.

PC_CLT (Cutover Line Transfer) tracks changes related to the general main facilities of the telephone network. This includes telephone number changes within the frame and cutover from switch to switch, such as PRX to Siemens.

PC_DSI (Daily System Installation) checks the daily request for services. In the evening the system sorts out the type of services requested and distributes the load among technicians the next morning, as described in Section 1.3.2.3 above. The system also provides statistical management reports regarding installation movements.

PC_JOB is used for service provision. This system maintains the data related to pending engineering orders for the maintenance of the network according to engineering order type, facility investigation memo, source, cabinet area effected, originator, cut-over-details and phone numbers.

1.3.7.3 PC-based Systems for Network and Engineering

The following systems have been developed by the Repair Service Centre (RSC) in the Cable Bureau in Riyadh. The systems relate to network assurance and the first two, CBARS and CARS, are used in all Repair Service Centres throughout the Kingdom.

CBARS is a network assurance system in use in all the Districts of Saudi Arabia. It is a stand-alone PC system, based on mainframe data. CBARS is used to monitor all defective primary cables according to every exchange by each cabinet number. In addition, the system maintains all cables routes and manhole records.

CARS is a network assurance system used by RSCs in all the Districts of the Kingdom. It takes care of all the data related to the cable system history; no mainframe data is used. The data that is maintained related to cable faults are: primary and secondary pairs, cable pressurisation, primary defective pairs (testing), cable cut (primary and secondary), cabinet

and DP repair (previous maintenance jobs). There is a monthly report summary which covers the assigned and terminated pairs and working lines.

PC_CRPR (Cable Repairs Productivity Reports) handles all the data related to the daily productivity of the cable repair technicians and foremen. Monthly summary reports are produced.

PC_DCS (Digging Contractor System) records all cable jobs, where digging has been required, both ongoing and completed jobs, and tracks the number of pits and trenching jobs by the contractors; it does not use mainframe data.

1.3.8 Payphone Systems (The MoPTT O&M Division)

The payphone system is used by the MoPTT Telephone Branch to manage the payphones of the Kingdom, especially the card phones. The payphone system is a separate system, not integrated with the other MoPTT systems. It is based on the application PMS (Payphone Management Services) from GPT (a subsidiary of GEC in the United Kingdom) and runs on DEC VAX/VMS platforms.

PMS has two components: the central PMS-HQ, located in Riyadh, and the PMS-DISTRICT, located in all Districts. All payphones, PP5073 GPT Prepay Card phones and the MK3 coin phones are connected to the District PMS via the Public Switched Telephone Network (PSTN), and all District PMS systems are connected to the central PMS-HQ via Decnet.

PMS-DISTRICT is used to configure the PP5073GPT Prepay Card phones, and to receive revenue and call details, as well as fault reports. PMS-DISTRICT also receives alarms from the MK3 coin phones, indicating that their coin receptacles are either full or have faults.

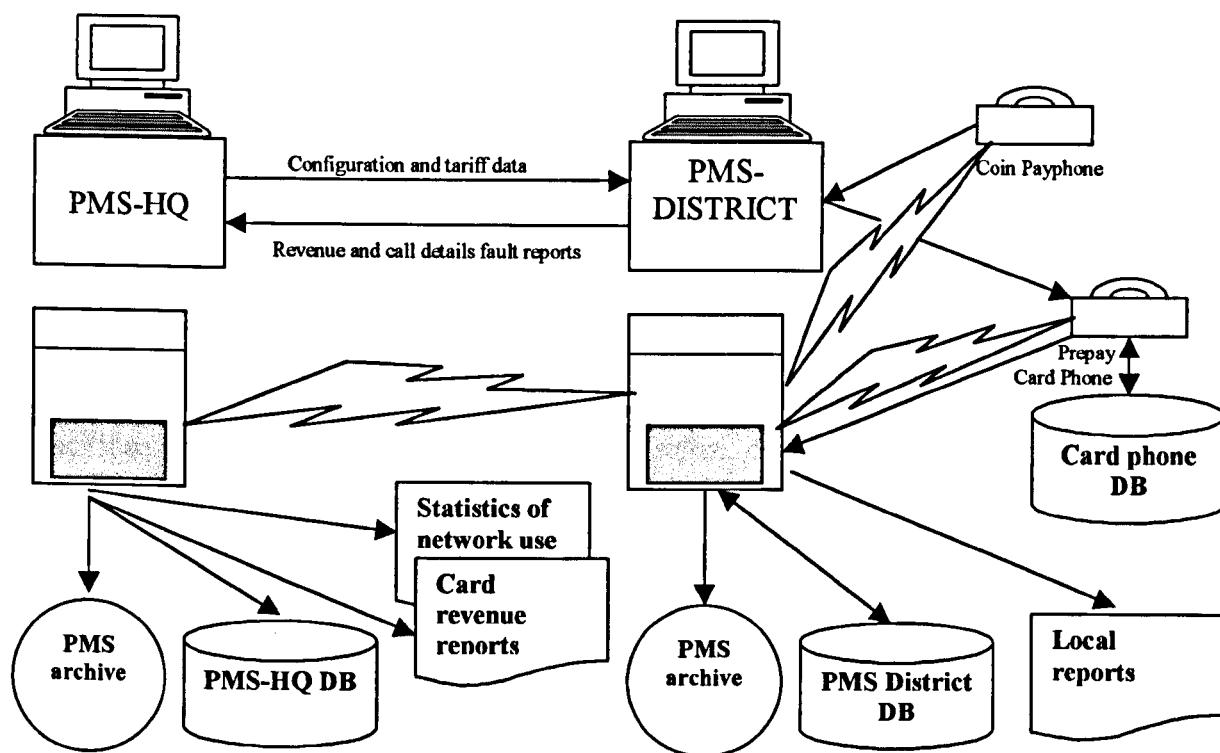


Figure 11. The O&M Division Public Network Services Payphone Management System

PMS-HQ maintains the configuration and tariff data for all the Kingdom's payphones and transfers this to each District PMS when a change has been made. PMS-HQ collects call and revenue details and fault details, used to generate various reports, from the District PMSs. PMS-HQ can be queried and makes statistical reports on the use of the payphone network, on cleared faults and call details, and on the revenue generated by the use of card phones. Apart from configuration and tariff data, the PMS-HQ database holds information on the pre-pay card accounts. There is an account for each card, and the system tracks the use of all cards in circulation, detecting inconsistencies that can indicate that a card is stolen. PMS-HQ maintains a stop-list of stolen, lost or abused cards, sent to the payphones via the District PMSs, and used to prevent abuse. The system also helps to manage card refunds. PMS-HQ is backed up and can be restored in case of media failure, and data can be archived on tape.

PMS-DISTRICT receives details of calls made, including revenue data from the card phones at regular intervals. The card phones may themselves detect and report faults, or PMS may detect a malfunction from the absence of the regular 'I'm OK' signal. PMS-DISTRICT receives from the coin phones a notice when they are full and the coins need to be collected.

PMS-DISTRICT receives the configuration and tariff data for the card phones from PMS-

HQ, and downloads this data to the card phones. This download takes place automatically when a change to the configuration data is made. The District PMS operator can further configure the District's card phones at the local level. The District PMS systems also receives a stop-list of cards from PMS-HQ, and downloads this to the card phones to prevent these cards from being used.

PMS-DISTRICT reports collected call details and fault reports to PMS-HQ, thus enabling PMS-HQ to generate system-wide reports. PMS-DISTRICT provides query and reporting facilities similar to PMS-HQ, on the network status, on configuration parameters, revenue collected, and so on. Like PMS-HQ, PMS-DISTRICT has data backup, recovery and archiving facilities.

The Payphone Management Systems are generally efficient and work well, providing good configuration and tariff management facilities, good reports on the use of network, good management of pay-card accounts, and good backup and recovery mechanisms. It is possible to configure different groups of payphones to operate in different ways. Printing can be done locally or remotely, and the Headquarters can logon remotely to screens and reports at each District.

The system offers facilities not currently used; card phones, for example, can display advertisements. PMS can be expanded to support newer smart card payphone technology and the potential exists for these facilities to generate new revenue for the MoPTT. The system does not offer Arabic support, which will be very expensive to implement. It is not integrated with the corporate accounting functions.

1.4 Application Security

The following subsections describe the security mechanisms of the applications.

1.4.1 RACF

RACF is used by the majority of the mainframe applications. On-line applications provide a direct verification, in that when a user logs on to the application he is verified as a valid user, and associated with a group that has admittance to a given set of the application transactions. In this way there can be multiple levels of access rights: one group of users may, for instance, have access only to read transactions, while another group may also generate

transactions which update data. For batch applications, the data sets accessed are RACF protected. The system administrator manages the batch job queue. RACF is a common and well-proven facility to manage access to mainframe resources.

1.4.2 Application Internal Security

Application internal security means that the application itself carries out access control. This control is based on a list of the access rights of users, kept in a database (IMS or DB2) or in a file.

Several applications display an application internal security capability, either in combination with RACF or as a stand-alone facility. SASOS makes use of a table of all users with update access to IMS transactions, maintained by the database administrator. The PAYROLL, PPIS, and PPTES payroll/personnel systems also have internal security capacity and FORT and FOUREX use internal security to ensure users only view data related to their specific Regions. Other systems with internal security facilities include Al-Badeel, EMF, and AQMS, which use internal security tables. The government accounting systems BDG and GAR have internal security in addition to RACF. The Telex systems have built-in security mechanisms in the application code to control user access.

Application internal security is something that is not easy to maintain, especially if the user access rules are built into the code or internal tables. Data access rules should be easily modifiable, and in some cases, users should also be able to pass their access rights to other authorised users without involving systems administrators.

1.4.3 NATURAL

A NATURAL function is much the same as RACF in that users or user groups are permitted access to transaction groups defined under each application group. A user is connected to the appropriate user group having access to the required applications. The only applications currently using NATURAL security are Al-Badeel, ARDES, ELMS and PPTES.

1.4.4 NDM and PC Security

NDM (Network Data Mover) security is used to transfer data between the Riyadh and Jeddah data centres and from Riyadh to local PCs. It uses internal security control access for

users logging on and/or transferring files. The NDM administrator maintains user IDs in an access control file, and these IDs are passed on to RACF, which then grants the required access to applications and data.

Download of data to PCs can only be done by users with read access to the specific data on the mainframe with NDM being used to capture the user ID and pass this to RACF. Pilot projects like BLINK use data upload from PCs. In addition, NDM and RACF controls write access rights to upload to the mainframe. NDM security is therefore used each time PCs accesses mainframe data.

1.5 Application Associations

1.5.1 Association of Applications to Functional Areas

The tables below indicate which applications support each functional area. Some applications belong to more than one category. Section 1.2 gives a description and assessment of the applications and their support for each area.

1.5.1.1 Finance/Business Systems O&M Division of the MoPTT

Functional Area – Purpose	Applications used
Financial management - management of sources and uses of finances.	VADS, AP, MMS, FURNITURE, NCS, EIS, PIR-F, SIS, LABS, TOOLS, MVIES, EOAS, ELMS, PAYROLL, PPTES, PPIS, JRNLS-RPTS Local, PC-based systems.
Centralised purchasing - management of corporate purchasing.	(none)
Strategic planning - determination of long-range business goals and tracking of organisation's achievement of goals.	(none)
Sales and marketing - administration of marketing campaigns and of large customer sales and service (business).	MERS, COMM-DIR
Service and product development - development and enhancement of new products to be marketed (business).	(none)

Table 2. Application Used by the MoPTT's Finance/Business Systems

1.5.1.2 Customer Services Systems O&M Division of the MoPTT

Functional Area – Purpose	Applications used
Service order creation , including creation of customer and service profile.	SASOS, ACCTS-UPDATE, CSIS
Service provision - preparation of orders for circuit work and service installation/maintenance, and administration of held service orders.	SASOS CSHOR, CSHOR D/E Local, PC-based system (PC_JOB)
Service activation - distribution of work orders, work and materials management.	SASOS Local PC-based system (PC_DSI)
Service assurance - surveillance of performance of provided services, scheduling of trouble work orders, management of maintenance and repair work.	CFRAS, CFRAS-D/E, SSMARS Local, PC-based systems
Service support - administration of order control status, customer assistance, and administration of free telephone numbers.	CSHOR, CSHOR-D/E, S-O-RPTS Local, PC-based systems
Billing - determines and distributes subscriber invoices (bills), administers payment and collections processes.	NIS-I, LOCAL-METERS, PHONOGRAM-D/E, PHONOGRAM-MFE, TOLL, BILLING, STIP PAYMENTS, PAYMENTS/NCR, ARDES, CCS, COLLN-RPTS, BLINK, AL-BADEEL, (JRNLS-RPTS)
Directory - publication and distribution of directory; operator assistance.	DIR-BK-PREP, MERS, DIR-PH-COMP, AD

Table 3. Application Used by the MoPTT's Customer Services Systems

1.5.1.3 Network & Engineering Systems O&M Division of the MoPTT

Functional Area – Purpose	Applications used
Financial planning - including evaluation and planning of future network configurations.	TAS, SCAS, TES NESP/NESPS, FORT (FOUREX)
Engineering - design of physical network, preparation of orders for plants, and administration of work and materials.	SLEAS PLOP, SMAC, CCLI, TOPPS, CONLEN, (MASS-CHANGE)
Network provision - preparation of orders for logical network (design); management of work schedule change due to trouble or rearrangements.	(none found)
Network activation - distribution of physical (plant) and logical work orders, construction work management, monitoring of use and availability of materials.	PC_CRPR, a stand-alone PC system
Network assurance - surveillance of network performance, scheduling of trouble work orders, and administration of maintenance and repair work (of network).	NIS-II, TADS, SNP, ROUTINE-682, (SSMARS, CFRAS, CFRAS D/E) PC-systems: CBARS, CARS, PC_DCS,...
Network support - control of flow of work orders, administration of inventory records and inventory assignment (to work orders).	TERS, SKIS, AMTS

Table 4. Application Used by the MoPTT's Network & Engineering Systems

1.5.1.4 General Support Systems O&M Division of the MoPTT

Functional Area – Purpose	Applications used
Asset (non-plant) management - administration of any non-plant resources, including human resources.	CSR-TRACK, PROSS, SRS, UCCS, DCRD
Internal & external affairs - administration of inter-department communications, as well as external relationships.	(none)

Table 5. Application Used by the MoPTT's General Support Systems

1.5.1.5 Telex/AI-Waseet Systems

Functional Area – Purpose	Applications used
Telex - Finance (materials management)	ASS, SPP, MOD
Telex - Customer Services (billing, service support)	BIL, ACC, TLG, PTM, COM, TSO, LCB, LCL, LCO
Telex - Network and Engineering (operations of Telex, operations of exchange system)	TRA, NET, TDS, PTN SUB
Telex - General Support	ASO
AI-Waseet - Finance	PTG
AI-Waseet - Customer Service	PTA, PTB, PTC, PTI
AI-Waseet - Network & Engineering	PTE, PTF, PTH
AI-Waseet - General Support	PTD

Table 6. Application Used by the MoPTT's Telex/AI-Waseet Systems

1.5.1.6 The F&A Division of the MoPTT Computing Department Financial Systems

Functional Area – Purpose	Applications used
Budget and Funding	BDG, EBD, TUFT
General Accounts	GAR, ERD
International Accounting	AFT, ALT, AXT, FBS, INM, IST, LXT, RDM, TSS, TTS, TXT
Organisational Planning and Personnel	JXT, PXT

Table 7. Application Used by the MoPTT's Computing Department Financial Systems

1.5.1.7 Stand-Alone PC-Based Systems

The following table lists only the systems actually found in the MoPTT. There may in fact be more systems operating on a small scale at a local level, but details about these can only be discovered by intensive local inquiry. Any such systems are like to be of the nature described in Section 1.3.7. The systems are given the PC_ name; most of them do not have a standardised name.

Functional Area – Purpose	Applications used
Finance (materials management, purchasing,...)	MVSPS, PC_CIS, PC_PMS, PC_SCS
Customer Services (service support, assurance, provision)	PC_CAT, PC_CLT, PC_DSI, PC_JOB
Network & Engineering (network assurance)	CBARS, CARS, PC_CRPR, PC_DCS

Table 8. Application Used by the MoPTT's Stand-Alone PC-Based Systems

1.6 User Application Needs

1.6.1 Users' Quality Ratings

Users were asked in the researcher's fieldwork questionnaire to rate the quality of the applications along eight dimensions:

- **Ease of use** (How easy is the application to use?)
- **Accessibility** (How accessible is the application to all who need it?)
- **Appropriateness** (How appropriate is the application to the business needs it supports?)
- **Availability** (How readily available is the application when needed?)
- **Functionality** (How well does the application deliver the required degree of functionality?)
- **Reliability** (How reliable is the application?)
- **Maintainability** (To what degree is reliable help support available?)
- **Response time** (How satisfied are you with the response time?)

For each, they could choose 'excellent', 'good', 'average', 'below average', or 'poor'. The ratings are available in the questionnaire responses. All questionnaires indicated similar responses. The answers were distributed on the eight dimensions for 20 key applications; applications which support critical business functions and are used most.

Since the applications that were rated are the key applications and vital for the MoPTT's business functions, it is fair to apply high quality requirements to all dimensions. The following comments, based on the quality of applications, have been made:

- **Reliability** rates rather favourably. This is most probably because the applications have existed nearly 15 years and have not received any major revisions. It is important to carry over this reliability to new systems.
- **'Ease of use'** means here that users do not make mistakes when using the applications. This will often be because the routines are fairly well known; the users have worked with the applications for many years. It does not mean that the functionality needed is made efficiently available; in many cases the applications require tedious and time-consuming manual procedures.

- Availability and ‘accessibility rate less favourably. Only 30% of the applications are rated ‘good’ or ‘excellent’ on availability, which indicates that the applications are not sufficiently available to support the users in their functions.
- Appropriateness and functionality rate poorly. It is a concern that only one third of the applications are considered ‘good’ in supporting the users in their functions. This can partly be explained by the fact that the applications are based on inaccurate data, partly due to the fact that the functions provided are not appropriate.
- Response time is rated unfavourably for 30% of the applications, and ‘poor’ for 15%. ‘Response time’ here means the response time for the single application (‘from the time you press a key until the screen changes’), not the overall business transaction throughput time. High CPU load is one reason for unsatisfactory response time performance.
- Maintainability rates unfavourably for as many as 40% of the applications. This is due to a combination of three factors: the age of the applications, a lack of proper support for the users, and a lack of up-to-date documentation.

Some noteworthy findings on the applications most directly related to revenue generation and key accounting functions are these:

- SASOS rated ‘average’ or ‘good’ in all categories.
- BILLING rated ‘average’.
- PAYMENTS and PAYMENTS/NCR rated ‘below average’ in four categories (including maintainability, response time, and availability), ‘good’ in two and ‘average’ in two.
- MDIS rated ‘below average’ or ‘poor’ in the categories of functionality, reliability, and maintainability. Reliability most probably rate ‘below average’ because the data held by MDIS is not very accurate.
- BDG rated favourably, ‘excellent’ in most categories.
- PAYROLL rated ‘poor’ in almost all categories.

1.6.2 Users’ Satisfaction

User satisfaction with an application has been assessed from how they rated the quality of the application, the usability of the application (‘usable as is’, ‘usable with modifications’, ‘needs replacement’), and on comments given throughout the questionnaires. Answers to

questions like ‘How satisfied are you with the current system?’ or ‘Does the existing data provide you with the information needs you require?’ indicate the extent of user satisfaction. Degrees of user satisfaction have been grouped in the categories ‘excellent’, ‘good’, ‘average’, ‘below average’, and ‘poor’, and have produced the Figure below. It illustrates that there is certainly room for improvement: almost 30% of the users are dissatisfied with the applications, and a majority (60%) are neither satisfied nor dissatisfied.

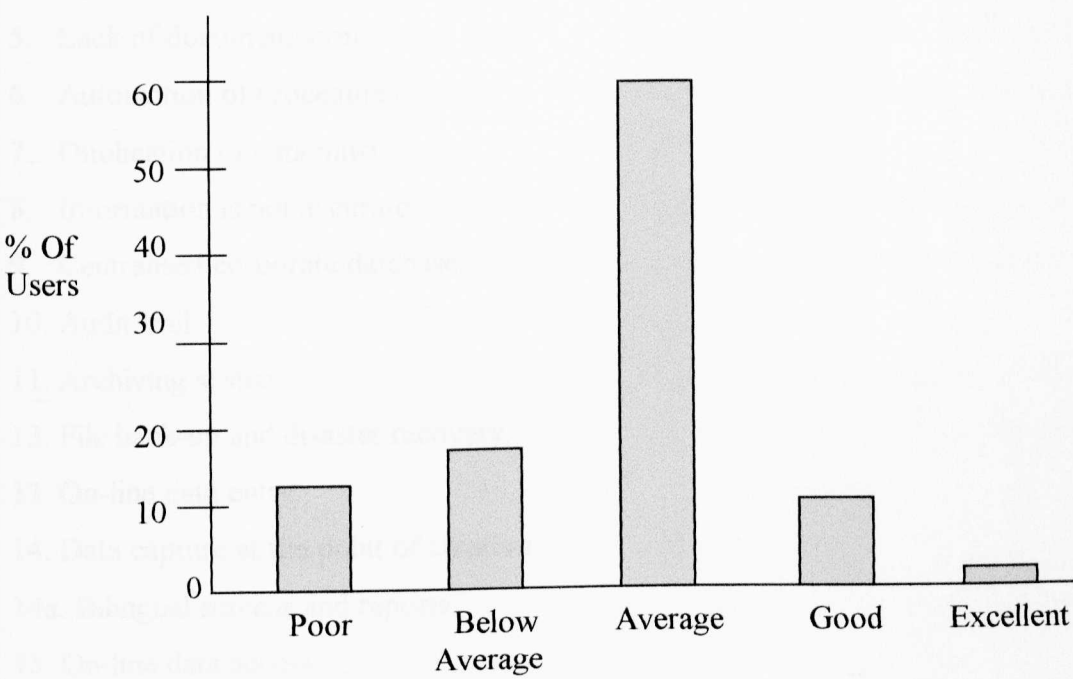


Figure 12. User’s Satisfaction with Existing Systems

1.7 Conclusion on Application Assessment

In this section, the various systems found in the MoPTT, and various other aspects such as application platforms and application security have been described and assessed.

Below is a presentation of the suggestions for improvement given directly by users and the IT staff in the questionnaires. These comments give an impression of how the users and the IT staff view the applications and data environments, and serve to highlight why applications are often rated low by users on usability and satisfaction. Positive comments have not been excluded. The comments illustrate and confirm many of the findings that have been made in this study.

1.7.1 Suggestions and Concerns from Users and the IT Staff

Turned from the users and IT staff, there were 24 most frequent comments and suggestions, including:

1. Major system groups must interface.
2. Major system groups must interface.
3. Integrate a family of systems.
4. Open design of systems.
5. Lack of documentation.
6. Automation of procedures.
7. Duplication of data must.
8. Information is not accurate.
9. Centralised corporate database.
10. Audit trail.
11. Archiving system.
12. File back-up and disaster recovery.
13. On-line data entry.
14. Data capture at the point of creation.
- 14a. Bilingual screens and reports.
15. On-line data access.
16. User-defined reports.
17. Integrated reports.
18. Graphic reports.
19. Decision support.
- 14b. Bilingual reports should be used.
20. Relational database technology.
21. Better PCs and printers.
22. Training and qualified personnel.
23. Faster implementation of CSRs.
24. Better communication between users and the IT Division.

A few of the returned questionnaires covered more than one application. For some applications more than one answer was received.

The 24 suggestions from users and the IT staff noted above are grouped and described below in further detail.

1.7.1.1 Systems

The message from the users was a strong expression of the need for systems integration. They recommended the following (comments given by more than 15% of users are boldfaced):

1. **Major system groups must interface (34.8%)**. For example, the Financial Management systems of the O&M Division of the MoPTT and of the F&A Division of the MoPTT systems should interface.
2. **Integrate a family of systems (23.6%)**. A set of systems that address the same area should be replaced by just one system, or at least appear as one system instead of a number of separate and only loosely integrated systems.
3. **There should be open design of systems (24.7%)**, and proper documentation, to allow for easier update and modifications of systems. Program logic should ideally be available for modifications.
4. **Lack of documentation (20.2%)** should be addressed.
5. **Automation of manual procedures is needed (10.1%)**. The cure for this is, to some extent, covered by the other suggestions.

1.7.1.2 Data

Data availability, accuracy, and duplication were concerns for many users. Some of the comments were:

6. **Duplication of data must be eliminated (13.5%)**.
7. **Information is not accurate (9%)**. This comment has been expressed by executives.
8. **There should be a centralised corporate database (12.4%)** to be shared by all applications, to eliminate duplication of files and the risk of inconsistency in the data. This complements the two comments above.
9. **The ought to be an audit trail (9%)**, to identify the source of data input. Especially when data entry becomes more distributed, the source of information must be clearly identified.
10. **There should be a proper archiving system (5.6%)** for storage of historical data on media so that electronic retrieval is easily possible.

11. File back-up and disaster recovery mechanisms should be put in place (4.5%).

1.7.1.3 Input

Users want on-line data entry. The current input procedures were clearly found time-consuming and unsatisfactory for two-third of the systems. Points of improvement were:

12. On-line data entry is required (58.4%). Real-time updates should be possible. The users requested better, faster capacity to correct data.

13. There should be data capture at the point of creation (13.5%) rather than through time-consuming creation and transfer of files and tapes.

14a. Bilingual input screens should be introduced (10.1%, screens and reports together) (Arabic and English).

1.7.1.4 Output

On-line data access was the overall 'winner' of all the suggestions, requested by 60%. The current output was found inadequate and too slow for almost all systems, as illustrated by the suggestions given below:

15. On-line data access is required (59.6%). The users requested faster processing of data, so that reports and other inquiries could be made available sooner, before the data grows obsolete.

16. There should be user-defined reports (25.8%), in addition to predefined ones. SQL and report generators were mentioned by users.

17. Integrated reports are required (25.8%). This ties into integrated systems as requested above; reports are from one system only, and only cover some of the information needs.

18. More graphic reports (7.9%). Graphic presentation of information, also on-line.

19. Decision support could be improved (9%), especially in the area of comparative and analytical reports.

14b. Bilingual reports should be used (10.1%, screens and reports together), but at least they should be in Arabic, with both Arabic and English headings.

1.7.1.5 Technology

A few technology-oriented remarks were given by the users.

20. **Relational database technology (14.6%)** is seen by users and the IT staff as the way to solve some of the concerns regarding on-line input/output, and better, more user-oriented reports.

21. **The need was stressed for better PCs and printers (13.5%).** The PCs are old, and the quality of the printers is low.

1.7.1.6 User aspects

The users pointed to the following to be addressed:

22. **An emphasis is required on training and qualified personnel (34.8%).** This remark has been made by both users and the IT staff. Several users stressed that training for users is needed, especially for new staff, and that they felt there was a shortage of skilled programmers to implement their change requests.

23. **There is a need for faster implementation of CSRs (Computer System Requests) (15.7%).** Technical support needs to be improved in the various data centres and at business group level. Some users mentioned their CSRs are two years old and still outstanding.

24. **There ought to be better communication between users and the IT Division (13.5%).**

1.7.2 Value of Suggestions

Some users stated that their input procedures consume their time unnecessarily (30%-50% of their time compared to what an optimal input method would take; sometimes even up to 90% of their time was taken). Data entry and correction of input errors is highly time consuming in terms of man-hours spent and in terms of time-to-completion. The lengthy time spent on inputting also means that users of the systems often do not have enough time for analysis of data with improvements in mind. The long turnaround time means that data is often no longer up to date when it reaches the employees who use it for decision-making.

The internal decision-making process in the MoPTT appears to be slowed down by the long time that it takes to produce adequate reports, and the subsequent manual processing of these to unearth the information that forms the basis for decisions. This holds true at all levels, from service engineers to executives. The MoPTT's way forward to faster and more informed decisions includes better integrated and more readily available information systems.

Several of the suggestions for change indicate that users are not able to give a satisfactory service to customer inquiries, whether the customers are external or internal to the MoPTT. A month's turnaround time for data is far from unusual. A conclusion from the comments is that an improvement of the MoPTT's service to its customers also requires change to, or replacement of, several or most systems.

Inefficiencies in managing its resources is another area that costs the MoPTT money. For example, users pointed to the inventory and materials management systems as unnecessarily slow and inaccurate, leading to inefficient use of the motor vehicles fleet, and to unnecessarily purchase of materials that are in stock somewhere.

Finally, changes to business processes are often made impossible by the current systems. For example, the MoPTT faces severe technical problems if they decide to change their billing from quarterly to monthly. The MoPTT is clearly hindered in optimising its revenue stream by the supporting information systems.

2. *IT Environment Assessment*

The centralised mainframe environment for the business operation provides a simple, robust and well understood environment. The mainframe is reliable, with a high uptime, according to the key technology indicators measured by the ITD. The SNA network is stable according to network management staff at the Riyadh Data Centre.

Part of the current IT environment is based on old and inefficient technology. The equipment in use is no longer supported by the vendors, and the systems are not well integrated with the mainframe (tape transfer is needed on a daily basis). The Al-Taruf project, which will enable cash payment from banks, thus reducing the need for the NCR cash payment equipment, is a good initiative and should be expanded further.

The shipment of toll tapes from the telephone exchanges to be loaded to the Riyadh mainframe is a manual, time-consuming and error-prone procedure.

There are still many dumb 3270 terminals in the field which should be replaced with multi-purpose PCs running terminal emulation software.

The laser printers that are used to print invoices are old and show a decreasing mean time between failures. Low print quality causes the mailing machine to place several invoices into one envelope, so that some customers do not receive bills and, as a consequence, are late in payment. This can result in a customer's phone line being disconnected. To date all invoices are produced on time, but a growing number of subscribers will put a heavy pressure on this achievement and increase the rate of errors.

The lack of a disaster recovery plan has been a problem for a very long time, and is still not resolved. The Jeddah Data Centre is not capable of serving as a backup site to the Riyadh Data Centre.

3. *Business Evaluation of Current Technology*

The main information technology used in the MoPTT is several years old and to some extent no longer supported. The mainframe reaches capacity limits and inter-connectivity of the departmental systems is very low. Newer technology, besides PC equipment, is the payphone system. The fast evolution of information technology makes it necessary to keep constant investments in new technology to ensure that the information systems support the business functions adequately.

The following major risks were identified by the researcher during his fieldwork in the course of his discussions with the ITD:

1. Important business functions, such as cash payment, are supported by outdated hardware. This hardware is not supported any longer by the vendors. More modern technology would replace processes that need to be carried out manually today. There is a risk that no spare parts for existing hardware will be available soon, and that any integration with other systems will be very expensive. The BLINK (Al-Taruf) project should be expanded further than the single line from SAMBA that is in production today. There is therefore an increasing risk of failures with the outdated hardware that can lead to interruptions of the business functions.
2. The current IT environment is not capable of responding quickly to changed or new business needs. Applications are old and difficult to change and maintain. Network

changes are time-consuming to implement since the SNA network is based on direct communication lines.

The present IT environment cannot support the strategic goal of reaching almost 2,000,000 telephone lines by the year 2002. The current technology does not seem capable of responding to the opportunities and the customer requirements that will come up as a consequence of the expansion of the telephone network.

3. The capacity of the Riyadh Data Centre in terms of CPU processing and on-line storage capacity is approaching the limits. At the same time the processors at the Jeddah Data Centre are comparatively little used. The capacity limitations may therefore soon require upgrades of the systems.
4. The Jeddah Data Centre has expensive hardware that could be put to better use. However, Jeddah is not able to serve as a backup site to Riyadh in case of a disaster because there is no disaster recovery plan in place. This means that business operation potential cannot be maintained over a long period of time if a disaster occurs at the Riyadh Data Centre. As things are at present, then, a business catastrophe both in terms of revenue and customer satisfaction could occur in case of a physical disaster at the Riyadh Data Centre.
5. Many employees of the MoPTT work with old-fashioned equipment at their desktop. This may be either old style 3270 terminals, or PCs without productivity tools or LAN connection, or both. LAN connection for information exchange has nowadays become very important. The productivity of the employees is affected as well as the job satisfaction of the individuals under the present circumstances.

The current IT environment of the MoPTT supports the basic business functions. As can be seen from the factors listed above, however, the IT environment will be a bottleneck for the enterprise goals if there is increased telephone network activity.

In a potentially more competitive environment, where customers start demanding prompt service and automated processes (for payment, for example), as well as on-line data access, etc., the current IT environment will not be able easily to adapt to such changes and requirements. Other companies might have a competitive advantage with fully integrated and

automated systems which require less manual labour and are more customer-oriented. The lack of a disaster recovery plan presents a serious risk to the business, but this risk has been well known for a long time.

The Payphone Management System (PMS) is in production in only seven Districts while PMS equipment has been acquired for 19 Districts. PMS is a very important revenue generating source for the MoPTT. At present, with just seven Districts in production, the income from this system accounts for approximately 22% of the total MoPTT revenue. The reason for not deploying the system in more Districts is probably lack of budget to install payphones. The cost of installing one new payphone is estimated to be about SR 12,000 (£ 2,000). It seems that there is a potential for fast return on investment by doing payphone installations in the Districts that are not in production.

In terms of employee job satisfaction and job productivity, some parts of the MoPTT should do more to ensure adequate equipment and productivity tools. This might be seen as an element in a strategy to stop the critical loss of skilled personnel. This may require changes to the budgeting, operations and maintenance procedures.

4. *The Potential Capabilities Assessment of IS Units*

4.1 Problems and Hindering Factors

The following problems were mentioned by Engineer Ali Al-Ghamdi, the Manager of the ITD, in a consultation with the researcher; they are the factors hindering successful IS support:

1. There is a lack of skilled staff:
 - staff is not skilled enough (quality);
 - sections are understaffed (quantity).
2. There is a lack of clear directions and planning.
3. Leadership by upper management is missing.
4. Bureaucracy and inefficient processes tie up too many resources.
5. There is a lack of leadership on the part of the ITD, partly because the ITD has no clear role.
6. Salary structure is not adequate to be able to hire and keep qualified personnel.

7. Office supplies are very hard to get and not sufficiently provided.
8. There is not enough money for adequate equipment.
9. There is a lack of integration of decentralised IT equipment.
10. The training budget is much too small and the wrong personnel are utilising it.
11. The lack of communication leads to duplication of effort (loss of resources and money to the MoPTT business).

A solution to these problems is vital so that the IT infrastructure can support the business users to enable them to reach their objectives.

4.2 Strengths and Weaknesses of IS Units

Strengths

1. There is good control of the centralised IT environment.
2. There is a definition of standards through the STTPs.
3. Some personnel are motivated, some management staff amongst them, to change and support new environments.

Weaknesses

1. There is a lack of the right and adequate resources (financial, material and human).
2. There is a lack of ability to recruit and retain skilled technical and managerial staff (Saudi only).
3. IT functions are not focused, centralised and co-ordinated within the MoPTT. There is no clear definition of the alignment of computer projects.
4. Decentralised IT infrastructure is not standardised.
5. There are inadequate data centre environments.
6. There is a heavy reliance on non-Saudi expertise.
7. There are continuous changes in organisation processes.
8. There is an inadequate IT environment for secure and recoverable processing.
9. There is an inadequate infrastructure to support rapid changes in IT.
10. There is an extremely hierarchical infrastructure.
11. There is a lack of control of the development of application systems.

4.3 Business Risks Associated with IS Units in the MoPTT

Dependence on a small number of skilled people for the delivery of IS support is a risky enterprise. One respondent commented that the whole mainframe operation actually depends on ten people, which leaves operational potential dangerously low if a number of staff are off sick or on leave. Furthermore a small number of staff means that their knowledge may go with them if they leave the Ministry.

Indeed there has been a high turnover of skilled people in the MoPTT IS organisations recently, and they have taken with them knowledge of the application systems. Major changes to the current application systems are not possible and lack sufficient version control to alleviate the risk of problems in putting something into production. This is a high business risk, as major changes or support of corporate goals might become impossible. It is clear, then, that the current environment is not capable of supporting the functional strategies of the business units.

Although they lack skilled staff, the ITD has good control over the current central processing environment. Hold ups in major projects over the last few years have caused the IS support of the organisation to fall behind industry standards.

End-users do a good part of their daily work manually or with locally developed PC based systems. These systems are developed outside of the ITD and the F&A Division of the MoPTT by the end-user or a supporting organisation, and most of these applications are not integrated. Therefore, the business units work with inaccurate data which leads to wrong decisions. The decentralised supporting units are not co-ordinated at a corporate level, which leads to non-integrated systems, redundant data, and loss of control.

The outsourcing contracts initially seemed to be a good way of ensuring required services and staff, but with the introduction of budget restrictions, only the creativity of the personnel involved allows an acceptable service. The budget restrictions will also result in less skilled staff, who require less salary, being supplied by the contractor. This will produce a reduced quality of service.

4.4 The Potential of IS Units to Meet Enterprise Goals and Objectives

The IS units have almost no control over decisions affecting their ability to support the business goals of the enterprise. Budget, incentives and equipment are out of control of the management of IS units. What is more, missing charge-back systems for the services of IS do not allow an increase in the level of service offered by the units unless agreed to by the Ministry. Getting this approval is currently a long and painful process that does not allow quick reaction to the changing needs of the business units.

The policies associated with human resources have led to a situation where the quality of most of the staff is below the standard of industry. Even training the individuals concerned would not help, as the salary policies are not capable of keeping skilled personnel in the organisation. This means that, unless there is a dramatic change, information systems will not be able to offer adequate services to the business units.

As the same policies apply more or less to the business units, building up user-directed IT staff will only result in an increase in the number of personnel serving, but not in their quality.

One of the most important factors associated with good support is the communications infrastructure. However, as we have already noted, this is underdeveloped within the ITD, between the ITD and the Computing Centre of the F&A Division of the MoPTT, and between these units and the end-users. Sometimes effective communication is in fact is completely absent or, at least, unofficial. Positive exceptions to this are the operations and support of the mainframe production system.

At the moment, no adequate infrastructure that allows state-of-the-art support of decentralised IT systems exists in either the ITD, the Computing Centre of the F&A Division of the MoPTT, or in the business units. The current support focuses on the central mainframe system and connected systems, but there is a great need for a co-ordinated support from the ITD for systems that are under the control of decentralised personnel in the business units. The ITD has the role of influencing the standardisation of IT equipment and of co-ordinating the effort to achieve an integrated IT environment.

4.5 The Capability of IS Units (Summary)

The units within the ITD are capable of controlling and managing the mainframe environment. Application development of the central IS units lacks skilled personnel to support the end-users' requirements sufficiently. New application development tools and methodologies are about to be introduced, but there is no such corresponding initiative to procure staff with the required level of skill.

The units within the end-user organisations are able to handle the PC environment. Even though some users, such as Strategic Resources, develop their own applications, the support of the end-users after the introduction of those applications has not yet been adequately ensured.

The distributed IS support units can be used as a basis to support the distributed environment.

Currently, the IS support units are not capable of supporting the enterprise goals and objectives sufficiently. In respect of this, the split and unlinked organisational units are a major factor. A corporate IT strategy has to be set up and supported by the top management.

Appendix E

1. *Object Descriptions*

This section describes the following objects:

- Goals
- Objectives
- Critical Success Factor
- Critical Assumptions
- Functions
- Strategies
- Information Needs
- Problems
- Opportunities.

1.1 **Goals**

Goals are summarised statements of major business aims that support the overall purpose and mission of the organisation. The Corporate Goals were gathered from the Corporate Plan. The Functional Strategy Goals were gathered from the Functional Strategic Plan. While the Corporate Goals and Strategic Functional Goals were not widely distributed throughout the Ministry, they were generally agreed to and support during the consultations with the Executives in the MoPTT.

1.1.1 **Corporate Goals**

Corporate Goal: CONTRIBUTE TO NATIONAL GOALS

Deals with the attainment of national goals such as Saudisation, training and improving the telephone service during Hajj.

Corporate Goal: EXTEND CUSTOMER SERVICE

Directed at extending telephone service throughout the Kingdom. Includes increasing working lines, mobile services and special services.

Corpora Goal: IMPROVE FINANCIAL PERFORM

Addresses the financial, head count and employee productivity goals. The financial goals centre on revenue growth, expense objectives and extent of fixed capital expenses.

Corporate Goal: IMPROVE NETWORK QUALITY

Deals with improvement in Network Services. Includes dial tone attempts, call attempts, trunk availability, and outage times.

Corporate Goal: IMPROVE SERVICE QUALITY

Directed at improving the Basic Telephone Customer Service. Addresses items such as reducing unsatisfied demand, greater telephone penetration throughout the Kingdom, time to install, trouble-free service, fault reporting, invoice errors and speed and access of operator answers.

Corporate Goal: INTRODUCE NEW PRODUCTS

Addresses the expansion of existing pager and analogue mobile services. Also describes the new products to be introduced and the time frames for introduction.

1.1.2 Functional Strategy Goals**Functional Strategy Goal: ACHIEVE ITEM STANDARDISATION**

Standardise all items and parts carried by the MoPTT.

Functional Strategy Goal: COMPLETE 1.8M LINE EXPANSION

Implantation and completion of 1.85 million line expansion program.

Functional Strategy Gaol: CONTRIBUTE TO EXPANSION PLANNING

Contribute to the reduction of held orders and future expansion planning.

Functional Strategy Goal: DELIVER CUSTOMER APPLICATIONS

Deliver customer applications from the IS Master Plan in accordance with the priorities of the MoPTT.

Functional Strategy Goal: DELIVER NETWORK PERFORMANCE

Deliver network performance that is consistent with, and responsive to, customer needs. Includes establishment of customer surveys to monitor quality of service being delivered to customer.

Functional Strategy Goal: DELIVER TECHNICAL TRAINING

Deals with the production, delivery and co-ordination of technical courses for in service training where new or additional skills are required to operate and maintain technical equipment.

Functional Strategy Goal: DEVELOP SECURITY AND DISASTER PLAN

Develop a security, emergency and national disaster capability to protect information system assets.

Functional Strategy Goal: DEVELOP ENGINEERS

Deals with the development of engineers and technical staff and by ensuring that they can maintain and operate the communications network at a high level of performance.

Functional Strategy Goal: DEVELOP MANAGERS

Deals with the development of all managers and technical managers through a structured integrated management development program which enables them to perform at the highest level.

Functional Strategy Goal: DEVELOP SKILLED WORKFORCE

Develop a skilled workforce to manage the existing and future networks whilst moving towards effective Saudisation.

Functional Strategy Goal: ENSURE DATA INTEGRITY

Ensure greater integrity, accessibility and availability of corporate data.

Functional Strategy Goal: EXPAND SERVICE DELIVERY SCOPE

Expand the service delivery scope to include all modern technological developments and new services required by the customer throughout the Kingdom.

Functional Strategy Goal: GRADUATE ASSISTANT ENGINEERS

Deals with the graduation of assistant engineers who are capable of operating and maintaining the National Communications Network in an effective manner.

Functional Strategy Goal: IDENTIFY NEW PRODUCT REQUIREMENTS

Identify and satisfy requirements for future products that will secure the MoPTT as the dominant communications provider in future markets.

Functional Strategy Goal: IMPLEMENT STRATEGIC PLANNING

Gaining acceptance and implementation of strategic planning perspective and process throughout the organisation.

Functional Strategy Goal: IMPLEMENT TRAINING PROGRAMS

Deals with the production and implementation of technical education classes that provide employees with a high degree of technical competency in operating and maintaining the national communications network.

Functional Strategy Goal: IMPROVE SERVICE DELIVERY

Improve the effectiveness and efficiency of service delivery to be consistent with customer expectations.

Functional Strategy Goal: IMPROVE MORALE AND MOTIVATION

Improve the morale and motivation of the staff and strengthen their commitment to the MoPTT.

Functional Strategy Goal: IMPROVE NET PRODUCTIVITY

Improve the productivity of network operation and maintenance activities.

Functional Strategy Goal: IMPROVE SKILL MIX

Improve the skill mix and productivity of the MoPTT workforce.

Functional Strategy Goal: INCREASE REVENUE OLD PRODUCT

Increase revenue from existing products.

Functional Strategy Goal: INTRODUCE NEW ORGANISATIONAL STRUCTURES

Introduce streamlined customer focused organisation structures at all levels. Fully document all introduced structures.

Functional Strategy Goal: LEVERAGE BUS RELATIONSHIPS

Maximise the benefits to the MoPTT derived from the relationships established with major business customers.

Functional Strategy Goal: MAXIMISE FLEET UTILISATION

Maximise the utilisation of the existing fleet.

Functional Strategy Goal: MAXIMISE REVENUE

Maximise revenue by using full capacity of the network.

Functional Strategy Goal: MINIMISE MAINTENANCE AND REPAIR COST

Minimise the cost of repairing and maintaining the existing fleet.

Functional Strategy Goal: NEW AND IMPROVE NETWORK MANAGEMENT SYSTEM

Goal deals with extent, nature and network management systems.

Functional Strategy Goal: OPTIMISE USE OF FUNDS

Make the best use of funds and control costs and revenues.

Functional Strategy Goal: ORGANISE SEMINARS

Deals with the organisation of seminars, providing training consultancy and dissemination of training information.

Functional Strategy Goal: PRODUCE MANAGEMENT AND ADMINISTRATION COURSES

Deals with the production, delivery and co-ordination of management, administrative and procedural courses to meet administrative skill requirements of the MoPTT.

Functional Strategy Goal: PROVIDE FINANCIAL STEWARDSHIP

Provide financial stewardship to prevent fraud, comply with legal requirements and maintain accountability to organisation.

Functional Strategy Goal: PROVIDE MAINTENANCE SUPPORT

Provide satisfactory maintenance and repair support to the fleet.

Functional Strategy Goal: PROVIDE STANDARDISED ARCHITECTURE

Provide a standardised corporate information processing architecture to facilitate delivery and support of customer applications.

Functional Strategy Goal: PROVIDE TRAINING CONSULTANCY

Deals with providing training consultancy and information to Saudi Telecom management to ensure that current and future practices and equipment are evaluated for inclusion in the National Communication Network.

Functional Strategy Goal: RECRUIT AND DEVELOP MARKETING STAFF

Recruit and develop marketing staff to meet requirements of the marketing positions.

Functional Strategy Goal: RECRUIT SKILLED NON-SAUDIS

Recruit in a timely and cost-effective manner highly skilled non-Saudi staff.

Functional Strategy Goal: REDUCE DISTRIBUTION COST

Reduce cost of warehousing and distribution.

Functional Strategy Goal: REDUCE FOREIGN LABOUR

Reduce the MoPTT's reliance on foreign workers.

Functional Strategy Goal: REDUCE STOCK LEVELS

Reduce total stock levels and the value of stock inventory.

Functional Strategy Goal: REDUCE SERVICE DELIVERY COSTS

Reduce service delivery costs and improve the profitability.

Functional Strategy Goal: REDUCE TIME TO CONTRACT

Streamline procedures and eliminate bureaucracy to reduce the amount of time it takes to get a contract negotiated and approved.

Functional Strategy Goal: RENOVATE BUILDINGS

Renovation of buildings in 268 sites that have been identified as requiring renovation. Work includes structural rehabilitation, architectural renovations, roof insulation and site work.

Functional Strategy Goal: REPLACE ELECTROMECHANICAL EQUIPMENT

Replace existing electrical and mechanical equipment that cannot be overhauled or which has reached the end of its useful life.

Functional Strategy Goal: SUPPLY MOTOR VEHICLES

Provide an effective supply of vehicles and support to the MoPTT working staff.

Functional Strategy Goal: TRAIN AND DEVELOPMENT STAFF

Assist all staff in effectively fulfilling their job requirements through the assessment of their development needs and providing them with relevant training to meet their needs.

Functional Strategy Goal: UNDERTAKE EDUCATIVE ROLE

Deals with taking an educational roll in informing the MoPTT management of the importance and optimisation of scarce training resources.

Functional Strategy Goal: UPGRADE SERVICE DELIVERY METHODS

Upgrade the efficiency and quality of service delivery methods.

Functional Strategy Goal: USE FULL NETWORK CAPACITY

Use full network capacity to maximise revenue.

1.1.3 Objectives

An objective is a more detailed business aim that is measurable and / or quantifiable and that directly supports the achievement of a goal.

Objective: CUSTOMER SERVICE OBJECTIVES

These are measures of telecommunication services provided to subscribers. Includes connection times, billing problems, credit management, etc.

Objective: FINANCIAL OBJECTIVES

These are the financial measures associated with the goals. They vary from corporate ratios to operational expense and revenue items such as expense per 1000 lines, revenue by product and training expense as a percentage of total expense.

Objective: INFORMATION TECHNOLOGY

Measurements of the effectiveness and efficiency of how well the information technology function is providing service to its users. Includes items such as application delivery time, programmer productivity, reported problems and service agreement measures (e. g. response time, application availability.)

Objective: MARKETING OBJECTIVES

Measures of the effectiveness of the marketing function. Includes items such as revenue by product, new product introduction times and demand by product.

Objective: NETWORK DEVELOPMENT OBJECTIVES

Measurements related to the development and installation of network. Includes things such as projected demand, number of circuits in place or required, traffic load and switch capacity.

Objective: NETWORK MANAGEMENT OBJECTIVES

Measures of the operation and maintenance of the network. Includes number of faults, time to repair, circuit outage and traffic statistics.

Objective: PERSONNEL OBJECTIVES

Measurements of personnel function. Includes % of jobs with job descriptions, numbers of employees by skill categories, number of foreign nationals employed and extent of SAUDISATION by organisation.

Objective: TRAINING OBJECTIVE

Measures of the effectiveness of the training functions. Includes items such as number of student days per employee, number of assistant engineers graduated, number and type of technical classes given, and number of Ph.D. program candidates.

1.1.4 Critical Success Factors

A critical success factor is any thing within an organisation's control that must happen to achieve its goals or objectives.

Critical Success Factor: ADEQUATE FUNDING

Critical is the availability of adequate funding to support the strategies, directions and projects of the MoPTT.

Critical Success Factor: ACQUISITION OF NEW TECHNOLOGY

Acquisition of new technology to support network operations and information system technology to support the processes and activities of the MoPTT are critical to carrying out the strategic direction of the organisations and the meeting of their goals.

Critical Success Factor: ATTRACT/RETAIN EMPLOYEES

Attracting and retaining skilled employees, especially Saudi Nationals is critical to attaining the goals of the MoPTT.

Critical Success Factor: CHANGE IN PROCESS AND METHODS

Critical to the success of the organisations are changes in the methods and procedures employed within the MoPTT. Especially critical is a change in the budgeting process to allow more autonomy to middle management in the allocation of the budget process. Other processes need to be changed to improve responsiveness to customer and reduce costs.

Critical Success Factor: DELEGATION OF AUTHORITY

Critical to the attainment of goals and to operational effectiveness is providing managers with more autonomy in decision-making and allocation of their departmental budgets.

Currently managers are not provided sufficient freedom in decision-making, especially when those decisions affect budget items.

Critical Success Factor: ENHANCE CUSTOMER SERVICE

It is very important that customer service be improved and that a customer perspective be taken within the organisation. Providing efficient and prompt service in all aspects of customer relations is crucial to the long-term success of the MoPTT.

Critical Success Factor: ENHANCE NETWORK INFRASTRUCTURE

Expanding the network facilities and improving the facilities needed to operate and maintain the network is critical to the success of the MoPTT and providing effective telecommunications services to the Kingdom.

Critical Success Factor: ENHANCED INFORMATION TECHNOLOGY CAPABILITIES

Providing expanded information systems capabilities and capacity to all organisations is critical to those organisations attaining their goals and meeting their objectives.

Critical Success Factor: IMPROVE TEAMWORK/INTER DEPARTMENTAL COMMUNICATIONS

Improved teamwork and inter departmental communication is key to organisational efficiency and effectiveness. Good teamwork and communication can eliminate duplication of effort that currently occurs when one department is unaware of the directions and activities of another department.

Critical Success Factor: IMPROVE FINANCIAL/OPERATIONS MEASURES

New and improved financial processes, and measures that track the financial progress of the organisation, are key to measuring and tracking the financial goals of the organisation. A switch from a budget focus to a strategic focus, along with accompanying new measures, is key to the long-term health and profitability of the MoPTT.

Critical Success Factor: IMPROVE PERSONNEL SKILLS

Improving the skills and capabilities of the MoPTT personnel, especially their technical skills, is critical to the success of the MoPTT.

Critical Success Factor: INCREASE SKILLED RESOURCES

Increasing the number of skilled resources, especially skilled Saudi nationals, is critical to the success of the MoPTT.

Critical Success Factor: NEW AND IMPROVED FACILITIES

Availability of new and improved facilities (buildings, equipment, tools, vehicles, etc.) is a critical to providing effective and efficient service to the customers of the MoPTT.

Critical Success Factor: STRATEGIC PLANNING CSFs

Adoption and wide spread acceptance of strategic planning are critical to the efficient and profitable operation of the MoPTT. A switch from budget planning to strategic planning is crucial to the success and competitiveness of the MoPTT.

1.1.5 Critical Assumptions

A critical assumption is anything outside an organisation's control that is assumed to hold true and that will affect an organisation's ability to achieve goals, objectives or critical success factors.

Critical Assumption: ACCEPTANCE OF STRATEGIC PLANNING

The MoPTT executive management recognises the need for strategic planning and put in place a strategic planning process that the entire organisation follows. The organisation shifts from budget focus to a strategic planning focus.

Critical Assumption: ADDITIONAL NETWORK CAPACITY

The 170 line expansion and expansion of GSM facilities are put in place within the expected time frames.

Critical Assumption: AVAILABILITY OF FUNDS

Additional and adequate funds are made available to carry out the functional strategies and projects of the MoPTT.

Critical Assumption: AVAILABILITY OF TECHNOLOGY

Advanced technology is researched and brought into the organisation. Information system's hardware and applications become widely available to most the MoPTT organisations.

Critical Assumption: AVAILABLE OUTSIDE TRAINING

The organisation is given the capability to go outside organisations for needed training. Training not available within the MoPTT can be obtained from outside organizations and schools.

Critical Assumption: BUILDING NUMBERS AND CAPACITY

Future network technology will greatly reduce the size and number of buildings needed to house network equipment and operations. Existing buildings have enough capacity to support 10,000 more individuals.

Critical Assumption: EMPHASIS ON CUSTOMER SATISFACTION

The MoPTT adopts a customer satisfaction focus. Emphasis is placed on providing superior customer service.

Critical Assumption: INCREASED DEMAND FOR TELECOM SERVICE

Despite a slowdown in the growth of the economy, demand grows for telecommunications services in both the residential and commercial sectors.

Critical Assumption: PERSONNEL PRODUCTIVITY

Yearly productivity improvement targets set by the government are realistic and are met.

Critical Assumption: RETENTION OF EMPLOYEES

Trained and skilled employees are retained and do not leave Saudi Telecom.

Critical Assumption: SLOWDOWN OF ECONOMY

The projected slowdown of the economy occurs resulting in a negative GDP growth.

Critical Assumption: TEP-6 COMPLETION

The TEP-6 project is completed on time and delivers the expected capabilities including the needed information systems.

1.1.6 Functions from the Functional Strategic Plans

The Functional Strategic Plan defines 12 functional areas. Their definitions appear below.

Function: BUILDINGS

The management of property to support Saudi Telecom activities, especially related to Network Development, Customer Service and other operational functions.

Function: CORPORATE FINANCIAL PLAN

The development and monitoring of strategic and budget planning for the MoPTT, as well as, the co-ordination of internal needs to establish the goals and objectives that will be satisfied by other MoPTT functions.

Function CUSTOMER SERVICE

The management of product and service delivery to customers that will satisfy current and potential demand and strengthen customer relations.

Function: FINANCIAL MANAGEMENT

The management of funds allocated by the MoPTT to the departments, including the analysis and control of disbursed moneys for budget and reporting purposes.

Function: HUMAN RESOURCES

The management of Saudi Telecom resources to optimise the use and development of workforce skills and maintain the desired work environment.

Function: INFORMATION TECHNOLOGY

The management of information sources (data and records) to support Saudi Telecom activities, especially related to the Corporate Financial Management and Network Management functions.

Function: MARKETING

The management of products and services to promote and improve current offerings and introduce new ones, by conducting market studies and planning, identifying product, service and tariff requirements to meet the needs of customer service, especially the commercial market segments.

Function: MATERIALS MANAGEMENT

The purchasing, distribution and control of materials and supplies used at the work group, district, regional and Kingdom wide levels, especially related to the Network Development, Network Management and Customer Service functions.

Function: MOTOR VEHICLES

The management and maintenance of the motor vehicle fleet, especially related to maintenance activities and support of the Network Management and Customer Service functions.

Function: NETWORK DEVELOPMENT

The management of network infrastructure expansion, especially related to planning and modernisation (new technology) activities in the exchange and customer access parts of the network.

Function: NETWORK MANAGEMENT

The management of network surveillance, repair and maintenance (assurance) in support of the Customer Service function.

Function: TRAINING

The management, education and training of Saudi Telecom personnel, especially related to the development and retention of the skilled labour force required to support all other FSP functions.

1.1.7 Strategies

A strategy is an approach with specific objectives aimed at successful achievement of goals in terms of developing, operating, and maintaining application systems, technology,

data, and management infrastructures. Corporate strategies have been derived from the Functional Strategic Plan (FSP) and the Corporate Plan.

Strategy: ALIGN CUSTOMER NEEDS/IT STRATEGY

Alignment of the customer's business needs and the corporate IT strategies by using corporate modelling and business analysis tools like project evaluation, project planning and information engineering.

Strategy: APPOINT EXTERNAL AUDITOR

Appointment of an external auditor.

Strategy: CONTINUE STRATEGY PLAN FRAMEWORK

Ongoing development of a strategic planning framework driven by a top-level Strategic Management Committee and supported by annual business plans and performance reviews of corporate indicators.

Strategy: DEVELOP IE INFRASTRUCTURE

Development of an Information Engineering Infrastructure including Corporate Enterprise Modelling.

Strategy: DEVELOP NEW BUSINESS VENTURES

Development of business ventures with major customers or other telecommunication companies to provide enhanced and expanded services.

Strategy: DEVELOP ORGANISATIONAL STRUCTURE FOR PROVINCIAL SYSTEM

Development of organisational structure to best meets the administrative decree for the provincial system.

Strategy: DEVELOP TMN and DSS UNDER TEP-6

Development of Telecommunications Management Network (TMN) under TEP-6 to include automated performance monitoring for quality of service and transmission quality. Development of a Decision Support System (DSS) under TEP-6 to provide data

and decision support facilities for National Network Control Centre (NNCC) to have technical capability to increase the number of successful calls carried in the network.

Strategy: DEVELOP IS FOR CUSTOMER CONTACT

Development of new information systems for customer service application, installation and maintenance such as:

1. Replacement of the Service Order System.
2. Replacement of the Held Order System.
3. Automation of the manual Special Services Order and Installation processes.
4. Enhancements to the Billing and Directory Systems, Billing and Collection Improvement Program.
5. Replacement of the Fault Management and Cable Analysis Systems.
6. Aggregation of customer data to assist development of Major Accounts function.

Strategy: ENHANCE BUDGET PROCESS

Enhancement to the budget process to identify priority funding areas.

Strategy: ENHANCE INSTRUCTOR SKILLS

Increase Instructor/Designer Resourcing/Skill levels through the use of Competence Based criteria prior to employment.

Strategy: ESTABLISH ASSET MANAGEMENT POLICIES

Establishment of asset management, accounting records and site portfolios.

Strategy: ESTABLISH PROCEDURE BUILDING DESIGN/CONSTRUCTION

Establishment of buildings design and construction supervision group to ensure optimum design standards and procedures for the all types of structures in Saudi Telecom.

Strategy: ESTABLISH VEHICLE MAINTENANCE TRAINING CENTRE

Establishment of training centres for maintenance of vehicles and equipment.

Strategy: IMPLEMENT ACCOUNTABILITY PROCEDURE

Development of an appropriate accountability structure.

Strategy: IMPLEMENT ACCOUNTABILITY FOR ITD SERVICE

Introduction of ITD accountability for delivery of services to its customers through the application of a rigorous project management discipline and introducing Service-Level Agreements.

Strategy: IMPLEMENT CCSS#7 ON NATIONAL/INTERNATIONAL

Establishment of a Common Channel Signalling System CCSS#7 on national and international basis.

Strategy: IMPLEMENT COMMERCIAL ACCOUNTING IN SAUDI TELECOM

Introduction of Commercial Accounting concepts into Saudi Telecom.

Strategy: IMPLEMENT COMMERCIAL DATABASE FOR TMN/COM/IS

Implementation of a Telecommunication Management Network (TMN) Commercial (COM) Information System (IS), TMN/COM/IS, into a common database and network strategy.

Strategy: IMPLEMENT COMMERCIAL TENDER EVALUATE/CONTRACT

Adoption of commercial tender evaluation practices based on 'Life of Contract Cost' in comparative supplier evaluation selection. Establishment and Implementation of General Contracting methodology for all suitable types of material for the Saudi Telecom.

Strategy: IMPLEMENT COMPREHENSIVE HR POLICY

Introduction of organisation structure efficiency through the documentation of organisation structure, central monitoring and approval of organisation change proposals and provision of guidelines for the development of organisation structure below 3rd layer.

Strategy: IMPLEMENT CUSTOMER SURVEYS

Introduce customer opinion surveys as a measure of network performance for:

1. Connection establishment
2. Connection retention
3. Connection quality
4. Billing integrity
5. Special service availability.

Strategy: IMPLEMENT DATABASES MARKET RESEARCH

Development of customer databases and undertaking of market research together with identifying requirements for future products and short-term business opportunities.

Strategy: IMPLEMENT DIGITAL MICROWAVE NETWORK

Development of a Digital Microwave Network between secondary cities.

Strategy: IMPLEMENT EFFECTIVE COMPANY POLICY

Development and introduction of effective salary policies tied to job classification.

Strategy: IMPLEMENT FIBRE OPTICS NETWORK

Development of a Fibre Optic Network between the cities of Jeddah, Riyadh and Dammam.

Strategy: IMPLEMENT GATEWAY ISC LOAD PLAN

Implementation of the policy on percentage of international traffic to be restored in the event of a single facility failure. Development international gateway loading plans to ensure that each of the ISC's is able to handle 75% of the total international circuit network.

Strategy: IMPLEMENT HR/SKILL MANAGEMENT SYSTEM

Development of a HR Information System including skill management.

Strategy: IMPLEMENT INTEGRATED PRODUCT PERFORMANCE REPORT

Development of a common and integrated approach to product performance reporting.

Strategy: IMPLEMENT MANPOWER PLANNING INFORMATION SYSTEM

Development of Manpower Planning process to forecast, monitor control manpower demand, major productivity and labour turnover.

Strategy: IMPLEMENT NEW COMMERCIAL INSURANCE PROCEDURE

Negotiation of new commercial arrangement for the insurance of the motor vehicle fleet, which takes into consideration the option of public tender self-insurance.

Strategy: IMPLEMENT NEW FMS

Development and implementation of a new Financial Management System (FMS) and financial management policy framework to support financial planning, reporting and analysis at all levels of the organisations.

Strategy: IMPLEMENT OUTSOURCING TRAIN DATABASE

Development of database to collect data about external providers and the efficiencies within Training Department.

Strategy: IMPLEMENT PDP/MDP IS FOR TRAINING

Identification of staff training and development needs through a standard Performance Development Program (PDP) and Management Development Program (MDP).

Strategy: IMPLEMENT PRIMARY SWITCHING NETWORK

Development of a primary switch network consisting of 18 super nodes based on 5ESS technology. Each super node will be connected through 155 Mbit/s SDH interface.

Strategy: IMPLEMENT PROJECT EVALUATION/PRIORITISATION PROCESS

Development and implementation of project evaluation, approval, funding and prioritisation process.

Strategy: IMPLEMENT SATELLITE EARTH STATIONS NETWORK

Development of an Intelsat, Arabsat and Inmarsat satellite earth stations network.

Strategy: IMPLEMENT SECURITY/EMERGENCY PLANS

Development of security, emergency and national disaster policies plans (Network Support).

Strategy: IMPLEMENT STOCK CONTROL INFORMATION SYSTEM

Implementation of stock control computer system.

Strategy: IMPLEMENT SUBSCRIBER RADIO NETWORK

Development of subscriber radio network to satisfy the needs for rural customers.

Strategy: IMPLEMENT TQM PROCESS

Implementation of TQM process suitable for Saudi Telecom through leadership of O&M, Departmental and Regional Quality Councils. Kingdom wide and local Process Improvement Teams; further development and training of managers and the provision of facilitation and technical support to various groups.

Strategy: IMPLEMENT VEHICLE FLEET MANAGEMENT IS

Completion and implementation of the Vehicle Fleet Management system (VFMS). Creation of centrally funded and controlled vehicle replacement program, which takes advantage of economies of scale and standardises vehicle types in the fleet.

Strategy: IMPROVE FINANCIAL PROCESS

Review and improvement of financial processes like billing collections to provide efficient and effective financial management services.

Strategy: IMPROVE PURCHASING PROCESS

Introduction of a purchasing improvement process to eliminate delays in tendering, contracting and delivery (Commercial tender evaluation).

Strategy: IMPROVE VEHICLE REPAIR CENTRES

Improvement and re-equipment of Vehicle Repair Centres to meet the changing requirements of new vehicles, tools and equipment.

Strategy: INSTALL MODERN QUEUING SYSTEM

Purchase of modern queuing systems for operator services.

Strategy: OPERATE LONG DISTANCE NETWORK BY ONE CONTRACTOR

Operate the long distance network is one entity with only one contractor.

Strategy: OPTIMISE NETWORK DESIGN AND CAPACITY

Development of network design and dimensioning system under TEP-6 to optimise traffic carried by the network. Development of a traffic data processing system to enable capacity to be fully utilised.

Strategy: PHASE OUT ANALOGUE SWITCHES

Termination of analogue switches such as ARE-11 and PRX, which are being replaced in TEP-6, by single digital homing nodes and removal of direct routes between analogue switches.

Strategy: PHASE OUT OLD INFORMATION SYSTEM

Reduction of Saudi Telecom's dependency on old technologies and legacy systems by replacing applications using IMS and COBOL I, and re-engineering legacy systems.

Strategy: PREPARE ISDN NETWORK INFRASTRUCTURE

Provision of new network infrastructure for ISDN to provide basic primary rate access ISDN in Riyadh, Jeddah, and Dammam.

Strategy: PROVIDE CUSTOMER CONSULTANCY

Introduction of Account Management and Communications Consultancy for our major accounts to tailor the supply and delivery telecommunications products and retain their loyalty.

Strategy: PROVISION OF QUALITY DIRECTORY SERVICES

Provision of quality directory services for telephone yellow pages, telex, and fax services.

Strategy: REVIEW MATERIAL MANAGEMENT PROCESS

Restructure material management organisation, rationalisation depots, and review procedures and practices.

Strategy: STANDARDISATION/COMPUTER PURCHASE POLICIES

Standardisation of the process for determining purchase quantities, both foreseeable and non-forecast items, and automation of the current manual process.

Strategy: TRAIN SUBSCRIPTION OFFICE STAFF

Fully train Subscription office staff to provide high-level of service.

1.1.8 Information Needs

The following information needs were used in the association matrixes.

Those information needs were obtained as the result of analysing current study used by the MoPTT management. Current information needs are treated as a single unit in the matrix of goals and information needs and the matrix of functions and information needs. In the definitions below, they are broken out into individual information needs as they appear in the annual report of Corporate Indicators.

Information needs were obtained from interviews with the MoPTT executives. These denote additional information needs, which will be required to support goals and functions.

1.1.8.1 Current Information Needs

Information Need: CORPORATE INDICATOR

Produced monthly to show profitability, operational efficiency, human resources, future planning and customer service performance measurements that are intended for use by executive management.

This information need can be broken down into the individual information needs defined below.

Information Need: SERVICE ORDERS COMPLETED IN 7 DAYS

This monthly Corporate Indicator shows percentage of service orders completed in 7 days for each region.

Information Need: FAULTS CLEARED WITHIN 8 HOURS

This monthly Corporate Indicator shows percentage of faults cleared within 8 hours compared to current fiscal year objective by region.

Information Need: NON ACHIEVEMENT OF SERVICE OBJECTIVE

This monthly Corporate Indicator shows performance ratios relative to established goals for telephone (e.g., % service orders completed, faults cleared, etc., for each region and total Kingdom).

Information Need: TOTAL HELD ORDERS IN SERVICED AREAS

This monthly Corporate Indicator shows total held orders in serviced areas by region.

Information Need: CABINETS GROWTH

This monthly Corporate Indicator shows the number of cabinets installed this month, YTD, and current fiscal year objective in each region.

Information Need: INCREASE IN INSTALLED EXCHANGE LINES

This monthly Corporate Indicator shows the total number of installed exchange lines in each region. This month and YTD number of lines are compared to current fiscal year objective.

Information Need: WORKING LINES GROWTH

This is a monthly Corporate Indicator that shows additional working lines installed during the month and YTD compared to current fiscal year objective in each region.

Information Need: SAUDIS IN KEY MANAGEMENT POSITIONS

This monthly Corporate Indicator shows the head count of key management positions (level 2 and up) in each region HQ department. Actual head count is compared to current fiscal year objective.

Information Need: TOTAL SAUDISATTON

This monthly Corporate Indicator shows the total head count of Saudis in each region HQ department. Actual head count is compared to current fiscal year objective.

Information Need: CHAPTER 3 EMPLOYEES

This Corporate Indicator shows the monthly change in head count for Chapter 3 employees by comparing the actual to current fiscal year objective. It is produced by region head quarter department.

Information Need: EXECUTIVE EMPLOYEES

This monthly Corporate Indicator shows the head count of executives in each category of employment. Actual head count is compared to current fiscal year objective.

Information Need: HQ CHAPTER 3 (EXECUTIVES)

This monthly Corporate Indicator shows the head count of executive employees (Chapter 3) in HQ in each category of employment. Actual head count is compared to current fiscal year objective.

Information Need: HQ CHAPTER 3 EMPLOYEES

This monthly Corporate Indicator reports the head count of Chapter 3 employees in each category of employment in HQ departments only.

Information Need: NO. OF TRAINEES (YTD)

This Corporate Indicator shows the total number of trainees in each region HQ department. YTD numbers are compared to current fiscal year objective.

Information Need: STAFF LOSS (SAUDI)

This monthly Corporate Indicator shows the head count of Saudi staff loss in each region HQ department.

Information Need: TOTAL EMPLOYEES

This Corporate Indicator shows monthly changes in head count in three categories of employment by region, head quarter, and total Kingdom. Actual head count is compared to current fiscal year objective.

Information Need: TOTAL HQ EMPLOYEES

This monthly Corporate Indicator shows the head count in each employment category in each HQ department. Actual head count is compared to current fiscal year objective.

Information Need: EXCHANGE UTILISATION

This information measures the percentage utilisation of all exchanges in each region each month.

Information Need: OUTSIDE PLANT UTILISATION

This performance measure reports the percentage utilisation of Outside Plant in each region every quarter.

Information Need: ADMINISTRATION EMPLOYEES

Operational Efficiency Corporate Indicator.

Information Need: CHAPTER 3 EMPLOYEE/1000 LINES

This Corporate Indicator provides information, on a monthly basis, of number of Chapter 3 employees per 1000 working lines for each region and the MoPTT HQ.

Information Need: CHAPTER 3 O&M EXPENSE/1000 LINES

This Corporate Indicator provides, on a monthly basis, Chapter 3 O&M expenses per 1000 working lines for each region and the MoPTT HQ.

Information Need: NUMBER OF EMPLOYEES/1000 LINES

This Corporate Indicator provides, on a monthly basis, the number of employees per 1000 lines for each region as well as at the MoPTT headquarters.

Information Need: CHAPTER 3 O&M EXPENSE/CHAPTER 3 EMPLOYEES

This Corporate Indicator provides, on a monthly basis, Chapter 3 expenses per each Chapter 3 employee for each region and the MoPTT headquarters.

Information Need: HELD ORDERS/1000 WORKING LINES

A performance measure of held orders per 1000 working lines in each region.

Information Need: BILLING and COLLECTION

This information is presently produced to only report YTD revenues and collections for each type of service.

Information Need: O&M EXPENSES AND COMMITMENT

This Corporate Indicator would provide actual monthly and YTD expenses, by budget line item, compared to commitment for districts, regions and total Kingdom.

1.1.8.2 Required Information Needs

Information Need: ACCOUNTING/FINANCIAL

This is additional information for revenue, expenditure, asset tracking, financial reporting and budgetary controls. This information is requested by Strategic Resources and Commercial Services.

Information Need: ANNUAL OPERATIONS REPORT

Operational results such as network development, network performance, customer service, financial service, etc. This information is requested by Strategic Planning.

Information Need: BUSINESS CUSTOMERS

Information about number of customers stored by type of service, city, connected, dropped, etc. This information is requested by Commercial Services.

Information Need: CORPORATE INDICATORS

Additional information about profitability, future planning, operational efficiency, human resources and customer service.

Information Need: CORPORATE PLANNING

Information such as corporate objectives, strategies, etc. It is needed for the development of the Corporate Plan. This information was requested by Strategic Planning.

Information Need: DEMOGRAPHIC INFORMATION

This type of information would provide demographic information on the Kingdom.

Information Need: FINANCIAL ANALYSIS AND STATISTICS

The purpose of this information is to provide better financial analysis and statistical information. It is requested by Public Network Services.

Information Need: HR INFORMATION

HR Compensation, staff development, career path, recruitment, planning, and management information. This information was requested by Strategic Resources.

Information Need: MATERIAL MANAGEMENT

Vendor services, procurement tracking, forecasting, analysis, local stock control, warehouses, organising total inventory control, return material and material distribution.

This information was requested by Strategic Resources.

Information Need: PROJECTS STATUS

This information includes ability to access contractor information such as schedule data.

This information is requested by Engineering.

Information Need: PROPERTY MANAGEMENT

Information on land and buildings, motor vehicles, furniture, tools, and material inventory and usage. This information was requested by Strategic Resources.

Information Need: RESIDENTIAL CUSTOMERS

Provide more information on customers: types, billing arrangements, etc. This information was requested by Public Network Services.

Information Need: SERVICE FORECAST

This information would identify the kind and characteristics of service needed by the subscribers, especially business customers. This information is requested by Central Region.

Information Need: SWITCH TOLL AND PERFORMANCE

Provide more accurate and timely information from switches about toll and performance, including surveillance information.

Information Need: TARIFF INFORMATION

This information is needed to program switches. It was requested by Network Operations.

Information Need: TELE-TRAFFIC INFORMATION

This assists in the preparation of specifications, monitoring performance and planning. This information was requested by Engineering and Network Operations. They feel most information is currently available but they lack access to it.

1.1.9 Problems

A problem is anything that binds an organisation's efforts to achieve its goals, objectives, or interferes with a critical success factor.

Problem: COMPLEX COSTLY MAINTENANCE

Complex, costly and delayed maintenance because of large numbers of heterogeneous communication equipment, aging motor vehicles fleet and lack of tools.

Problem: CROSS FUNCTIONAL ISSUES

Cross-functional issues because of unclear definition of responsibilities between HQ, regions and districts and unclear definition of responsibilities among departments.

Problem: GOVERNMENT POLICIES

Departments are held responsible for their operations, but they lack the necessary authority to effectively manage their businesses. This is due in large part to policies promulgated by the Ministry and other government entities, particularly policies dealing with allocation and expenditures of funds and human resources.

Problem: INADEQUATE PLANNING

This is an inability to comply with corporate-wide directions and objectives because planning is still focused on short-term individual department objectives. The planning process does not mirror organisational structure. It is bottom up rather than top down.

Problem: INADEQUATE MARKETING PROCESS

Lack of an integrated product positioning strategy and policy.

Problem: LACK OF FUNDS

Inability to carry out expansion programs due to lack of funds.

Problem: LACK OF INFORMATION SYSTEMS

Manual and labour intensive processes due to a lack of appropriate information systems needed to automate those processes.

Problem: LACK OF MANAGEMENT CONTROL

Inadequate controls due to the lack of integrated policies, clear lines of responsibilities, and lack of information Systems that supply needed data and aid in decision-making.

Problem: LACK OF SKILLED STAFF

Lack of skilled staff because resource policies inhibit effective recruiting and retaining skilled persons.

Problem: LOSS OF REVENUE

Loss of revenue due to inadequate tracking of non-billable calls and the lack of a system for international traffic.

Problem: SAUDISATION

Saudisation, a national goal to develop necessary technical and managerial skills of Saudi nationals, is currently going on at a slow pace.

Problem: UNRELIABLE SERVICES

Degradation of performance due to overloading of switch and transmission components.

1.1.10 Opportunities

An opportunity is something that can enhance an organisation's ability to achieve or even exceed its goals, objectives or critical success factors.

Opportunity: BECOME CUSTOMER FOCUSED

The completion of ongoing reorganisation and TQM projects that offer the MoPTT an opportunity to achieve a service and product focused organisation that would improve customer service.

Opportunity: COMMERCIAL MARKETING

An opportunity to take advantage of the Government's offer of incentives to foreign businesses and the subsequent growth potential in the trade and service sectors.

Marketing a comprehensive product line would increase annual revenues which are currently at 44 %. Commercial service accounts for 22 % of working lines.

Opportunity: DECREASE OPERATIONS COSTS

Decrease operations costs through improved procedures, the introduction of new technology, and further centralisation of operations.

Opportunity: HAJJ SEASON

An opportunity to take advantage of this seasonal, but significant increase in demand for local and long distance services.

Opportunity: IMPROVE/SUPPLY TRAINING

Improve and require the following types of training:

1. Customer Services
2. External Plant
3. Switching and Transmission
4. Management Training
5. English Language Training for Instructors
6. PC Training
7. Basic Technical Training
8. Assistant Engineer Training.

Opportunity: INTERNATIONAL MARKETING

An opportunity for Saudi Arabia to join a number of world-wide telecommunications alliances that provide service to business and government sectors. Forming such alliances may include Saudi Arabia in international networks thereby increasing revenues.

Opportunity: PAYPHONE MARKETING

An opportunity to expand payphone service within the constraints of the existing network and thereby increases revenues. At present 1 % of working lines are allocated to payphones that provide 20 % of telephone revenues.

Opportunity: REGIONAL MARKETING

An opportunity to take advantage of Saudi Arabia's position as a leader in the Middle East by introducing a telecommunications 'hub' to attract a significant volume of international traffic and increase revenues. Currently much of this traffic is routed through neighbouring countries.

Opportunity: RESIDENTIAL MARKETING

An opportunity to take advantage of the sustained, long-term demand for basic and special services that will increase as the population matures. Sixty percent of Saudi nationals are under the age of 18, and a 3.2 % of annual population growth is forecast by the Ministry of Planning.

2. *Actual strategy model relationships*

Each of the most important relationships in Figure 12 (Chapter 8) is discussed in more detail in the following sections.

2.1 Objectives as Measures of Goals

This is a critical relationship that can be used to measure how well the MoPTT is meeting its goals.

Some objectives provide more appropriate measures of how well the MoPTT is achieving each goal than others. Matrix 1 shows which objectives support which goals, with goals listed vertically and objectives listed horizontally. Answers have been collated to question 10 in the questionnaire to fill out the matrix. If an objective is found to be useful for a particular goal, the appropriate row and column are ticked for the goal and objective. The more ticks in a column, the greater the importance of the objective as a measure of goals. In other words, the more ticks in a column, the higher the weighting of the objective. The columns with the most ticks are highlighted.

Matrix 1 indicates that financial objectives are the important measures that should be used by the MoPTT to assess how well the organisation is meeting its strategic goals. The

interviews with the MoPTT executives also indicated that a shift is needed in the current objective structure from a budget orientation to one that is more centred on the attainment of strategic goals and an investment/profit perspective. Many executives felt that incorporating a strategic planning focus, and the current budget orientation, would ultimately produce greater telecommunications revenues. This focus would position the MoPTT to provide higher quality service to its customers.

Objectives related to network management and personnel (productivity, Saudisation and skill mix) also provide measures of the success of the MoPTT in meeting its goals. The objectives related to training are important measures of how well the organisation is meeting its skill and personnel goals.

Suggestion

It is suggested that the organisation begin inserting into its planning processes new objectives that provide measures of the success of the organisation in meeting its goals. These new measures should take a strategic planning and investment view to balance the current budget viewpoint.

Incorporating new strategic planning objectives along with the budget-oriented objectives would allow executive management to balance the need to control expenditure with a view of how well the organisation is meeting its strategic goals and carrying out its plans. This combination would allow executive management to exercise more effective decision-making when balancing budget availability with strategic needs, an approach which could lead to significant increase in revenue.

Objectives

Goals	Training Objectives	Customer Service Objectives	Financial Objectives	IT objectives	Marketing Objectives	Network Development Objectives	Network Management Objectives	Personnel Objectives
ACHIEVE ITEM STANDARDISATION			✓				✓	
COMPLETE 1.8M LINE EXPANSION		✓					✓	
CONTRIBUTE TO EXPANSION PLANNING		✓						
DELIVER CUSTOMER APPLICATIONS				✓				
DELIVER NETWORK PERFORMANCE		✓				✓	✓	
DELIVER TECHNICAL TRAINING	✓							✓
DEVELOP SECURITY AND DISASTER PLAN fit				✓			✓	
DEVELOP ENGINEERS	✓					✓	✓	✓
DEVELOP MANAGERS	✓							✓
DEVELOP SKILLED WORKFORCE							✓	
ENSURE DATA INTEGRITY				✓				
GRADUATE ASSISTANT ENGINEERS	✓							✓
IDENTIFY NEW PRODUCT REQUIREMENTS		✓			✓			
IMPLEMENT STRATEGIC PLANNING	✓	✓	✓	✓	✓	✓	✓	✓
IMPLEMENT TRAINING PROGRAMMES	✓							✓
IMPROVE SERVICE DELIVERY		✓						
IMPROVE MORALE & MOTIVATION								✓
IMPROVE NET PRODUCTIVITY							✓	
IMPROVE SKILL MIX								✓
INCREASE REVENUE OLD PRODUCT			✓		✓			
INTRODUCE NEW ORGANISATIONAL STRUCTURES								
MAXIMISE FLEET UTILISATION			✓					
MAXIMISE REVENUE			✓					

Objectives

Goals	Training Objectives	Customer Service Objectives	Financial Objectives	IT objectives	Marketing Objectives	Network Development Objectives	Network Management Objectives	Personnel Objectives
MINIMISE MAINTENANCE and REPAIR COST			✓				✓	
NEW AND IMPROVE NETWORK MANAGEMENT SYSTEM							✓	
OPTIMISE USE OF FUNDS			✓					
ORGANISE SEMINARS	✓							
PRODUCE MANAGEMENT and ADMINISTRATION COURSES	✓							
PROVIDE FINANCIAL STEWARDSHIP			✓					
PROVIDE MAINTENANCE SUPPORT							✓	
PROVIDE STANDARDISED ARCHITECTURE fit								
PROVIDE TRAINING CONSULTANCY	✓							
RECRUIT AND DEVELOP MARKETING STAFF					✓			✓
RECRUIT SKILLED NON-SAUDIS								✓
REDUCE SERVICE DELIVERY COSTS		✓						
REDUCE DISTRIBUTION COST			✓					
REDUCE FOREIGN LABOUR			✓					✓
REDUCE STOCK LEVELS			✓					
REDUCE TIME TO CONTRACT			✓			✓		
RENOVATE BUILDINGS							✓	
REPLACE ELECTROMECHANICAL EQUIPMENT							✓	
SUPPLY MOTOR VEHICLES		✓					✓	
TRAIN AND DEVELOPMENT STAFF	✓							✓
UNDERTAKE EDUCATIVE ROLE	✓							
UPGRADE SERVICE DELIVERY METHODS		✓						
USE FULL NETWORK CAPACITY							✓	✓

Matrix 1. Objectives as Measures of Goals

2.2 Objectives As Measures Of Critical Assumptions

Objectives provide insight into how well an organisation has made critical assumptions or educated guesses about external factors it cannot directly control. This relationship is shown in Matrix 2. Critical assumptions are listed vertically and objectives are listed horizontally. If an objective is used to validate a particular assumption, the appropriate row and column are ticked for the critical assumption and objective. The more ticks in a column, the greater the importance of the objective as a measure of assumptions. In other words, the more ticks in a column, the more significance the objective has. The columns with the most ticks are highlighted.

Financial objectives and network management objectives are the main indicators of how valid the critical assumptions made by executive management have been in setting the goals of the organisation.

To the MoPTT, financial objectives are critical measures of how well the organisation is meeting its goals. Success in the achievement of financial objectives reflects the correctness of the critical assumptions made by executive management on the availability of funds over the strategic planning period.

Success in the achievement of network management objectives reflects the correctness of critical assumptions about the timing and resultant capabilities of the various projects currently planned or under way.

Network development, training and information technology objectives are also vital measures of the validity of the critical assumptions made by the MoPTT management. Most of these objectives are used to assess the correctness of critical assumptions about productivity and the implementation schedule for new products, computer application availability and network facilities.

Critical Assumptions	Objectives							
	Customer Service Objectives	Financial Objectives	IT Objectives	Marketing Objectives	Network Development Objectives	Network Management Objectives	Personnel Objectives	Training Objectives
ACCEPTANCE OF STRATEGIC PLANNING	✓	✓	✓		✓	✓	✓	✓
ADDITIONAL NETWORK CAPACITY	✓	✓			✓	✓		✓
AVAILABILITY OF FUNDS	✓	✓	✓	✓	✓	✓	✓	✓
AVAILABILITY OF TECHNOLOGY	✓		✓		✓	✓		✓
AVAILABLE OUTSIDE TRAINING							✓	✓
BUILDING NUMBERS & CAPACITY		✓			✓	✓		
EMPHASIS ON CUSTOMER SATISFACTION	✓	✓		✓		✓		
INCREASED DEMAND FOR TELECOM SERVICE	✓	✓		✓	✓	✓		
PERSONNEL PRODUCTIVITY		✓	✓		✓	✓	✓	✓
RETENTION OF EMPLOYEES		✓	✓		✓	✓	✓	✓
SLOWDOWN OF ECONOMY		✓		✓				
TEP-6 COMPLETION	✓	✓	✓		✓	✓		✓

Matrix 2. Objectives as Measures of Critical Assumptions

2.3 Critical Assumptions Affecting Goals

Critical assumptions can affect either the setting of goals or their attainment. It is important, therefore, to understand the leading external factors that the MoPTT must make assumptions about. Furthermore, it is necessary to understand these factors in order to judge what goals can be affected by the assumptions, especially if the wrong assumptions have been made. This section documents which goals are affected by which critical assumptions, and this relationship is shown in Matrix 3.

Goals are listed vertically and critical assumptions are listed horizontally. If a critical assumption means the difference between achieving or not achieving a particular goal, the appropriate row and column are ticked for the goal and critical assumption. The more

ticks in a column, the greater the importance of the critical assumption to the achievement of goals. The more ticks in a column, the higher the weighting of the critical assumption. The columns with the most ticks are highlighted.

Availability of funds is, by far, the most crucial assumption made by all organisations of the MoPTT in their efforts to set functional strategies and goals. Many of the interviewed executives also stated that they need more control over the allocation of funds that they are given. Unpredictable changes to budgets were cited as a key problem in making assumptions about funds that will be made available and the attainment of departmental goals.

Assumptions about personnel productivity are also vital to the setting of organisational goals and strategies. Increases or decreases in personnel productivity affect how much a given organisation can or cannot do given the current availability of funds. Gains in productivity will be important for the future if the MoPTT is to operate effectively in the current environment of budget constraint.

Assumptions about the availability of technology, increased demand for telecommunications services, and the retention rate of employees are also fundamental assumptions that the MoPTT executives must make in setting realistic goals and strategies.

Critical Assumptions

Goals	Acceptance of Strategic Planning	Additional Network Capacity	Availability of Funds	Availability of Technology	Available Outside Training	Building Numbers & Capacity	Emphasis on Customer Satisfaction	Increased Demand for Telecom Service	Personnel Productivity	Retention of Employees	Slowdown of Economy	TEP-6 Completion
Achieve Item Standardisation			✓					✓				
Complete 1.8M Line Expansion		✓	✓	✓		✓		✓	✓	✓	✓	✓
Contribute to Expansion Planning												
Deliver Customer Applications			✓	✓					✓	✓		
Deliver Network Performance		✓	✓	✓		✓		✓	✓	✓	✓	✓
Deliver Technical Training			✓	✓	✓				✓	✓		
Develop Security & Disaster Plan			✓									
Develop Engineers			✓	✓	✓			✓	✓			
Develop Managers			✓		✓				✓			
Develop Skilled Workforce									✓			
Ensure Data Integrity			✓									

Critical Assumptions

Goals	Acceptance of Strategic Planning	Additional Network Capacity	Availability of Funds	Availability of Technology	Available Outside Training	Building Numbers & Capacity	Emphasis on Customer Satisfaction	Increased Demand for Telecom Service	Personnel Productivity	Retention of Employees	Slowdown of Economy	TEP-6 Completion
Graduate Assistant Engineers			✓		✓			✓	✓			
Identify New Product Requirements	✓		✓	✓			✓	✓				✓
Implement Strategic Planning	✓		✓									
Implement Training Programs			✓	✓	✓				✓			
Improve Service Delivery												
Improve Network Productivity												
Improve Morale & Motivation	✓	✓	✓	✓	✓	✓	✓			✓		✓
Improve Skill Mix	✓		✓		✓					✓		
Increase Revenue Old Product	✓	✓	✓				✓	✓	✓		✓	✓
Introduce New Organisational Structures	✓								✓			
Leverage Bus Relationships							✓	✓		✓		

Critical Assumptions

Goals	Acceptance of Strategic Planning	Additional Network Capacity	Availability of Funds	Availability of Technology	Available Outside Training	Building Numbers & Capacity	Emphasis on Customer Satisfaction	Increased Demand for Telecom Service	Personnel Productivity	Retention of Employees	Slowdown of Economy	TEP-6 Completion
Maximise Fleet Utilisation			✓					✓	✓			
Minimise Maintenance & Repair Cost			✓	✓				✓	✓	✓		✓
New & Improve Network Management System												
Optimise Use of Funds	✓	✓							✓	✓		✓
Organise Seminars			✓	✓	✓							
Produce Management & Administration Courses			✓	✓	✓							
Provide Financial Stewardship												
Provide Maintenance Support			✓	✓				✓	✓	✓		✓
Provide Standardised Architecture	✓											
Provide Training Consultancy			✓		✓							
Recruit & Develop Marketing Staff			✓		✓		✓					
Recruit Skilled Non-Saudis			✓									

Critical Assumptions

Goals	Acceptance of Strategic Planning	Additional Network Capacity	Availability of Funds	Availability of Technology	Available Outside Training	Building Numbers & Capacity	Emphasis on Customer Satisfaction	Increased Demand for Telecom Service	Personnel Productivity	Retention of Employees	Slowdown of Economy	TEP-6 Completion
Reduce Service Delivery Costs												
Reduce Distribution Cost				✓				✓	✓	✓		
Reduce Foreign Labour									✓	✓		
Reduce Stock Levels								✓				
Reduce Time to Contract			✓									
Renovate Buildings		✓		✓		✓		✓	✓			✓
Replace Electro-mechanical Equipment			✓							✓		✓
Supply Motor Vehicles			✓					✓	✓	✓		
Train & Development Staff			✓	✓	✓		✓		✓	✓		
Undertake Educative Role									✓	✓		
Upgrade Service Delivery Methods												
Use Full Network Capacity								✓				

Matrix 3. Critical Assumptions Affecting Goals

2.4 Functions Affecting Attainment of Goals

The functions that the MoPTT performs are the means adopted to attain the goals and objectives that it has set for itself. Understanding which functions are most critical to the attainment of the goals is therefore extremely important for the MoPTT. This relationship is shown in Matrix 4.

Goals are listed vertically and functions are listed horizontally. If a function affects a particular goal, the appropriate row and column are ticked for the goal and function. The more ticks in a column, the greater the importance of the function to the achievement of goals. The more ticks in a column, the higher the weighting of the function. The columns with the most ticks are highlighted.

Analysis showed that the most critical function to ensuring the attainment of the MoPTT goals is the Customer Service function. This finding was reinforced by the executive interviews, which provided a consensus on the importance of enhancing customer service and its importance to meeting the goals of the MoPTT now and in the future.

The next most critical functions to the attainment of the goals of the MoPTT are:

- **Human Resources:** affecting the goals related to enhancement of skills, employee productivity and retention, Saudisation and the development of staff.
- **Network Development:** affecting the goals related to network expansion and performance, planning and requirements, network productivity and enhancement, and the introduction of new technologies.
- **Network Management:** affecting goals related to planning, network performance and operating cost, the utilisation of existing facilities and the quality of maintenance.
- **Training:** affecting the goals of producing skilled workers, the development of technical professionals and managers, and the implementation of improved training delivery systems.

Functions

Goals	Buildings	Corporate Financial Plan	Customer Service	Financial Management	Human Resources	Information Technology	Marketing	Materials Management	Motor Vehicles	Network Development	Network Management	Training
Achieve Item Standardisation				✓				✓				
Complete 1.8M Line Expansion	✓					✓				✓		
Contribute to Expansion Planning	✓	✓	✓				✓			✓	✓	
Deliver Customer Applications			✓			✓						
Deliver Network Performance	✓									✓	✓	
Deliver Technical Training					✓							✓
Develop Security & Disaster Plan						✓						
Develop Engineers					✓							✓
Develop Managers			✓		✓							✓
Develop Skilled Workforce					✓							✓
Ensure Data Integrity						✓						
Graduate Assistant Engineers					✓							✓

Functions

Goals	Buildings	Corporate Financial Plan	Customer Service	Financial Management	Human Resources	Information Technology	Marketing	Materials Management	Motor Vehicles	Network Development	Network Management	Training
Identify New Product Requirements			✓				✓			✓		
Implement Strategic Planning		✓	✓		✓					✓	✓	
Implement Training Programs			✓		✓							✓
Improve Service Delivery	✓		✓					✓		✓	✓	
Improve Morale and Motivation			✓		✓							
Improve Network Productivity	✓							✓		✓	✓	
Improve Skill Mix					✓							✓
Increase Revenue Old Product		✓	✓	✓			✓				✓	
Introduce New Organisational Structures			✓		✓					✓		
Leverage Bus Relationships			✓				✓					
Maximise Fleet Utilisation									✓		✓	
Maximise Revenue			✓	✓			✓			✓	✓	

Functions

Goals	Buildings	Corporate Financial Plan	Customer Service	Financial Management	Human Resources	Information Technology	Marketing	Materials Management	Motor Vehicles	Network Development	Network Management	Training
Minimise Maintenance & Repair Cost			✓	✓				✓	✓	✓	✓	
New & Improve Network Management System			✓							✓	✓	
Optimise Use of Funds		✓	✓	✓						✓	✓	
Organise Seminars					✓							✓
Produce Management & Administration Courses												✓
Provide Financial Stewardship				✓								
Provide Maintenance Support									✓		✓	
Provide Standardised Architecture						✓						
Provide Training Consultancy												✓
Recruit & Develop Marketing Staff			✓		✓		✓					
Recruit Skilled Non-Saudis					✓							
Reduce Service Delivery Costs	✓		✓	✓						✓	✓	
Reduce Distribution Cost				✓				✓		✓	✓	

Functions

Goals	Buildings	Corporate Financial Plan	Customer Service	Financial Management	Human Resources	Information Technology	Marketing	Materials Management	Motor Vehicles	Network Development	Network Management	Training
Reduce Foreign Labour					✓							
Reduce Stock Levels				✓				✓				
Reduce Time to Contract								✓				
Renovate Buildings	✓											
Replace Electro-mechanical Equipment	✓											
Supply Motor Vehicles			✓						✓		✓	
Train & Development Staff					✓							✓
Undertake Educative Role					✓							✓
Upgrade Service Delivery Methods			✓							✓		
Use Full Network Capacity			✓							✓	✓	

Matrix 4. Functions Affecting Attainment of Goals

2.5 Functions Important for Achievement of Critical Success Factors

Functions are not only important to the attainment of goals; they are also important to ensuring that CSFs are met. Therefore, it is crucial to understand which functions can most influence the CSFs. This relationship is shown in Matrix 5.

CSFs are listed vertically and functions are listed horizontally. If a function affects a particular CSF, the appropriate row and column are ticked. The more ticks in a column, the greater the importance of the function to the achievement of goals. The more ticks in a column, the higher the weighting of the function. The columns with the most ticks are highlighted.

The mapping of the CSFs extracted from the FSP to the 12 functional areas highlights the importance of Training to insuring the CSFs are met.

Customer Service and Information Technology are the next most important functions in supporting the CSFs. There is a direct dependency among these functions and that of Training. For example, personnel who receive quality training will be better able to service customer and process orders. Additional information technology can improve training delivery and customer servicing methods.

Executives have revealed that the factors most critical to the success of the organisation are the management of critical resources (e.g. skills, funding and organisational behaviour) rather than the management of technology, materials or structures.

Functions

CSFs	Buildings	Corporate Financial Plan	Customer Service	Financial Management	Human Resources	Information Technology	Marketing	Materials Management	Motor Vehicles	Network Development	Network Management	Training
Adequate Funding	✓		✓		✓	✓		✓		✓	✓	✓
Acquisition of New Technology												✓
Attract / Retain Employees	✓		✓		✓					✓		✓
Change in Process and Methods	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓
Delegation of Authority	✓	✓	✓		✓	✓		✓		✓		✓
Enhanced Information Technology Capabilities	✓	✓		✓		✓		✓				✓
Enhance Customer Service		✓	✓			✓	✓					✓
Enhance Network Infrastructure										✓	✓	
Improve Financial / Operations Measures				✓								✓
Improve Personnel Skills		✓	✓		✓	✓	✓			✓	✓	✓
Improve Teamwork / Inter Departmental Communications	✓	✓	✓			✓						✓
Increase Skilled Resources		✓	✓				✓	✓				✓
New and Improved Facilities			✓					✓				
Strategic Planning												

Matrix 5. Functions Important for Achievement of Critical Success Factors

2.6 Critical Success Factors Important for Goal Attainment

Another significant relationship is that of specific CSFs to the attainment of the goals of the organisation. This relationship highlights those CSFs that are most critical to the attainment of the MoPTT goals and is shown in Matrix 6.

Goals are listed vertically and CSFs are listed horizontally. If a CSF must be met to achieve a particular goal, the appropriate row and column are ticked. The more ticks in a column, the greater the importance of the CSF to the achievement of goals. The more ticks to a column, the higher the weighting of the CSF. The columns with the most ticks are highlighted.

Adequate funding is the single most important CSF in meeting the goals of all organisations and the goals of the FSPs. The importance of adequate funding was stated repeatedly by all executives who were interviewed.

Availability of information systems, change and enhancement of the processes employed by the organisation, and improved customer service are three tightly coupled CSFs that are vital to meeting the goals of the MoPTT. The availability of required information systems would allow automation and streamlining of current information handling processes which are, for the most part, manual throughout the Ministry. Improved and streamlined processes, augmented with automation, would do much to improve customer service and satisfaction.

CSFs

Goals	Adequate Funding	Acquisition of New Technology	Attract / Retrain Employees	Change in Process and Methods	Delegation of Authority	Enhanced Information Technology Capabilities	Enhance Customer Service	Enhance Network Infrastructure	Improve Financial / Operations Measures	Improve Personnel Skills	Improve Teamwork / Inter Departmental Communication	Increase Skilled Resources	New and Improved Facilities	Strategic Planning
Achieve Item Standardisation		✓		✓		✓					✓			✓
Complete 1.8M Line Expansion	✓	✓		✓		✓	✓	✓	✓		✓	✓	✓	✓
Contribute to Expansion Planning											✓			✓
Deliver Customer Applications	✓	✓				✓								
Deliver Network	✓	✓		✓	✓	✓	✓	✓		✓		✓	✓	
Performance														
Deliver Technical Training	✓	✓		✓		✓	✓			✓		✓		
Develop Security	✓	✓												✓
Develop & Disaster Plan														
Develop Engineers	✓						✓			✓		✓		✓
Develop Managers	✓						✓			✓	✓	✓		✓
Develop Skilled Workforce			✓							✓		✓		
Ensure Data Integrity				✓		✓					✓			

CSFs

Goals	Adequate Funding	Acquisition of New Technology	Attract / Retrain Employees	Change in Process and Methods	Delegation of Authority	Enhanced Information Technology Capabilities	Enhance Customer Service	Enhance Network Infrastructure	Improve Financial / Operations Measures	Improve Personnel Skills	Improve Teamwork / Inter Departmental Communication	Increase Skilled Resources	New and Improved Facilities	Strategic Planning
Expand Service Delivery Scope	✓						✓							
Graduate Assistant Engineers	✓					✓						✓		
Identify New Product Requirements		✓				✓	✓							
Implement Strategic Planning				✓		✓		✓			✓	✓		✓
Implement Training Programs	✓	✓	✓	✓								✓		
Improve Service Delivery							✓							
Improve Network		✓						✓						
Productivity														
Improve Morale & Motivation	✓	✓	✓	✓		✓					✓			✓
Improve Skill Mix	✓	✓	✓			✓	✓			✓		✓		

CSFs

Goals	Adequate Funding	Acquisition of New Technology	Attract / Retrain Employees	Change in Process and Methods	Delegation of Authority	Enhanced Information Technology Capabilities	Enhance Customer Service	Enhance Network Infrastructure	Improve Financial / Operations Measures	Improve Personnel Skills	Improve Teamwork / Inter Departmental Communication	Increase Skilled Resources	New and Improved Facilities	Strategic Planning
Increase Revenue Old Product									✓					
Introduce New Organisational Structures				✓	✓						✓			
Leverage Bus Relationships	✓	✓		✓	✓	✓	✓	✓						✓
Maximise Fleet Utilisation				✓		✓								
Maximise Revenue		✓		✓	✓	✓	✓	✓	✓					✓
Minimise Maintenance & Repair Cost		✓		✓	✓	✓	✓							
New & Improve Network Management System	✓	✓				✓		✓						
Optimise Use of Funds				✓	✓	✓			✓					✓
Organise Seminars	✓	✓	✓				✓			✓	✓	✓		
Produce Management & Administration Courses	✓		✓				✓			✓	✓	✓		✓
Provide Financial Stewardship				✓	✓				✓					✓

CSFs

Goals	Adequate Funding	Acquisition of New Technology	Attract / Retrain Employees	Change in Process and Methods	Delegation of Authority	Enhanced Information Technology Capabilities	Enhance Customer Service	Enhance Network Infrastructure	Improve Financial / Operations Measures	Improve Personnel Skills	Improve Teamwork / Inter Departmental Communication	Increase Skilled Resources	New and Improved Facilities	Strategic Planning
Provide Maintenance Support	✓	✓				✓	✓			✓		✓		
Provide Standardised Architecture		✓		✓		✓								✓
Provide Training Consultancy	✓		✓									✓		
Recruit & Develop Marketing Staff	✓		✓		✓		✓					✓		
Recruit Skilled Non-Saudis	✓											✓		
Reduce Distribution Cost				✓		✓			✓					✓
Reduce Foreign Labour			✓	✓						✓		✓		✓
Reduce Stock Levels				✓										✓
Reduce Time to Contract				✓	✓		✓		✓		✓			
Renovate Buildings	✓						✓						✓	
Replace Electro-mechanical Equipment	✓	✓					✓	✓						
Supply Motor Vehicles	✓						✓							

CSFs

Goals	Adequate Funding	Acquisition of New Technology	Attract / Retrain Employees	Change in Process and Methods	Delegation of Authority	Enhanced Information Technology Capabilities	Enhance Customer Service	Enhance Network Infrastructure	Improve Financial / Operations Measures	Improve Personnel Skills	Improve Teamwork / Inter Departmental Communication	Increase Skilled Resources	New and Improved Facilities	Strategic Planning
Train & Development Staff	✓	✓	✓			✓	✓			✓	✓	✓		✓
Undertake Educative Role	✓	✓	✓			✓				✓	✓	✓		✓
Upgrade Service Delivery Methods	✓			✓			✓							
Use Full Network Capacity														

Matrix 6. Critical Success Factors for Achievement of Goals

2.7 Critical Assumptions Affecting Critical Success Factors

The accuracy of critical assumptions made by the MoPTT management affects the attainment of the CSFs crucial to the success of the organisation. This relationship is shown in Matrix 7.

CSFs are listed vertically and critical assumptions are listed horizontally. If a critical assumption needs to be correct to fulfil a CSF, the appropriate row and column are ticked. The more ticks in a column, the greater the importance of the critical assumption to the achievement of the CSF. The more ticks in a column, the higher the weighting of the critical assumption. The columns with the most ticks are highlighted.

By mapping the critical assumptions to the CSFs, it has been founded that the following assumptions were most important in determining whether the CSFs would be met:

- Availability of funds
- Acceptance of strategic planning by the organisation
- Availability of new technology
- Increase in demand for Saudi Telecom services
- Completion of 'future improvement projects' with delivery of expected services and capabilities within the assumed time frame.

Critical Assumptions

CSFs	Acceptance of Strategic Planning	Additional Network Capacity	Availability of Funds	Availability of Technology	Available Outside Training	Building Numbers & Capacity	Emphasis on Customer Satisfaction	Increased Demand for Telecom Service	Personnel Productivity	Retention of Employees	Slowdown of Economy	TEP-6 Completion
Adequate Funding	✓	✓	✓	✓		✓		✓	✓		✓	✓
Acquisition of New Technology			✓					✓				✓
Attract / Retain Employees			✓	✓	✓					✓		
Change in Process and Methods	✓		✓	✓			✓		✓			
Delegation of Authority	✓											
Enhanced Information Technology Capabilities		✓	✓	✓						✓		✓
Enhance Customer Service	✓	✓	✓	✓			✓	✓	✓			✓
Enhance Network Infrastructure	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
Improve Financial / Operations Measures	✓											
Improve Personnel Skills			✓		✓					✓		
Improve Teamwork / Inter Departmental Communications	✓						✓					
Increase Skilled Resources			✓		✓				✓	✓		
New and Improved Facilities	✓	✓	✓	✓		✓		✓				
Strategic Planning	✓		✓			✓	✓	✓			✓	✓

Matrix 7. Critical Assumptions Affecting Critical Success Factors

3. Strategy Analysis

3.1 Corporate Strategies Important for Achievement of Functional Strategic Plan (FSP) Goals

There is an important relationship between corporate strategies and FSP goals. The strategies are essential to achieving the goals. Furthermore, the goals have an impact on how the strategies themselves are devised and executed.

It was found that most of the corporate strategies are directed at the following FSP goals:

1. Improve service delivery expansion and planning
2. Implement strategic planning
3. Expand the scope of service delivery
4. Optimise the use of funds
5. Improve network productivity
6. Develop a skilled work force
7. Improve morale and motivation.

The following FSP goals have the fewest supporting strategies:

1. Reduce foreign labour
2. Supply motor vehicles
3. Train and develop staff
4. Recruit skilled non-Saudis
5. Achieve item standardisation
6. Introduce a new organisation structure.

Suggestion

The MoPTT's strategic planning process needs to ensure that there are adequate strategies directed at the FSP goals. Strategies should be mapped to goals to ensure that there is a plan for achieving each goal. In addition, strategies that do not help in achieving goals should be reassessed.

3.2 Corporate Strategies Important for Achieving Critical Success Factors (CSFs)

Corporate strategies have been derived from the FSP and the Corporate Plan. The relationship between corporate strategies and CSFs is important because specific strategies will be instrumental in ensuring the CSFs are met. The relationships have been established by the researcher using the interviews conducted and various documents provided by the MoPTT; the relationships are documented in Matrix 8.

In this matrix, strategies are listed vertically and the CSFs are listed horizontally. If a strategy helps in fulfilling a CSF, the appropriate row and column are ticked. The more ticks in a column, the more important is a strategy to ensuring that the CSFs are met.

The matrix identifies that most strategies will play a leading role in meeting the following CSFs:

1. Acquisition of new technology
2. Enhancement of information technology capability
3. Enhancement of the network infrastructure
4. Enhancement of customer services.

The following strategies are also important to attaining the CSFs:

1. Implementation of an accountability process
2. Aligning customer needs with IT strategy
3. Development of new business ventures
4. Development of TMN and DSS
5. Implementation of subscribers' radio network
6. Implementation of Total Quality Management (TQM) process.

It should be noted that adequate funding is the most important CSF that must be met in order to achieve the corporate goals. However, there is no specific corporate strategy that is devised to support this CSF. The strategies listed in Matrix 8 are defined primarily to achieve the corporate goals.

CSFs

Strategies	Adequate Funding	Acquisition of New Technology	Attract / Retrain Employees	Change in Process and Methods	Delegation of Authority	Enhanced Information Technology Capabilities	Enhance Customer Service	Enhance Network Infrastructure	Improve Financial / Operations Measures	Improve Personnel Skills	Improve Teamwork / Inter Departmental Communications	Increase Skilled Resources	New and Improved Facilities	Strategic Planning
Align Customer Needs / IT Strategy				✓		✓	✓	✓			✓			
Appoint External Auditor									✓					✓
Continue Strategy Plan Framework														✓
Develop IS for Customer Contact		✓				✓	✓							
Develop IE Infrastructure		✓				✓		✓						
Develop New Business Ventures	✓		✓	✓					✓					✓
Develop Organisational Structure for Provincial System					✓		✓							
Develop TMN and DSS Under TEP-6	✓	✓					✓	✓	✓					
Enhance Budget Process	✓			✓					✓					✓
Enhance Instructor Skills			✓							✓		✓		
Establish Asset Management Policies	✓												✓	
Establish Procedure Building Design / Construction													✓	

CSFs

Strategies	Adequate Funding	Acquisition of New Technology	Attract / Retrain Employees	Change in Process and Methods	Delegation of Authority	Enhanced Information Technology Capabilities	Enhance Customer Service	Enhance Network Infrastructure	Improve Financial / Operations Measures	Improve Personnel Skills	Improve Teamwork / Inter Departmental Communications	Increase Skilled Resources	New and Improved Facilities	Strategic Planning
Establish Vehicle Maintenance Training Centre													✓	
Implement Accountability Procedure		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Implement Accountability for ITD Service		✓				✓								
Implement CCSS#7 on National / International		✓						✓						
Implement Comprehensive HR Policy			✓							✓				
Implement Commercial Accounting in Saudi Telecom				✓					✓					
Implement Commercial Database for TMN / COM / IS		✓				✓								
Implement Commercial Tender Evaluate / Contract									✓					
Implement Customer Surveys							✓				✓			
Implement Databases Market Research				✓			✓		✓					

CSFs

Strategies	Adequate Funding	Acquisition of New Technology	Attract / Retrain Employees	Change in Process and Methods	Delegation of Authority	Enhanced Information Technology Capabilities	Enhance Customer Service	Enhance Network Infrastructure	Improve Financial / Operations Measures	Improve Personnel Skills	Improve Teamwork / Inter Departmental Communications	Increase Skilled Resources	New and Improved Facilities	Strategic Planning
Implement Digital Microwave Network		✓				✓	✓	✓						
Implement Effective Company Policy			✓									✓		
Implement Fibre Optics Network		✓				✓	✓	✓						
Implement Gateway ISC Load Plan		✓				✓		✓						
Implement HR / Skill Management System		✓	✓									✓		
Implement Integrated Product Performance Report		✓												
Implement Manpower Planning Information System		✓				✓								
Implement New Commercial Insurance Procedure				✓										✓
Implement New FMS	✓								✓					✓
Implement Outsourcing Train Database										✓		✓		
Implement PDP/MDP IS for Training		✓				✓				✓		✓		

CSFs

Strategies	Adequate Funding	Acquisition of New Technology	Attract / Retrain Employees	Change in Process and Methods	Delegation of Authority	Enhanced Information Technology Capabilities	Enhance Customer Service	Enhance Network Infrastructure	Improve Financial / Operations Measures	Improve Personnel Skills	Improve Teamwork / Inter Departmental Communications	Increase Skilled Resources	New and Improved Facilities	Strategic Planning
Implement Primary Switching Network		✓				✓	✓	✓						
Implement Project Evaluation / Prioritisation Process				✓										
Implement Satellite Earth Stations Network		✓				✓		✓						
Implement Security / Emergency Plans													✓	
Implement Stock Control Information System		✓				✓							✓	✓
Implement Subscriber Radio Network	✓	✓				✓	✓	✓						
Implement TQM Process			✓		✓		✓			✓	✓	✓		
Implement Vehicle Fleet Management IS													✓	
Improve Financial Process	✓								✓					✓
Improve Purchasing Process				✓										
Improve Vehicle Repair Centres													✓	

CSFs

Strategies	Adequate Funding	Acquisition of New Technology	Attract / Retrain Employees	Change in Process and Methods	Delegation of Authority	Enhanced Information Technology Capabilities	Enhance Customer Service	Enhance Network Infrastructure	Improve Financial / Operations Measures	Improve Personnel Skills	Improve Teamwork / Inter Departmental Communications	Increase Skilled Resources	New and Improved Facilities	Strategic Planning
Install Modern Queuing System		✓				✓	✓							
Operate Long Distance Network by One Contractor									✓					
Optimise Network Design and Capacity		✓				✓	✓	✓						
Phase Out Analogue Switches		✓				✓	✓	✓						
Phase Out Old Information System		✓				✓	✓	✓						
Prepare ISDN Network Infrastructure		✓				✓		✓						
Provision of Quality Directory Services	✓						✓							
Provide Customer Consultancy	✓						✓							
Review Material Management Process				✓									✓	
Standardisation / Computer Purchase Policies	✓					✓							✓	
Train Subscription Office Staff			✓				✓					✓		

Matrix 8. Corporate Strategies Important for Achieving Critical Success Factors

3.3 Corporate Strategies Important for Capitalising on Opportunities

Mapping corporate strategies to opportunities highlights those strategies which are basic to capitalising on opportunities.

In Matrix 9 strategies are listed vertically and opportunities are listed horizontally. If a strategy can help take advantage of an opportunity, the appropriate row and column are ticked. The more ticks in a column, the more important the strategy is for capitalising on opportunities.

Analysis of the matrix shows that strategies related to upgrading and improving the telecommunications network infrastructure are crucial to capitalising on the opportunities presented to the MoPTT. This indicates the inadequacy of the current infrastructure and the need to upgrade it in order to capitalise on them.

Implementation of the Common Channel Signalling System (CCSS) for the national and international networks, implementation of the fibre optics network, and the phasing out of analogue switches are some of these strategies. Execution of these strategies is extremely important to meeting the increasing demand for basic telephone services, the introduction of new products and an increase in customer satisfaction.

In addition, the ongoing development of a strategic planning framework and the development of new business ventures are also fundamental to enhancing the organisation's ability to achieve or even exceed its goals, objectives and CSFs.

Opportunities

Strategies	Become Customer Focused	Commercial Marketing	Decrease Operations Costs	Hajj Season	Improve / Supply Training	International Marketing	Payphone Marketing	Regional Marketing	Residential Marketing
Align Customer Needs / IT Strategy	✓								
Appoint External Auditor			✓						
Continue Strategy Plan Framework	✓	✓	✓	✓	✓	✓	✓	✓	✓
Develop IE Infrastructure	✓								
Develop New Business Ventures				✓	✓	✓	✓	✓	✓
Develop Organisational Structure for Provincial System			✓		✓				
Develop TMN and DSS Under TEP-6				✓					
Enhance Budget Process			✓						
Enhance Instructor Skills					✓				
Establish Asset Management Policies			✓						
Establish Procedure Building Design / Construction			✓						
Establish Vehicle Maintenance Training Centre			✓						
Implement Accountability Procedure									
Implement Accountability for ITD Service									
Implement CCSS#7 on National / International			✓	✓		✓	✓	✓	✓
Implement Commercial Accounting in Saudi Telecom									
Implement Commercial Database for TMN / COM / IS									
Implement Commercial Tender Evaluate / Contract									
Implement Comprehensive HR Policy					✓				
Implement Customer Surveys	✓	✓							
Implement Databases Market Research		✓							

Opportunities

Strategies	Become Customer Focused	Commercial Marketing	Decrease Operations Costs	Hajj Season	Improve / Supply Training	International Marketing	Payphone Marketing	Regional Marketing	Residential Marketing
Implement Digital Microwave Network			✓	✓		✓	✓	✓	✓
Implement Effective Company Policy									
Implement Fibre Optics Network			✓	✓		✓	✓	✓	✓
Implement Gateway ISC Load Plan			✓	✓		✓	✓	✓	✓
Implement HR / Skill Management System					✓				
Implement Integrated Product Performance Report	✓	✓							
Implement Manpower Planning Information System					✓				
Implement New Commercial Insurance Procedure			✓						
Implement New FMS			✓						
Implement Outsourcing Train Database			✓		✓				
Implement PDP/MDP IS for Training					✓				
Implement Primary Switching Network				✓			✓	✓	✓
Implement Project Evaluation / Prioritisation Process							✓		
Implement Satellite Earth Stations Network			✓	✓		✓	✓	✓	✓
Implement Security / Emergency Plans									
Implement Stock Control Information System			✓						
Implement Subscriber Radio Network			✓	✓		✓	✓	✓	✓
Implement TQM Process									
Implement Vehicle Fleet Management IS			✓						

Opportunities

Strategies	Become Customer Focused	Commercial Marketing	Decrease Operations Costs	Hajj Season	Improve / Supply Training	International Marketing	Payphone Marketing	Regional Marketing	Residential Marketing
Improve Financial Process									
Improve Purchasing Process									
Improve Vehicle Repair Centres			✓						
Install Modern Queuing System	✓	✓					✓		✓
Operate Long Distance Network by One Contractor			✓	✓		✓			
Optimise Network Design and Capacity			✓	✓		✓	✓	✓	✓
Phase Out Analogue Switches			✓	✓		✓	✓	✓	✓
Phase Out Old Information System	✓		✓						
Prepare ISDN Network Infrastructure				✓		✓	✓	✓	✓
Provide Customer Consultancy		✓							✓
Provision of Quality Directory Services	✓	✓		✓			✓		✓
Review Material Management Process			✓						
Standardisation / Computer Purchase Policies									
Train Subscription Office Staff	✓				✓				

Matrix 9. Corporate Strategies Important for Capitalising on Opportunities

3.4 Functions Supporting Strategy Execution

Mapping corporate strategies to functions performed by the enterprise highlights those functions which are basic to successful execution of the corporate strategies. This relationship is shown in Matrix 10.

In the matrix strategies are listed vertically and functions are listed horizontally. If a function supports a strategy, the appropriate row and column are ticked. The more ticks in a column, the more important a strategy is to the execution of the MoPTT strategic directions.

The researcher's analysis of this relationship indicates that the most important functions for ensuring the implementation of corporate strategies are those of Training and Information Technology.

The focus on the Training function reflects the organisation's need for skilled workers and for increased productivity. Successful execution of the Training-related strategies would help staff in different Departments. Training specialists would assess their development needs and provide relevant training, which would allow them to fulfil their job requirements effectively.

The Information Technology function may help by automating many tasks and processes, and by providing the information critical to decision-making.

The next most important functions for supporting the implementation of corporate strategies are the Buildings and Land Management, Network Development and Network Management functions.

Functions

Strategies	Buildings	Strategic Planning	Customer Service	Financial Management	Human Resources	Information Technology	Marketing	Materials Management	Vehicles Management	Network Development	Network Management	Training
Align Customer Needs / IT Strategy			✓			✓	✓				✓	
Appoint External Auditor		✓		✓								
Continue Strategy Plan Framework	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Develop IS for Customer Contact			✓			✓	✓					
Develop IE Infrastructure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Develop New Business Ventures			✓				✓					
Develop Organisational Structure for Provincial System	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Develop TMN and DSS Under TEP-6	✓					✓				✓	✓	
Enhance Budget Process		✓		✓								
Enhance Instructor Skills					✓							✓
Establish Asset Management Policies	✓	✓		✓				✓	✓			
Establish Vehicle Maintenance Training Centre	✓				✓				✓			

Functions

Strategies	Buildings	Strategic Planning	Customer Service	Financial Management	Human Resources	Information Technology	Marketing	Materials Management	Vehicles Management	Network Development	Network Management	Training
Establish Procedure Building Design / Construction	✓	✓										
Implement Project Evaluation / Prioritisation Process		✓		✓		✓						
Implement Accountability Procedure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Implement Accountability for ITD Service						✓						
Implement CCSS#7 on National / International	✓									✓	✓	
Implement Effective Company Policy				✓	✓							
Implement Commercial Accounting in Saudi Telecom				✓								
Implement Commercial Database for TMN / COM / IS	✓			✓		✓				✓	✓	✓
Implement Commercial Tender Evaluate / Contract	✓							✓				
Implement Customer Surveys			✓			✓	✓					

Functions

Strategies	Buildings	Strategic Planning	Customer Service	Financial Management	Human Resources	Information Technology	Marketing	Materials Management	Vehicles Management	Network Development	Network Management	Training
Implement Databases			✓			✓	✓					
Market Research										✓	✓	✓
Implement Digital Microwave Network	✓	✓										
Implement Comprehensive HR Policy					✓	✓						
Implement Fibre Optics Network	✓	✓								✓	✓	✓
Implement Gateway ISC Load Plan										✓		
Implement HR / Skill Management System					✓	✓	✓					✓
Implement Integrated Product Performance Report			✓			✓						
Implement Manpower Planning Information System					✓	✓						✓
Implement New Commercial Insurance Procedure		✓		✓		✓			✓			
Implement New FMS		✓		✓		✓						✓
Implement Outsourcing Train Database					✓	✓						✓

Functions

Strategies	Buildings	Strategic Planning	Customer Service	Financial Management	Human Resources	Information Technology	Marketing	Materials Management	Vehicles Management	Network Development	Network Management	Training
Implement PDP/MDP IS for Training					✓	✓						✓
Implement Primary Switching Network	✓									✓	✓	✓
Implement Satellite Earth Stations Network	✓									✓	✓	✓
Implement Security / Emergency Plans	✓									✓	✓	
Implement Stock Control Information System						✓		✓				
Implement Subscriber Radio Network	✓									✓	✓	✓
Implement TQM Process		✓			✓	✓						✓
Implement Vehicle Fleet Management IS						✓			✓			
Improve Financial Process				✓		✓						
Improve Purchasing Process				✓		✓						
Improve Vehicle Repair Centres	✓								✓			
Install Modern Queuing System			✓				✓			✓	✓	✓

Functions

Strategies	Buildings	Strategic Planning	Customer Service	Financial Management	Human Resources	Information Technology	Marketing	Materials Management	Vehicles Management	Network Development	Network Management	Training
Operate Long Distance Network by One Contractor		✓								✓	✓	
Optimise Network Design and Capacity						✓				✓	✓	✓
Phase Out Analogue Switches	✓									✓	✓	
Phase Out Old Information System						✓						
Prepare ISDN Network Infrastructure	✓	✓								✓	✓	✓
Provision of Quality Directory Services			✓			✓	✓					
Provide Customer Consultancy			✓				✓					
Review Material Management Process								✓				
Standardisation / Computer Purchase Policies						✓		✓				✓
Train Subscription Office Staff			✓									✓

Matrix 10. Functions Supporting Strategy Execution

Appendix F

1. Applications Architecture

1.1 Guiding Principles

The researcher's development of the proposed applications architecture was guided by several principles, which represent a fundamental shift from how the automation of business activities in the MoPTT has been approached in the past. The most important of these principles are:

- Applications must be developed with a degree of flexibility that allows them to be responsive for changing business needs.
- Information engineering is critical to define the future needs of the business. It is the formal link between application planning and strategic planning.
- User involvement will play a significant role in the application development process. End-user computing capabilities need to be increased.
- IS professionals will take a proactive and business-oriented approach to the application planning process.
- Commercially available applications are the preferred solution. Cost-effectiveness and speed of delivery are the primary selection criteria.
- Applications support data and data principles. Applications that share, rather than replicate, data will be developed.
- Applications and data will be integrated.

In addition to these guiding principles, the architecture is dependent upon the business strategy and the implementation of a unified and integrated database.

In accordance with this conceptual basis of the architecture, and in order to improve the long-term effectiveness of IS, there is a need progressively to redesign and add to the inventory of current applications. The main thrust of this endeavour must be:

- implementing integrated databases independently of the applications which process them and which constitute the major portion of the overall architecture.

- providing access to data through uniform interfaces (in terms of common presentation methods and common access techniques) across applications to all users throughout the MoPTT according to their individual needs and authorisation levels.

The emphasis of the support to the MoPTT's activities that the applications architecture reflects lies in the following areas:

1. Increased support of strategic decision-making, planning and control activities.

The principal architectural aspect satisfying this requirement is the provision of integrated databases of the MoPTT's operational data, especially the data that reflects the core activities of the business. Secondly, applications to support directly the mainline activities are proposed.

2. Increased automation of operational activities.

This development takes the form of applications which automate the present manual or partially- automated processes, for example automation of the service order handling and fault ticket processes.

A few practical considerations constrain the shape of the IS proposals, these being business priorities, the need to evolve technology implementations, and common sense.

Business priorities indicate that development and implementation efforts should be focused on providing automation support for the core operational activities.

Any architecture or system design proposal is also constrained by the technology available; the advance of technology can only permit some things. In addition to the two specific constraints mentioned above other considerations may affect the implementation priorities. Additionally, system data may not be needed by other applications (i.e. it does not need to be shared), and when this is clearly the case, the proposals curtail further investment in migrating the applications concerned and their associated data to the enhanced IS.

Several of the databases and corresponding applications that are described may not be implemented, with the current applications being retained instead. At the same time, others described in the architecture will not be implemented at an early stage, and will need to be part of future implementation projects. These applications and data, which are maintained by current applications, may need to be bridged to support each other.

Three fundamental considerations have driven the projections for early implementation elements of the architecture:

- firstly, the management priorities and emphasis on applications requiring immediate replacement
- secondly, the requirements associated with network implementation
- thirdly, the pragmatic evaluation of what is attainable within the horizon of a realistic strategic plan.

1.2 Application Descriptions

In the light of these principles indicated above, we can now move on to consider the direction in which the MoPTT applications must move in order to achieve the aims and objectives of the Ministry, and to enable it to operate successfully in a competitive telecommunications environment.

This section gives an overview of the current MoPTT applications that have been identified by the researcher, including their overall purpose and their interrelationships.

The information requirements were used along with the business process model and IS to fashion conceptual applications, i.e., logical clusters of functionality and data, as well as to provide the basis for the data structure. Technology characteristics for the applications noted in the descriptions were derived from the application functionality, distribution, data access requirements and type of application. The following were also used as guidelines to determine support requirements:

- data collected during the researcher's current IS assessment (Chapter 7)
- results from the data and application architectures (Chapter 9).

Conceptual applications make use of information engineering and create applications based on the business and their use of data. These applications are presented in terms of their role in the performance and management of the business and the data used.

1.2.1 Strategic Planning Applications

Three conceptual applications have been defined to support the Strategic Planning business area. These applications are: Strategic Planning, Budget Planning and Tracking,

and Enterprise Information Systems.

1.2.1.1 Strategic Planning

This application assists in developing and reviewing the Strategic Plan of the O&M Division of the MoPTT and in breaking out major projects and project tasks from this plan. The Strategic Plan addresses goals and objectives for the MoPTT in the planning period, as well as CSFs and opportunities/threats. Strategic Planning is an executive management function, and the Strategic Planning application is a set of information tools. The Strategic Planning application serves an important role by making the MoPTT overall goals and objectives available for further analysis and alignment in each level of the organisation. This application is complemented by the EIS (enterprise information systems,) application, which makes business data available for the strategic planning activity.

The Strategic Planning application stores and provides access to information in a variety of formats including simple flat files, relational databases and electronic documents. The application is used to produce annual business plans, operations plans and long-term strategic plans. Primary users of the Strategic Planning application are the MoPTT Executive Management, Strategic Planning personnel and administrative staff in corporate offices. The Strategic Planning application interfaces to Budget Planning and Tracking, Human Resource Planning, Product Research and Development, and Network Planning and Forecasting.

1.2.1.2 Budget Planning and Tracking

This application prepares the annual budget request that is sent to the Ministry of Finance and National Economy (MoFNE). This request is based on the financial plan provided by the Strategic Planning application. Upon approval of the budget for the MoPTT, it allocates budgets to various organisational units, keeping track of authorised work projects and approved budgets. It tracks actual performance as compared to performance expectation in budget terms. This information is used to take corrective action and to adjust the budget on a periodic basis. Managers with budget responsibility at all locations have an access to this application. The type of access will be commensurate with the level of management and budget authority.

1.2.1.3 Enterprise Information System (EIS)

This is a general executive-level information application, which supports the Strategic Planning function – along with planning, forecasting, tracking against (non-financial) goals and decision-making processes. It provides a wide range of performance and productivity information in order to support management decision-making. In addition, it represents a summary from the corporate information database or warehouse, tailored for decision-making. The application:

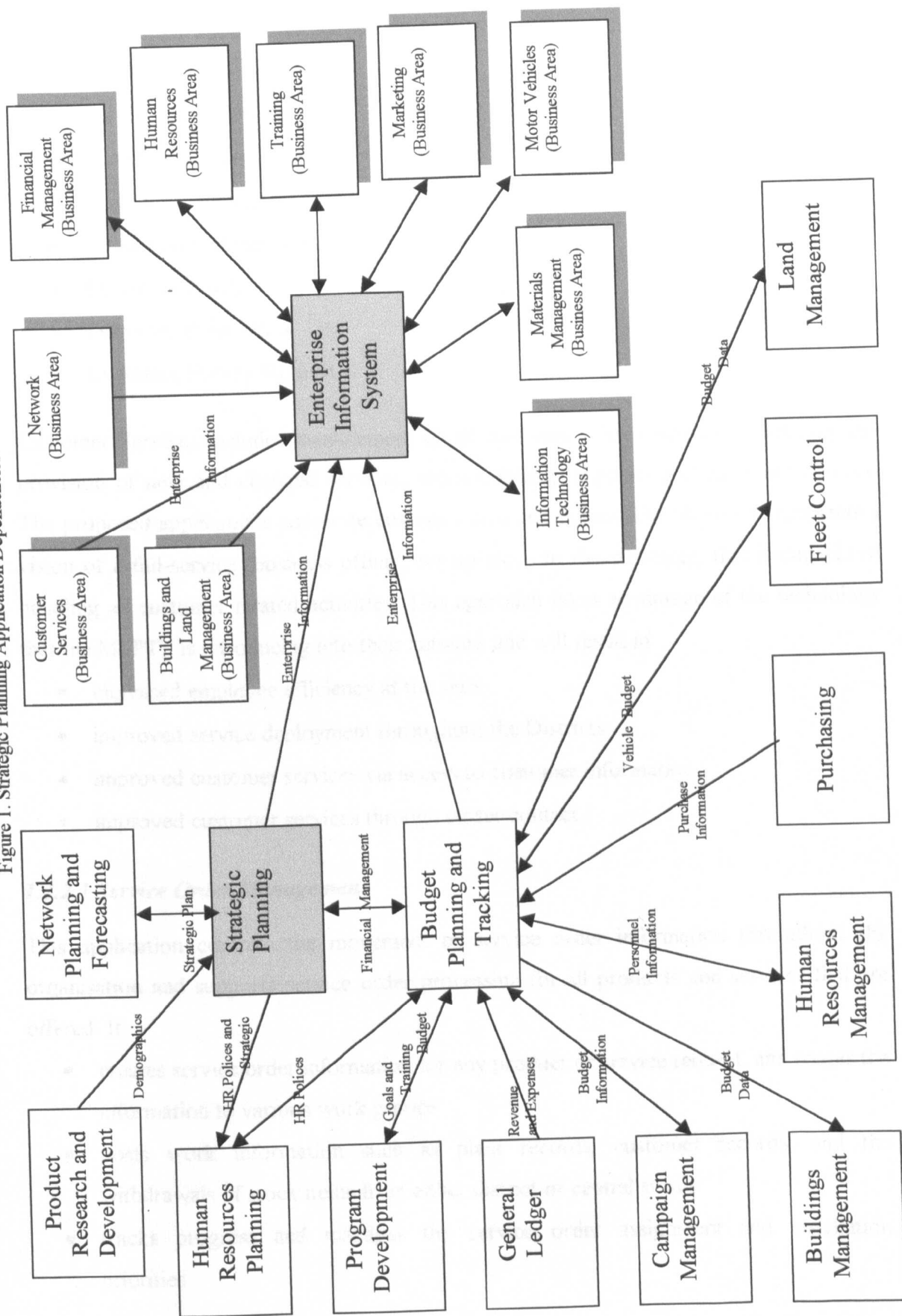
- produces the corporate indicators, operational results and productivity measurement information
- consolidates management accounting information by activity, by District, and product (including general ledger, cost and accrual accounting)
- provides demographic and network information summaries by exchange areas, statistical analysis of product service – sales, cancellations, etc., and network and customer services results – tele-traffic usage, traffic and congestion, revenue information – meter and tolls, billings, etc., and expenditures – budget, allocations, commitments and payments.

The principal users of this application are the MoPTT executive and senior management in corporate and District offices.

1.2.1.4 Interfaces

Application interfaces for Strategic Planning are shown in Figure 1. Applications specific to Strategic Planning are shaded, applications from other business areas are shown as clear boxes, and other business areas themselves are shown as clear boxes with a shadow.

Figure 1. Strategic Planning Application Dependencies



1.2.2 Customer Services Applications

Seven conceptual applications have been identified to support the Customer Services business area. These applications are:

- Service Order Management
- Customer Inquiry
- Fault Management
- Work Force Management
- Customer Billing
- Directory Production
- Customer Survey Support.

Customer Services includes management of all customer related activities, including the provision of new and changed services, repairs, billing, inquiries and customer surveys. The proposed applications automate customer care and billing. The blueprint represents a vision of a full-service 'business office', set up close to the customer, that is capable of handling all customer related activities. This approach takes advantage of the technology that the MoPTT is introducing into their network and will result in:

- increased employee efficiency at the sites
- improved service deployment throughout the Districts
- improved customer services via access to customer information
- improved customer services through closer contact.

1.2.2.1 Service Order Management

This application controls the movement of service order information throughout the organisation and supports service order processing for all products and services that are offered. It:

- creates service order information for any product or service request, and routes the information to various work groups
- posts work information such as plant records, customer records, and the withdrawals of stock items from either district or central stores
- tracks progress and manages the service order assignment and installation priorities

- gathers and reports historical information (e.g., measurements of service provision, monthly orders processed)
- handles missed appointments, service order quality measurement, etc.
- handles orders that cannot be fulfilled immediately.

The application supports analysis of service orders, service order generation, closing service orders and dispatch through the Work Force Management application.

Information that is captured in the Service Order Management application affects other applications and the MoPTT business practices. For example:

- A service order is created when a customer requests a new service, or a change to an existing service has occurred. The customer may visit a business office or contact a customer services representative by telephone. The representative would create the service order during the initial contact with the customer.
- The Service Order Management application assigns network facilities to the customer requesting service. Information about the existence of network facilities is supplied by the Network Configuration Management application.
- The Service Order Management application identifies tasks that must be done in order to complete the service order. Any physical labour that is required is administered by the Work Force Management application.
- When the service order is completed, information relating to the customer is updated in the Directory Production and Billing applications.
- Information in the Service Order Management application can be used to report such performance measures as:
 - number of orders processed per month
 - missed installation appointments
 - time required to complete service orders.

The primary users of the Service Order Management application are the customer services representatives in business offices and the customer services administrators in the District offices who assign specific service jobs to the appropriate staff. Since this application supports a critical business process it is essential that it be available during the normal business hours for the District and business offices.

1.2.2.2 Directory Production

Using information received from the Service Order Management application, Directory Production supports all processes associated with designing and publishing the White Pages, Yellow Pages and tele-fax directories. This includes processes to design and layout individual entries or advertisements, processes to design and layout the pages, and processes to support the design and layout of the actual physical books. In addition, Directory Production provides and uses graphical and typesetting capabilities to support these processes. This application supports multiple publishing cycles.

The primary users of the Directory Production application are the corporate office staff responsible for design and layout of the books and the staff responsible for the production runs. The initial process associated with this application (the design of individual entries and advertisements) needs to be available during the normal work hours of the business offices. The final part (book production) is batch process and needs to be available during production cycles.

1.2.2.3 Customer Billing

This application gathers local meter, toll and non-toll charges, and calculates and produces company or customer bills. It maintains tariffs, and customer billing records and invoices. In addition it supports on-line queries. Historical information is available on-line on a report basis.

The capabilities offered include:

- entering and maintaining company, general ledger account number, billing, service and equipment, and toll information parameters
- entering and reviewing payments, deposits, and any adjustments through the Accounts Receivable component
- using service and equipment information for detail and summary information for charges
- using the billing cycle information to set up individual subscriber parameters as needed.

Customer account information, such as customer name, billing address, services purchased, etc. are originated in the Service Order Management application. Tariff and

rate plan information is maintained by the Customer Billing application. Customer Billing produces customer invoices primarily via batch computer runs determined by billing cycles. Current and historical customer account information is available for inquiry by groups who answer customer billing inquiries. Records of customer payments are originated in the Accounts Receivable application.

1.2.2.4 Fault Management

This application controls the movement of trouble tickets throughout the organisation. It:

- creates trouble ticket information for any product or service and routes the information to the appropriate processes
- uses the Network Fault Management application for testing
- creates trouble ticket information
- tracks progress and manages the trouble ticket priorities
- updates information such as plant and exchange records, and customer records
- gathers and reports historical fault information.

In addition, it supports trouble ticket generation, trouble ticket dispatch through the Work Force Management application, trouble ticket closing, and trouble ticket analysis. Trouble tickets are generated when faults occur in the network. Trouble tickets can be created because of a customer complaint, or through an internal request generated by a technician or by the Network Fault Management application. The Fault Management application administers the flow of such notices, identifying the sequence of operations that must be performed to correct a fault and close a trouble ticket. The application shares information with, and initiates activities performed by, the Work Force Management and Network Fault Management applications.

The MoPTT corporate office staff who manage the network, and business office staff who receive complaints from customers, will create trouble tickets. This application is important for the recording of problems and their referral to the appropriate units, but it is not important for the successful clearing of faults. It should be available around the clock, but does not have to be fault tolerant.

The Fault Management application will record information that can be used to report such statistics as:

- number of trouble tickets reported per month
- number of trouble tickets per month per service
- times required to clear trouble tickets.

The application supports direct inquiries on data related to Fault Management and produces summary reports.

1.2.2.5 Work Force Management

This application supports the handling, tracking, and scheduling of the work force and assignment of work orders for service orders and trouble tickets. It manages the work activity, along with maintaining catalogued time estimates for each activity for use in scheduling. It automatically schedules work orders, prepares schedules, and optimises manpower usage according to defined geographic work areas.

The Service Order Management and Fault management applications identifies activities that must be performed. Assignment of personnel to complete the work orders is scheduled by the Work Force Management application, taking into account the skills of the technician and the location of the required repair.

Staff in District offices who are responsible for overseeing installation and repair technicians are the primary users of the Work Force Management application. Because the application schedules trouble ticket-related work, the application should be available during the normal working hours of installation and repair personnel.

1.2.2.6 Customer Inquiry

This application answers customer queries on a range of matters: service orders, trouble tickets, customer bills, products and services, customer financial records (credits, payments, etc.), and directory services. In addition, it supports directory assistance (number 905) as a value-added and revenue producing service. It reads information from service orders, plant records, fault management records, billing records, financial records and the customer database. It provides integrated access from one single end-user terminal to customer services information.

Corporate office and business office staff, who answer customer inquiries, are the primary users of this application. Since customers may make contact by phone or in person the

application should be available during the normal business hours.

1.2.2.7 Customer Survey Support

This application maintains customer survey information, and generates survey reports and forms. It helps in establishing customer satisfaction measures and potential customer needs. The application supports the ongoing Total Quality Management (TQM) program.

This application is used by marketing staff at corporate offices and customer services staff in business offices in tracking customer satisfaction and overall service quality. Marketing staff can post questionnaires to this application in order to identify new product and service needs, and through it customer Services staff can follow-up on new installations, service changes and fault reports. The application records the information received from completed questionnaires and surveys, and uses this information for further analysis.

1.2.2.8 Interfaces

Application interfaces for Customer Services are shown in Figure 2. Applications specific to Customer Services are shaded, and applications from other business areas are shown as clear boxes.

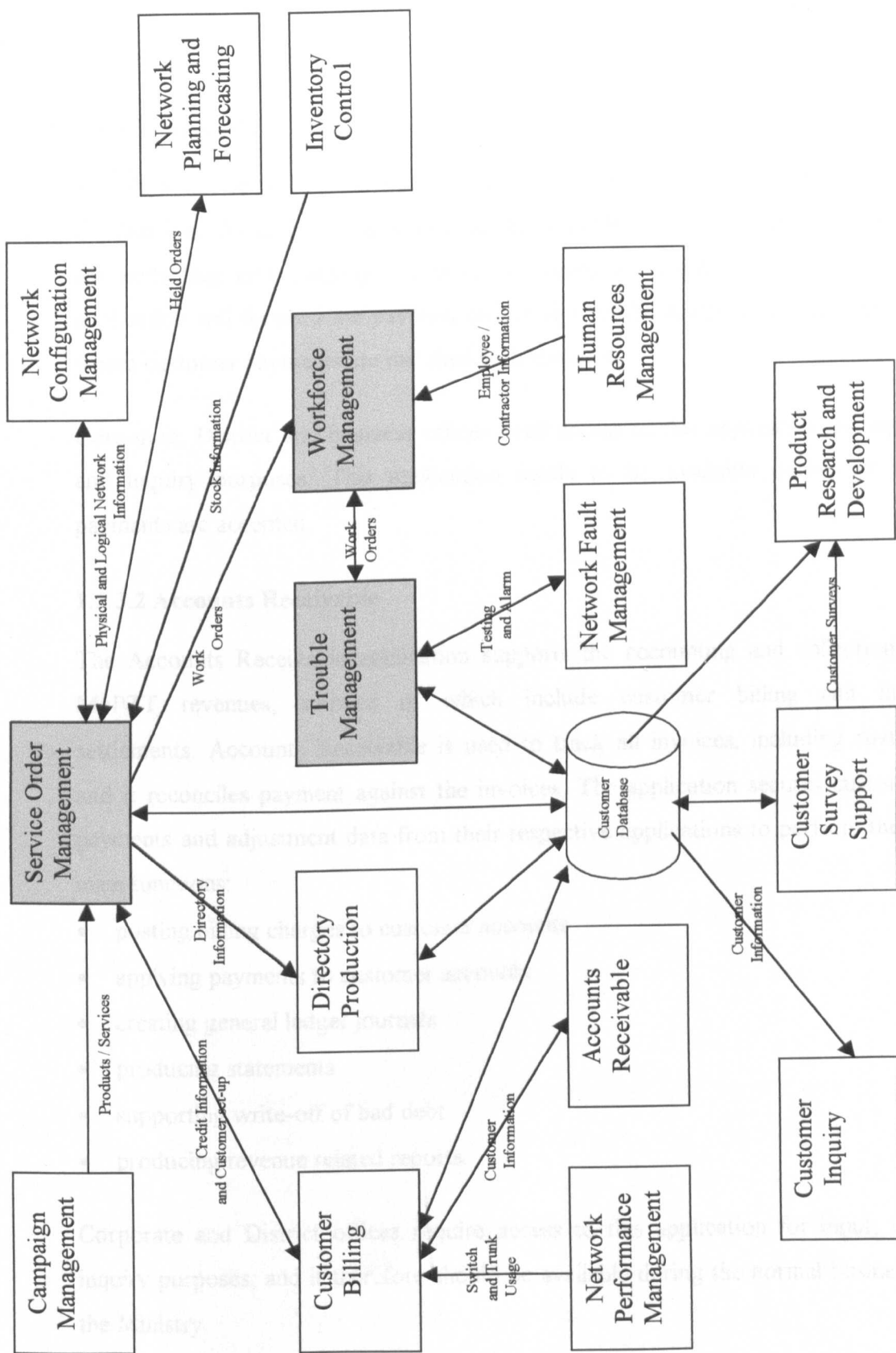


Figure 2. Customer Service Application Dependencies

1.2.3 Financial Management Applications

Five conceptual applications have been defined to support the Financial Management business area. These are: Payments, Accounts Receivable, Accounts Payable, Asset Management and General Ledger.

1.2.3.1 Payments

The Payments application supports the collection and processing of customer payments in the Districts. As such, it is a part of the Accounts Receivable process, specifically geared for collecting and tracking customer payments of telephone bills. In addition, this application will forward the payment information to the Accounts Receivable application, where customer payments are matched with invoices.

Corporate, District and business offices need access to this application for input, update and inquiry purposes. This application needs to be available during all hours that payments are accepted.

1.2.3.2 Accounts Receivable

The Accounts Receivable application supports the accounting and collection of all the MoPTT revenues, sources of which include customer billing and international settlements. Accounts Receivable is used to track all invoices, including customer bills, and it reconciles payment against the invoices. The application secures customer billing, payments and adjustment data from their respective applications to perform the following main functions:

- posting billing charges to customer accounts
- applying payments to customer accounts
- creating general ledger journals
- producing statements
- supporting write-off of bad debt
- producing revenue related reports.

Corporate and District offices require access to this application for input, update and inquiry purposes, and it therefore should be available during the normal business hours of the Ministry.

1.2.3.3 Accounts Payable

The Accounts Payable application supports the payment, tracking and accounting of all MoPTT expenses and the production of expense accounting information. Accounts Payable captures and records the financial obligations of the MoPTT, providing the means to match invoices against purchase orders; it ensures that bills are paid and it distributes the expenses to appropriate general ledger accounts. The payable accounts include employee payrolls, suppliers and contractors. In addition, the Accounts Payable application maintains information on indirect costs and allocations. Expense accounting reports are produced by this application.

Corporate and District Offices require access to this application for input, update and inquiry purposes, so that it needs to be available during the normal MoPTT business hours.

1.2.3.4 Asset Management

This application supports accounting for the assets and stocks that are owned by the Ministry. Asset Management:

- records asset acquisition, transfer and disposition
- tracks asset warranties
- supports site equipment tags
- maintains asset attributes available across the organisation.

Corporate and District Offices need access to this application for input, update and inquiry purposes, and it requires to be available during the normal business hours of the MoPTT.

1.2.3.5 General Ledger

This application interfaces with the Asset Management application as well as, as we have noted, the Accounts Receivable and Accounts Payable applications. It receives the posting journal from Accounts Payable, Accounts Receivable and Asset Management. The General Ledger application maintains the MoPTT General Ledger. It is the location for data on revenues, expenditures and assets, and prepares General Ledger information and reports. It is the application that consolidates and summarises the financial data into an overall financial statement for the MoPTT. It consolidates financial information and

maintains an interface to the Budget Planning and Tracking application.

Corporate and District offices requires access to this application for input, update and inquiry purposes. This application needs to be available during the normal business hours of the MoPTT.

1.2.3.6 Interfaces

Application interfaces for Financial Management are shown in Figure 3. Applications specific to Financial Management are shaded, and applications from other business areas are shown as clear boxes.

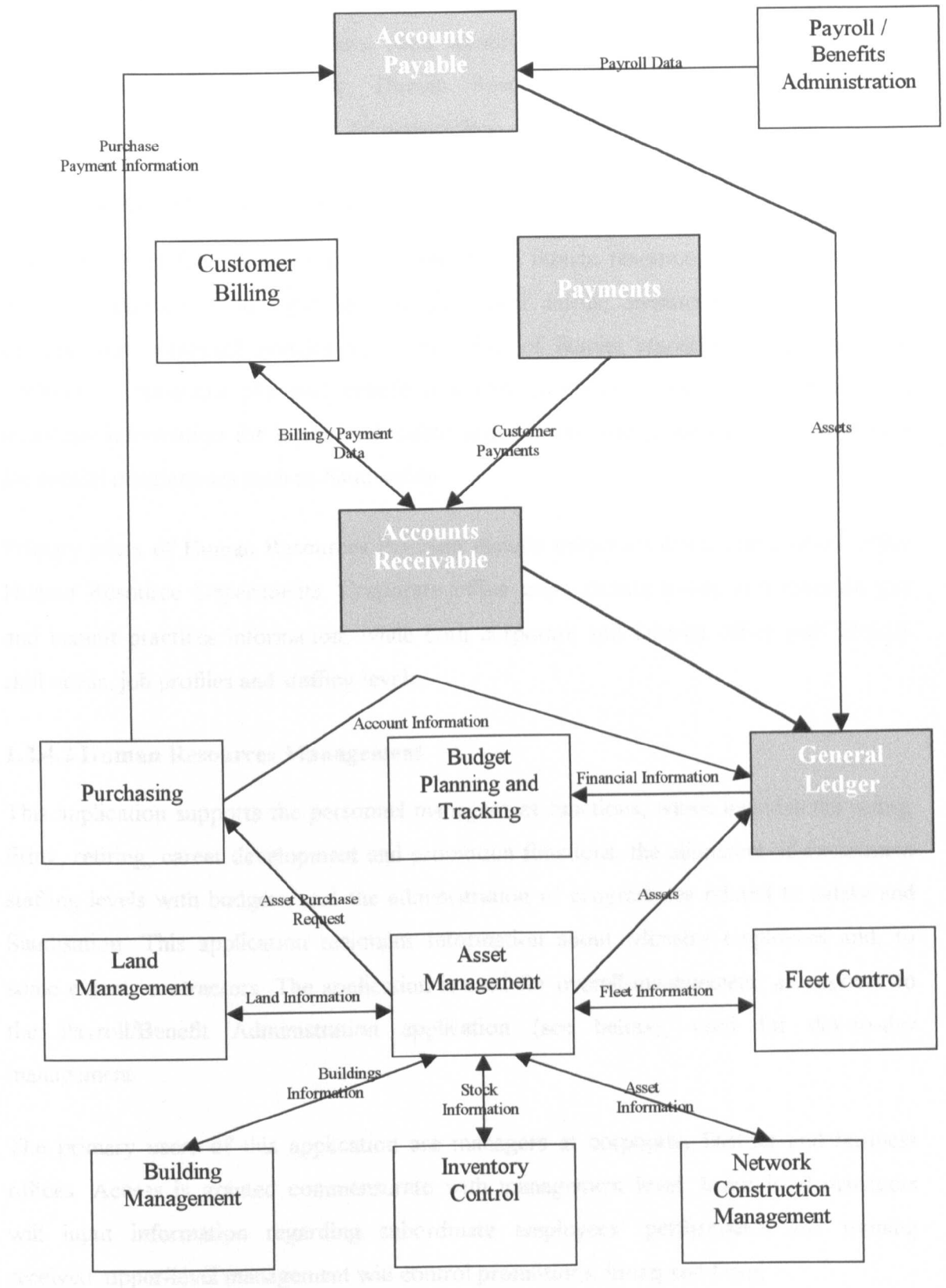


Figure 3. Financial Management Application Dependencies

1.2.4 Human Resources Applications

Three conceptual applications have been identified to support the Human Resources Business Area and these are: Human Resources Planning, Human Resources Management and Payroll/Benefits Administration.

1.2.4.1 Human Resources Planning

The purpose of this application is to support the human resources infrastructure. This includes maintaining job profiles, tracking skill needs, monitoring staffing levels, carrying out personnel policies and developing of human resources programmes. In addition, it maintains pay and benefit practices information. Finally, this application maintains information for health and safety programmes and procedures, and measures for special programmes such as Saudisation.

Primary users of Human Resources Planning include corporate office and District office Human Resource Departments. Corporate office users dictate policy and maintain pay and benefit practices information, while both corporate and District office staff identify skill needs, job profiles and staffing levels.

1.2.4.2 Human Resources Management

This application supports the personnel management functions, which includes the hiring, firing, retiring, career development and promotion functions, the alignment of department staffing levels with budgets, and the administration of programmes related to safety and Saudisation. This application maintains information about Ministry employees and, to some extent, contractors. The application is used for overall management, as opposed to the Payroll/Benefit Administration application (see below), used for day-to-day management.

The primary users of this application are managers at corporate, District and business offices. Access is granted commensurate with management level: lower-level managers will input information regarding subordinate employees' performance and training received; upper-level management will control promotions, hiring and firing.

1.2.4.3 Payroll/Benefits Administration

This application supports the administration of activities related to time registration and

payments, and to benefits and rewards within the MoPTT. The application maintains information about the following: payroll, the weekly/monthly record of an employees' salaries, hours spent on project activities, pension and programme adjustments, and special benefits. Primary users include corporate office Human Resource management.

1.2.4.4 Interfaces

Application interfaces for Human Resources are shown in Figure 4. Applications specific to Human Resources are shaded. Applications from other business areas are shown as clear boxes.

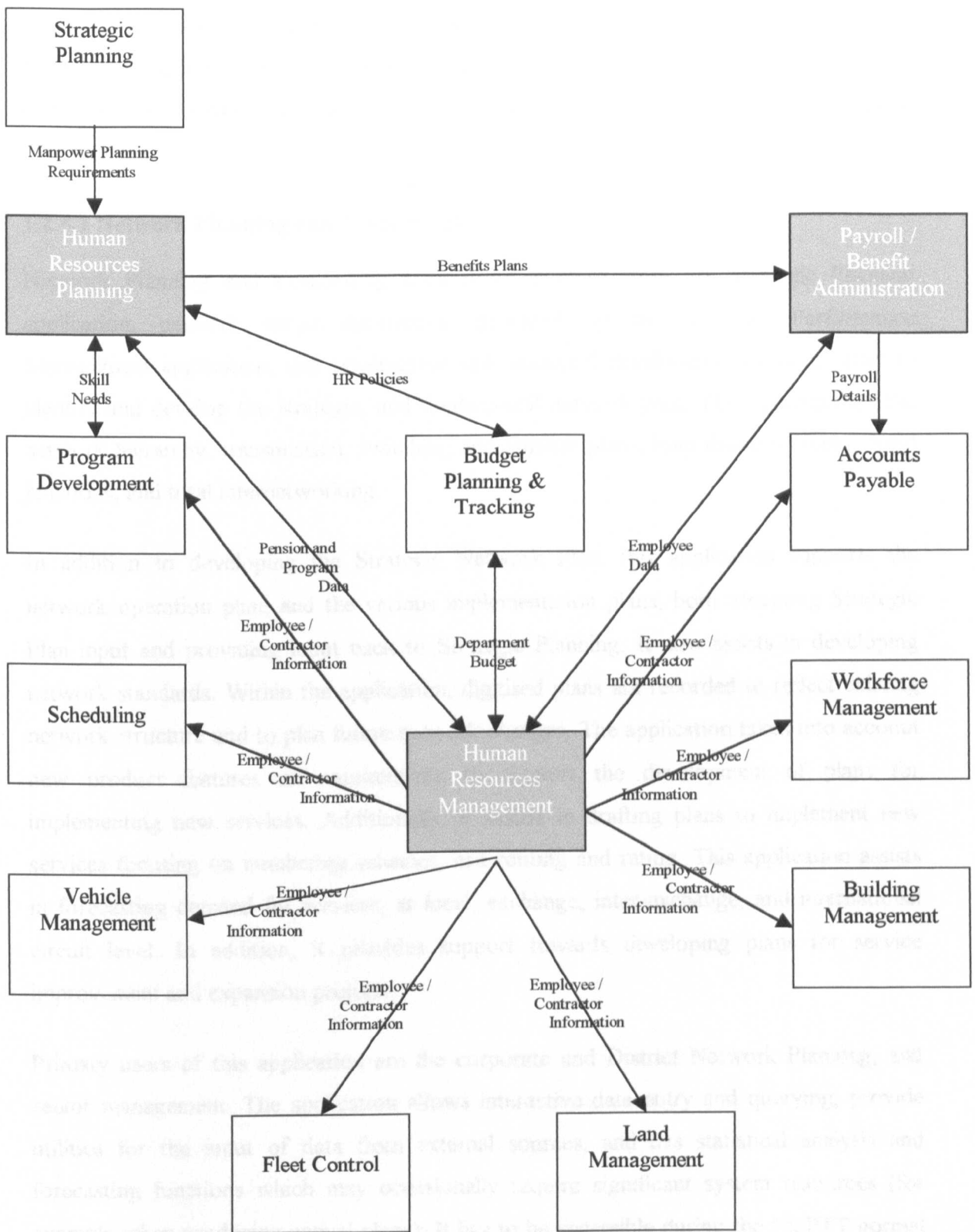


Figure 4. Human Resources Applications Dependencies

1.2.5 Network Applications

There are five conceptual applications to support the Network business area. These are: Network Planning and Forecasting, Network Construction Management, Network Configuration Management, Network Performance Management, and Network Fault Management

1.2.5.1 Network Planning and Forecasting

Network Planning and Forecasting uses strategic plans from the Strategic Planning application, network usage information provided by the Network Performance Management application, and government and municipal development plans in order to identify and develop the strategic, and fundamental network plan. This encompasses the network hierarchy, transmission, switching and number plans, long distance trunks, local junctions, and total internetworking.

In addition to developing the Strategic Network Plan, this application supports the network operation plan, and the various implementation plans, both accepting Strategic Plan input and providing input back to Strategic Planning. It also assists in developing network standards. Within the application, digitised plans are recorded to reflect existing network structure and to plan future network changes. The application takes into account new product features or requirements to support the development of plans for implementing new services. Additionally, it assists in drafting plans to implement new services focusing on numbering schemes, call routing and rating. This application assists in forecasting demand for services, at local, exchange, inter-exchange, and international circuit level. In addition, it provides support towards developing plans for service improvement and expansion projects.

Primary users of this application are the corporate and District Network Planning, and senior management. The application allows interactive data entry and querying, provide utilities for the input of data from external sources, and has statistical analysis and forecasting functions which may occasionally require significant system resources (for example when producing annual plans). It has to be accessible during the MoPTT normal business hours.

1.2.5.2 Network Construction Management

This application manages information about network sites, buildings, cables, equipment and components. It is utilised in relation to the implementation of plans for transmission and network construction, and expansion and improvement. In carrying out this operation it receives these plans from the Network Configuration Management application and returns to that application any changes to the plan that have occurred during the actual construction. This application interacts with the Asset Management application to track corporate assets, and with the Materials Management applications for materials usage.

The principal users of this application are Network Planning Departments, District Construction Departments, and engineering staffs. As progress is made on a plan, whether by Ministry staff or an outside contractor, Construction Department staff update information in the Network Construction Management application.

1.2.5.3 Network Performance Management

This application supports the ongoing process of collecting and analysing network usage, performance (for example successful call attempts and completions), and signal quality data. It organises and forwards usage data to Network Planning and Forecasting. It detects loss or impairment of logical network paths and can be used to prompt reallocation of network resources (network restoration, traffic re-routing). In addition, it detects instances of abnormal demand upon network resources and can be used to initiate counter-measures (traffic controls). Failures to perform to expected standards/targets can be forwarded to the Fault Management application as alarms so that they may be correlated with other data to help isolate faults. Data that are gathered by this application are used to compute the grade of service offered by the network.

The primary users of this application are corporate office Network Management staff. This application is critical for ensuring the stability of the MoPTT network. Some aspects of this application (related to traffic re-routing and interfaces with the Network Fault Management application) require the use of real-time, process control software. The availability of this application should meet industry-accepted norms for the applications of telecommunications network control applications.

1.2.5.4 Network Configuration Management

This application supports outside plant engineering and inside plant design and is used to establish and continue all the physical and logical relationships in the network. In addition, it is used to define logical paths (connections) across the network and to allocate these to specific services (for example inter-office trunks, leased lines, dedicated network connections such as signalling link sets or other corporate data connections, etc.). The map of logical paths onto the physical network is used to correlate and suppress network alarms during the fault isolation process. The ability of this application to set parameters in the network elements, is used by other applications in order to control critical service parameters (e.g., signalling destination point codes and routing tables, cellular hand-off thresholds, etc.).

Primary users of this application are corporate office and District office Engineering Departments and circuit designers, as well as corporate office network management staff. Because the application is used to control network elements, it is the most critical application of all applications that are identified in this architecture in terms of availability, and should therefore be accessible twenty-four hours a day.

1.2.5.5 Network Fault Management

This application is used to collect and correlate network alarms and other exception reports. It triggers the maintenance process, which begins with the identification, isolation and confirmation of a network fault, interfacing with the Fault Management application. The maintenance process ends when repair work has been scheduled, performed and the repair has been verified as completed (the network element no longer reports an abnormal condition). This cycle involves the Fault Management and Work Force Management applications. Routine maintenance (physical work on the network that is not triggered by a network fault or a construction project) is scheduled by the Work Force Management application based upon established maintenance practices external to this application.

The primary users of this application are corporate office Network Management staff. Because the application involves monitoring alarms from network elements, a high degree of real-time, process control software will be required to support the application. Additionally, because this application helps the MoPTT in ensuring service quality, this system's availability should be as high as that for the Network Configuration

Management application.

1.2.5.6 Interfaces

Application interfaces for the network are shown in Figure 5. Applications specific to the network business area are shaded. Applications from other business areas are shown as clear boxes.

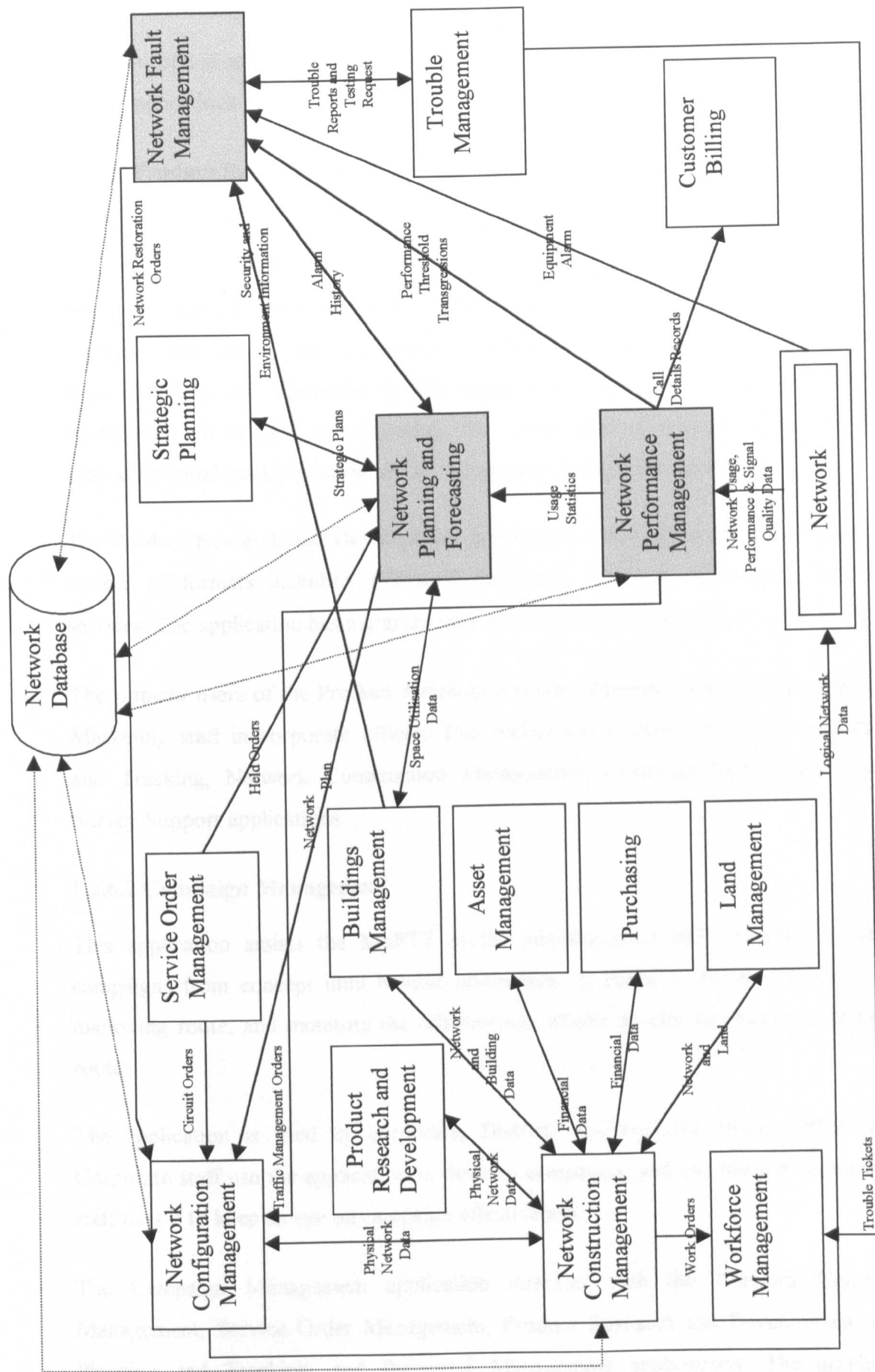


Figure 5. Network Application Dependencies

1.2.6 Marketing Applications

Two conceptual applications have been defined to support the Marketing business area. These applications are Product Research and Development, and Campaign Management.

1.2.6.1 Product Research and Development

This application helps the Ministry in identifying and defining new products and services. It is used to gather and analyse information from a variety of sources, identify market segments, industry trends, and product requirements required to address the needs of the segments and support industry trends. In addition, it helps the MoPTT in developing business cases and administering the approval process for new product proposals. Furthermore, it is used in monitoring the performance of a given product or service against its initial market penetration and acceptance in the marketplace.

The Product Research and Development application stores and accesses information in a variety of formats including relational databases, electronic documents, and on-line services. The application has a graphic user interface and can be used on portable PCs.

The primary users of the Product Research and Development application are the MoPTT Marketing staff in corporate offices. The application interfaces to the Budget Planning and Tracking, Network Construction Management, Customer Billing, and Customer Survey Support applications.

1.2.6.2 Campaign Management

This application assists the MoPTT in the administration and tracking of marketing campaigns from concept until beyond completion. It helps in choosing the appropriate marketing route, and monitors the effectiveness of any specific marketing campaign and route.

The application is used by corporate, District, and business office marketing staff. Corporate staff use the application to develop campaigns, and District and business office staff uses it to keep an eye on campaign effectiveness.

The Campaign Management application interacts with the Network Construction Management, Service Order Management, Product Research and Development, Budget Planning and Tracking, and Personnel Management applications. The graphic user

interface is used to display charts and graphs depicting campaign effectiveness.

1.2.6.3 Interfaces

Application interfaces for the Marketing Business Area are shown in Figure 6. Applications specific to Marketing are shown as shaded boxes, while applications from other business areas are shown as clear boxes.

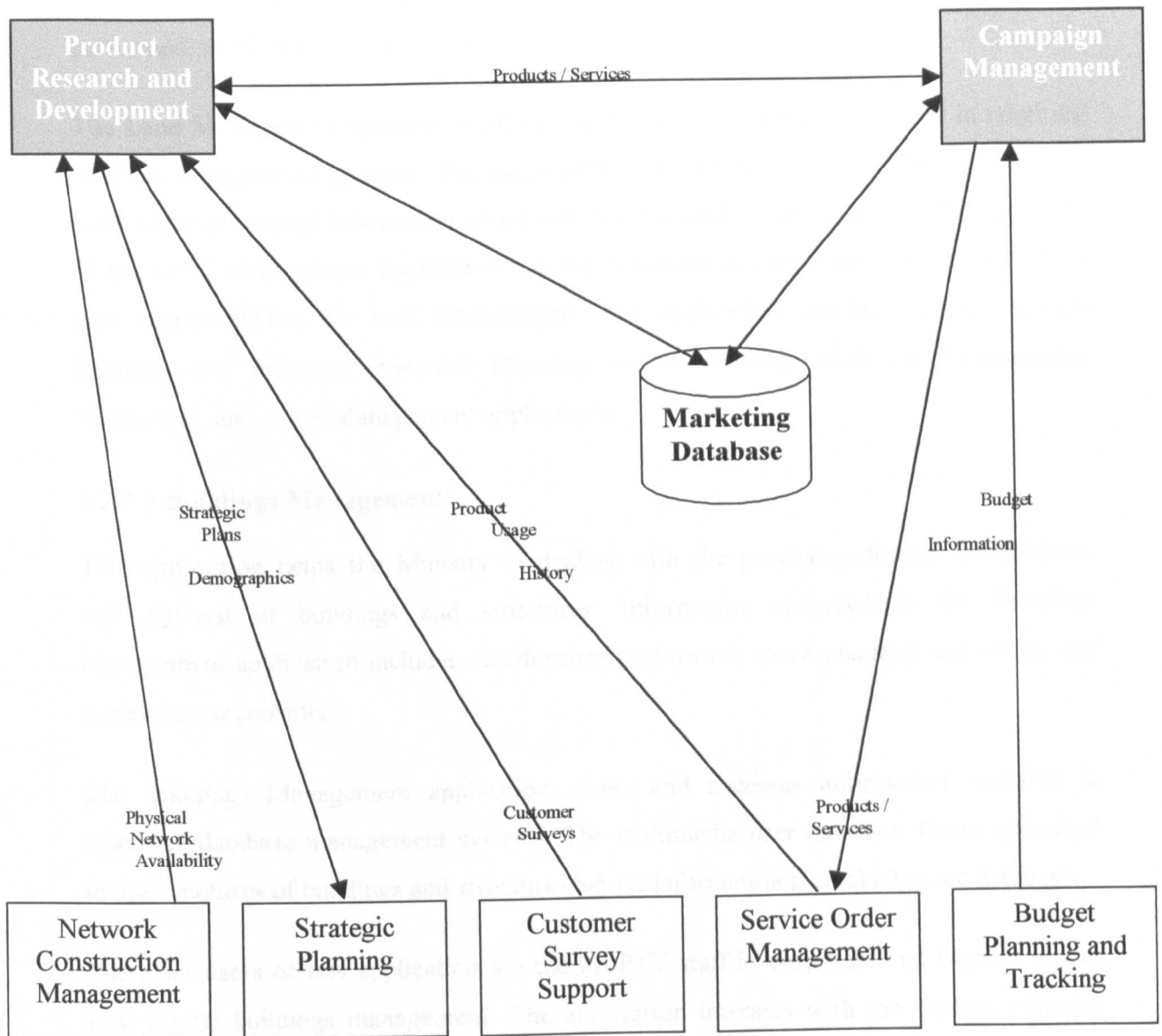


Figure 6. Marketing Application Dependencies

1.2.7 Buildings and Land Management Applications

Two conceptual applications have been selected to support the Buildings and Land Management Business Area. These are the Buildings Management and the Land Management applications.

1.2.7.1 Land Management

This application helps the MoPTT in administering the purchase, ownership and disposal of land. Information recorded in the Land Management application includes maintenance performed, municipal services available and security arrangements.

The Land Management application stores and accesses information primarily in relational database management systems. The multimedia user interface allows the Ministry staff to view pictures of land information about which is tracked in the databases. Primary users of the Land Management application are the personnel in corporate and District offices with responsibilities for land management. The application interfaces to the Budget Planning and Tracking, Network Planning and Forecasting, Buildings Management, Purchasing, and Asset Management applications.

1.2.7.2 Buildings Management

This application helps the Ministry in dealing with the purchase, design, maintenance, and disposal of buildings and structures. Information recorded in the Buildings Management application includes maintenance performed, space planning and usage, and security arrangements.

The Buildings Management application stores and accesses information primarily in relational database management systems. The multimedia user interface allows personnel to view pictures of buildings and structures whose information is tracked in the databases.

The chief users of this application are the MoPTT staff in corporate and District offices who handle buildings management. The application interacts with the Budget Planning and Tracking, Network Planning and Forecasting, Buildings Management, Purchasing, Network Performance Management, and Asset Management applications.

1.2.7.3 Interfaces

Application interrelationships for Buildings and Land Management are shown in Figure 7. Applications from the Buildings and Land s Business Area are shaded. Applications from other Business Areas are shown as clear boxes.

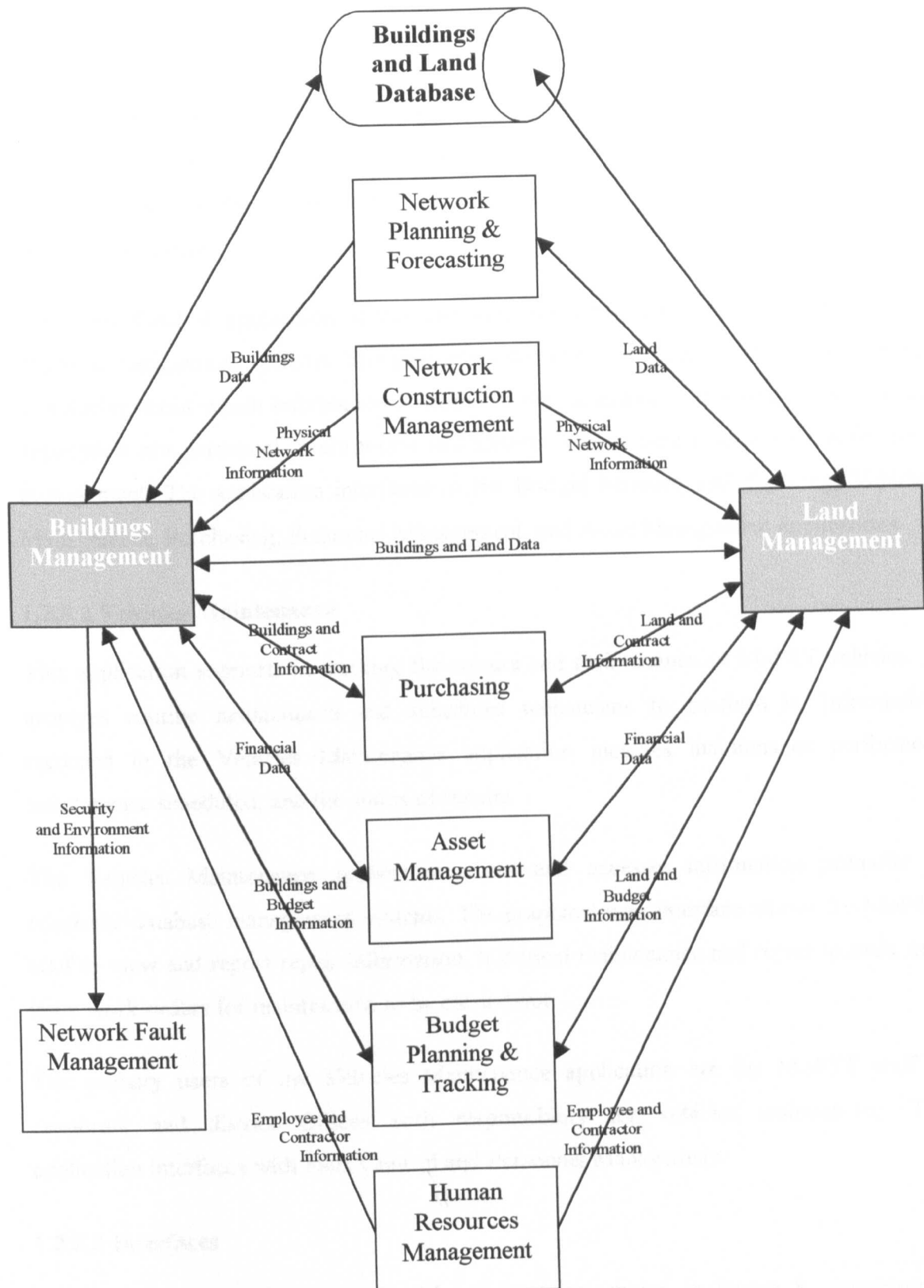


Figure 7. Buildings and Land Management Application Dependencies

1.2.8 Vehicles Management Applications

Two conceptual applications have been identified to support the Vehicles Management Business Area. These applications are Fleet Control and Vehicles Maintenance.

1.2.8.1 Fleet Control

This application helps the MoPTT in administering the purchase, ownership, and disposal of vehicles. Information, which is recorded in the Fleet Control application, includes purchase date, in-service date, employee assigned to the vehicles, insurance data, and decommission date.

The Fleet Control application stores and accesses information primarily in relational database management systems. The graphical user interface allows staff to view pictures of vehicles about which information is stored in the databases. The primary users of this application are personnel in corporate and District offices with responsibilities for fleet management. The application interfaces to the Budget Planning and Tracking, Vehicles Management, Purchasing, Personnel Management, and Asset Management applications.

1.2.8.2 Vehicles Maintenance

This application supports in tracking the repairs and maintenance of MoPTT vehicles. It arranges routine maintenance and schedules technicians to perform it. Information recorded in the Vehicles Maintenance application includes maintenance performed, maintenance scheduled, and the status of repairs.

The Vehicles Maintenance application stores and accesses information primarily in relational database management systems. The graphical user interface allows the MoPTT staff to view and report repair information, historical maintenance and repair records, and issue work orders for maintenance to be carried out.

The primary users of the Vehicles Maintenance application are the MoPTT staff in corporate and district Offices with responsibility for vehicles maintenance. The application interfaces with Fleet Control and Personnel Management.

1.2.8.3 Interfaces

Application interfaces for Vehicles Management are shown in Figure 8. Applications

specific to Vehicles Management are shaded. Applications from other Business Areas are shown as clear boxes.

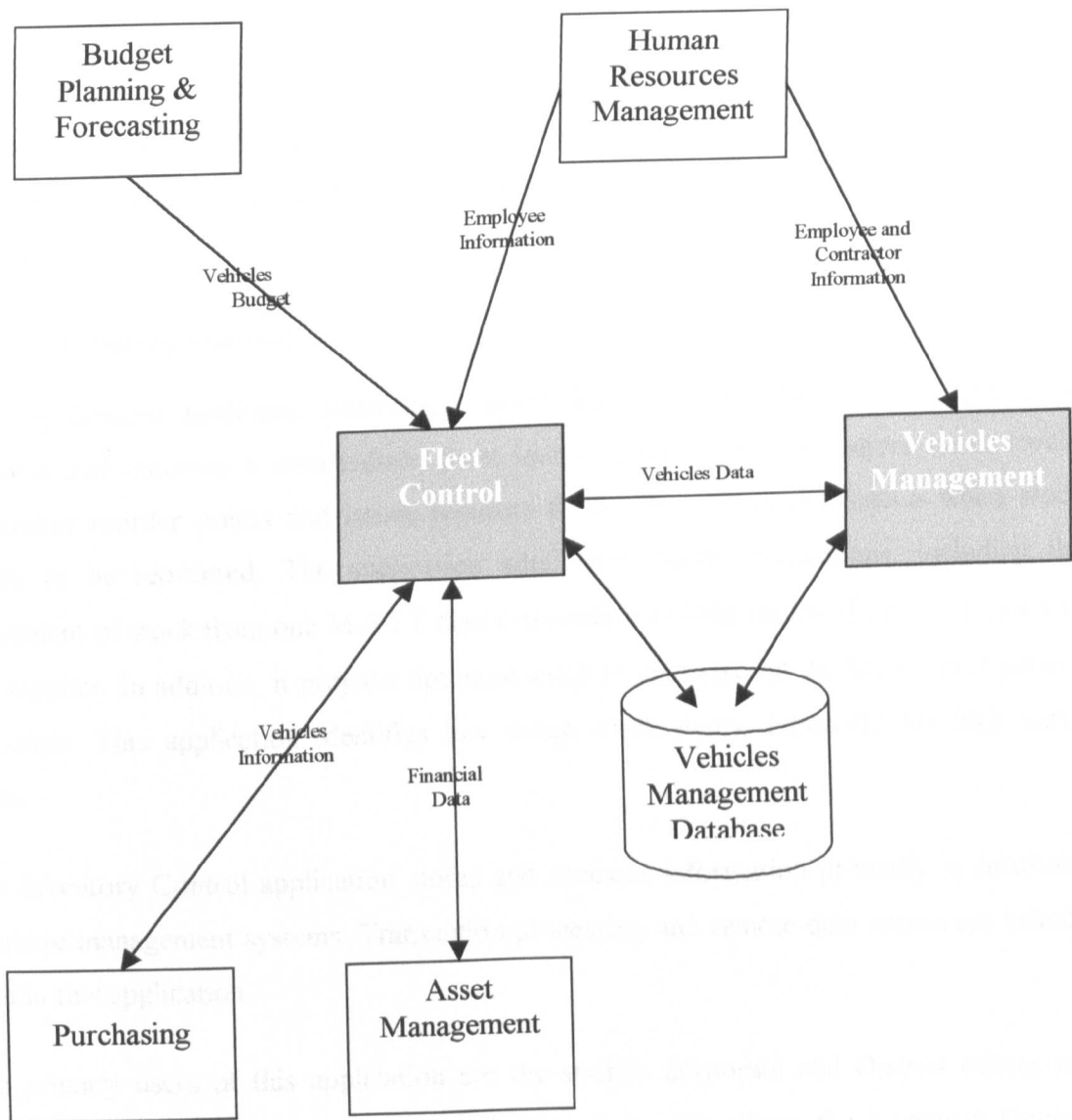


Figure 8. Vehicles Management Application Dependencies

1.2.9 Materials Management Applications

Two conceptual applications have been identified to support the Materials Management Business Area. These are Purchasing and Inventory Control.

1.2.9.1 Purchasing

The main use of this application is to issue purchase orders. The application creates purchase orders in response to requests that originate in several other applications.

Supporting functionality includes selecting vendors, monitoring vendor effectiveness, and, if necessary, administering tender and contracts. The Purchasing application stores and accesses information primarily in relational database management systems.

The chief users of this application are staff in corporate and District offices with responsibility for purchasing stock and materials. The application interfaces with the Budget Planning and Tracking applications, and accepts requests from several other systems.

1.2.9.2 Inventory Control

This application facilitates maintaining stock levels in the MoPTT. The application sustains and enforces a standardised parts identification scheme, monitors stock levels, calculates reorder points and issues requests to the Purchasing application when stock needs to be reordered. The application administers stock transactions, including the movement of stock from one MoPTT depot to another and the return of defective stock to the supplier. In addition, it projects optimum stock levels based on the known past pattern of usage. This application identifies low usage stock items, especially for high value items.

The Inventory Control application stores and accesses information primarily in relational database management systems. Transaction processing and remote data access are heavily used in this application.

The primary users of this application are the staff in corporate and District offices are responsibility for stock control. Field technicians may also access the Inventory Control application to make withdrawals of stock items. The application interfaces to Purchasing and Asset Management.

1.2.9.3 Interfaces

Application interfaces for the Materials Management Business Area are shown in Figure 9. Applications specific to Materials Management are shaded. Applications from other business areas are shown as clear boxes.

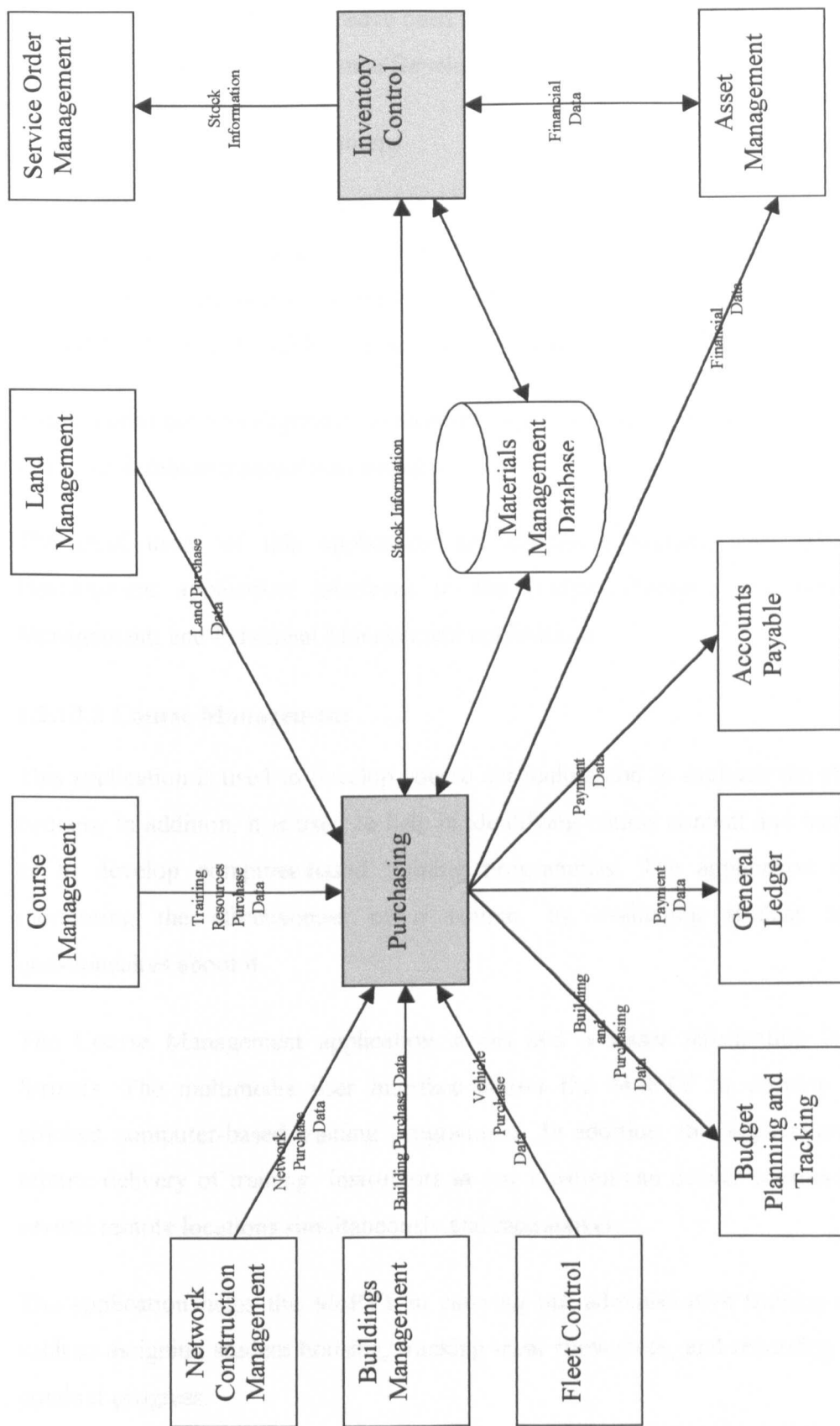


Figure 9. Materials Management Application Dependencies

1.2.10 Training Applications

Three conceptual applications have been identified to support the Training Business Area. These applications are Programme Development, Course Management, and Scheduling.

1.2.10.1 Programme Development

This application helps the Ministry in identifying and planning for training courses. The application accesses historical training data, current organisation skills assessments and needs, current instructor competency, and future training needs to help determine courses. It plans for the use of both human and other resources.

The Programme Development application stores and accesses information primarily in relational database management systems.

The chief users of this application are corporate training staff. The Programme Development application interfaces to the Budget Planning and Tracking, Course Management, and Personnel Management applications.

1.2.10.2 Course Management

This application is used to develop course curriculum and to evaluate the effectiveness of courses. In addition, it is used to help in identifying course content and materials, as well as to develop computer-based training programmes. The application contributes to monitoring the effectiveness of a course, by evaluating student and instructor questionnaires about it.

The Course Management application stores and accesses information in a variety of formats. The multimedia user interface allows the MoPTT to develop effective and efficient computer-based training programmes. In addition, this application supports the remote delivery of training. Instructors in one location can deliver courses to students at several remote locations simultaneously and interactively.

The application helps the MoPTT in carrying out administrative training-related duties, such as assigning student housing, tracking meal allowances, and recording student social conduct progress.

The primary users of the Course Management application are the MoPTT corporate staff responsible for developing courses. The application interfaces to Purchasing, Programme Development, and Scheduling.

1.2.10.3 Scheduling

The main function of this application is to schedule the MoPTT courses. The application determines student, instructor, materials, and facilities availability, as well as course schedule. In addition, it is used to invite students to courses and keep track of student and instructor attendance.

The Scheduling application stores and retrieves data primarily in relational database management systems. It displays schedule and attendance statistics in appropriate charts and timelines.

The principal users of the Scheduling application are the MoPTT corporate training staff and District staff responsible for administering training. The application interfaces to Personnel Management and Course Management.

1.2.10.4 Interfaces

Application interfaces for the Training Business Area are shown in Figure 10. Applications specific to Training are shaded, while applications from other business areas are shown as clear boxes.

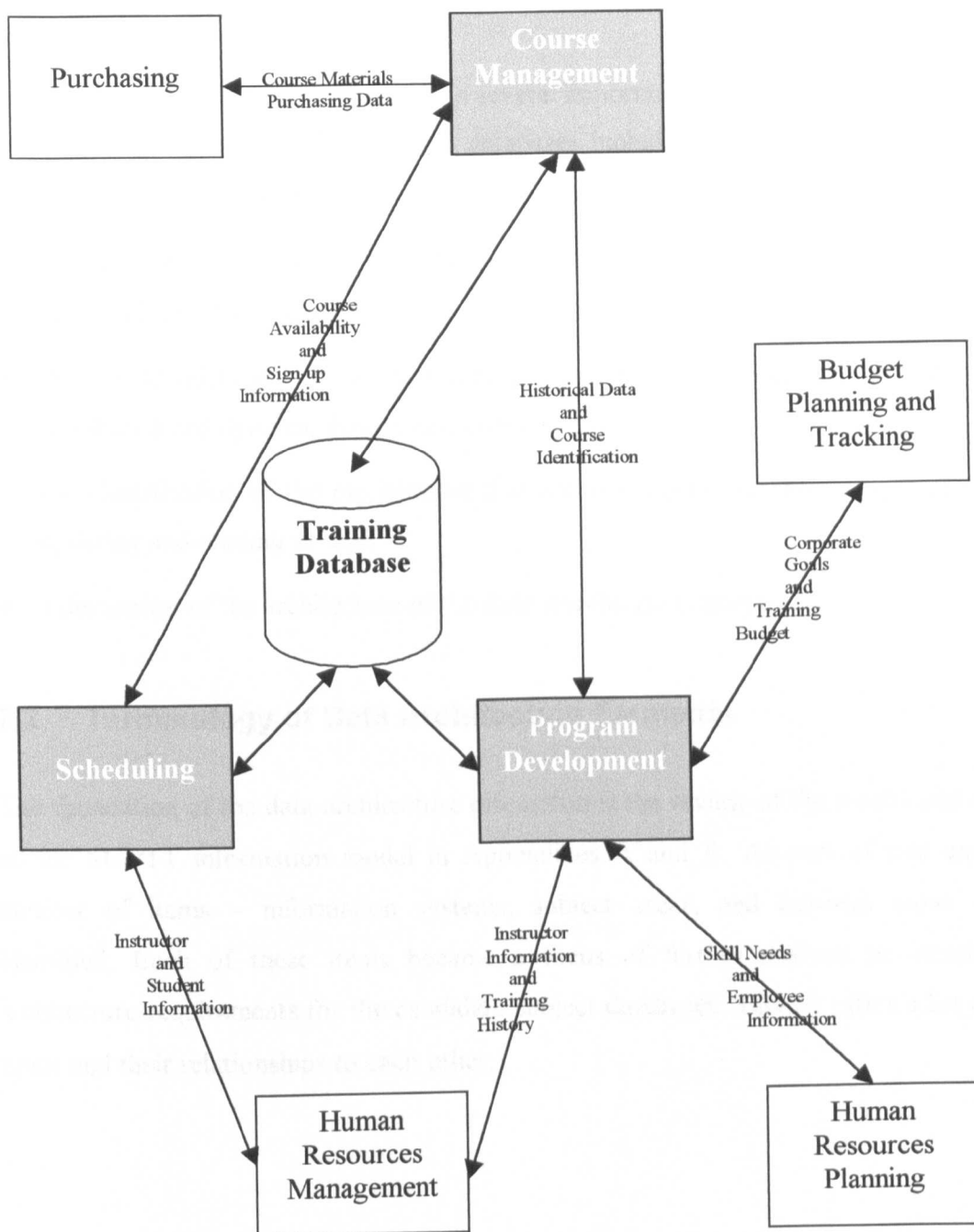


Figure 10. Training Application Dependencies

2. Data Architecture

2.1 Architecture Overview

The data architecture work encompasses several important areas:

- the definition of candidate subject databases including the data entities and subject areas within each database and maps to applications
- the description of relationships among the candidate subject databases including data partitions and dependencies
- the identification and of key data management strategies necessary for managing the distributed and dynamic data environment
- the identification of the mechanisms that act as database stewards responsible for all updating and reading of data
- a discussion of the architecture of the data warehouse concept.

2.2 Terminology of Data Architecture Elements

The foundation of the data architecture discussion is the review of the results and analysis of the MoPTT information model in Appendixes A and B. As part of that analysis a number of items – information systems, subject areas, and business areas – were identified. Each of these items became a focus of further analysis to identify data architecture requirements for the candidate subject databases. Table 1 offers a list of these items and their relationships to each other.

Information System	Subject Area	Business Area
Strategic Planning Budgetary Planning	Business Parameters Budget	Strategic Planning
Network Planning Network Construction Network Operations	Network Plans Network Components Network Events	Network Operations
Customer Care Customer Billing	Customer Activity Customer Invoice	Customer Services
H R Planning H R Maintenance	H R Parameters H R Activity	Human Resources
Revenue Expense General Ledger / Asset	Revenue Expense General Ledger / Asset	Financial Management
Marketing Research Marketing Implementation	Marketplace Information Promotion Parameters	Marketing
Training Planning Training Implementation	Training Planning Training Activity	Training
Materials Acquisition Stock Management	Materials Acquisition Stock Management	Materials Management
Land Management Buildings Management	Land Activity Buildings Activity	Land and Buildings Management
Vehicles Management Vehicles Maintenance	Vehicles Acquisition Vehicles Maintenance	Vehicles Management

Table 1. Architecture Object Relationships

2.3 Subject Databases and Business Areas

According to the Navigator methodology a simple data architecture is to create a subject database for each business area. This is illustrated in Figure 11.

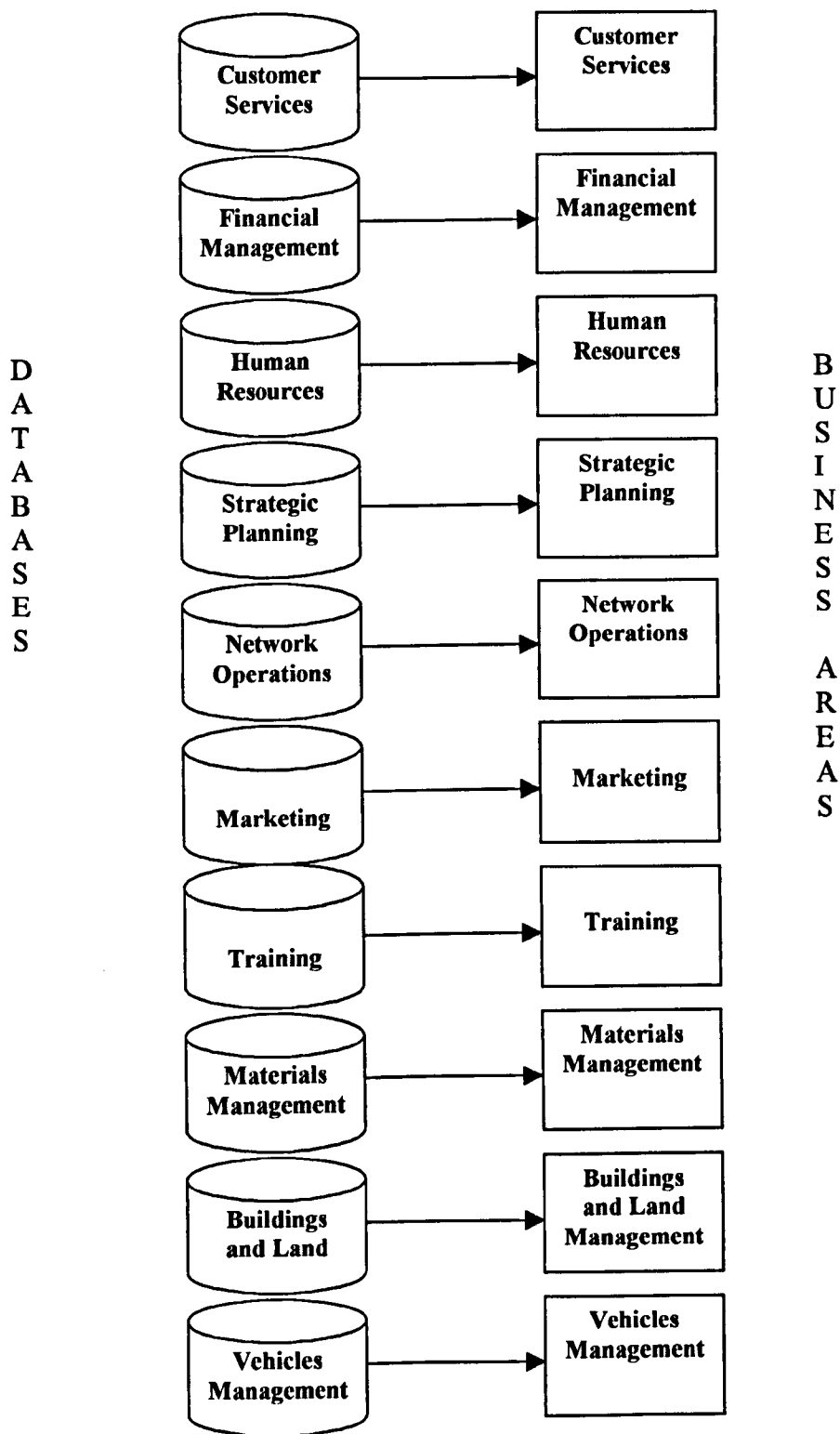


Figure 11. Databases to Business Areas

2.4 Subject Database Descriptions

2.4.1 Dynamic versus Static Data

The data stored in each of the ten logical databases is either static or dynamic. The difference between these two is that dynamic data changes as customer usage change but static data does not. Network events, for example, reflect an ongoing process of constantly changing messages, alarms, and snapshots. This data accumulates and then is dumped at regular intervals and thus constitutes dynamic data. Network plans and network components change only with network construction activity, service provision or maintenance and thus constitute static data. As customer usage changes it remains the same. A similar principle applies to customer invoicing. The dynamic message history data is required for equally dynamic toll charge calculation, accumulation and dump. Conversely, customer information, plant records, fault reports, service orders and directory information are data that is not constantly changing.

This difference is important when defining the technology architecture for those systems that move this dynamic data. The differences in data characteristics are shown in Table 2.

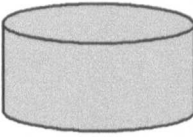
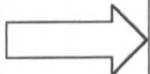
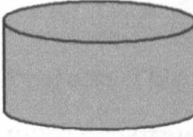
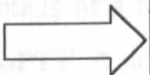
DATA CHARACTERISTIC	SUBJECT AREAS
 = Static Data 	NETWORK PLANS NETWORK COMPONENTS REVENUES GENERAL LEDGER/ASSETS EXPENSES HUMAN RESOURCES PARAMETERS HUMAN RESOURCES ACTIVITY CUSTOMER ACTIVITY BUDGET BUSINESS PARAMETERS MARKETPLACE INFORMATION PROMOTION PARAMETERS TRAINING PLANNING TRAINING ACTIVITY MATERIALS ACQUISITION STOCK MANAGEMENT LAND ACTIVITY BUILDINGS ACTIVITY VEHICLES ACQUISITION VEHICLES MAINTENANCE
 = Dynamic Data 	NETWORK EVENTS CUSTOMER INVOICE

Table 2. Subject Area Characteristics

2.4.2 Strategic Planning

As a result of the studies discussed in Chapter 5, the data entities in Figure 12 have been grouped into the Strategic Planning business area. The hierarchy of entities in this diagram indicates which entities are created before others. The layout of this hierarchy has been used to show some characteristics of the architecture of the Strategic Planning database described below. What follows is a definition of each entity.

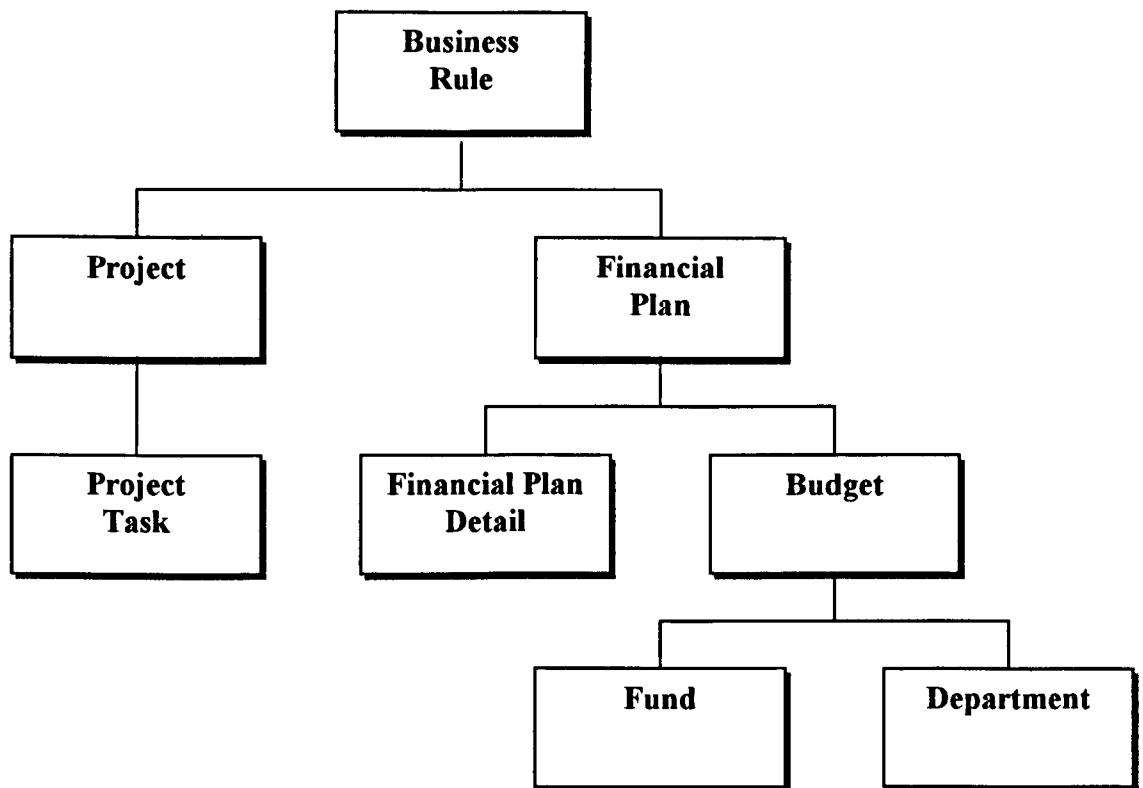


Figure 12. Strategic Planning Data Collection

Business Rule: This is information on objectives and strategies concerning every aspect of the Ministry's business. A primary key for this entity is RULE_ID.

Project: This represents the details of a business endeavour to be undertaken by one or more departments within the MoPTT. A primary key for this entity is PROJ_CODE.

Project Task: This represents the details of various sections of a business endeavour within the organisation, which may or may not be completed sequentially during the life of the project. A primary key for this entity is PROJ_CODE, TASK_ID.

Financial Plan: This represents the ultimate corporate plan for the Ministry. A primary key for this entity is YEAR, VERSION.

Financial Plan Detail: This represents the details of the ultimate corporate plan that determine the departments and the budgets for those departments. A primary key for this entity is YEAR, VERSION, ENTRY_NO.

Budget: This is the MoPTT’s budget for all aspects of the business including projects, departments, salaries and benefit payments. A primary key for this entity is BUDG_CODE.

Department: This represents the individual work areas of the business as defined by the Strategic Plan. A primary key for this entity is DEPT_CODE.

Fund: This represents the money earmarked for the specific projects or departments as defined by the corporate plan. A primary key for this entity is FUND_CODE.

The MoPTT Strategic Planning logical database encompasses all the data and data relationships specified in the Strategic Planning entity-relationship model from Appendix A.

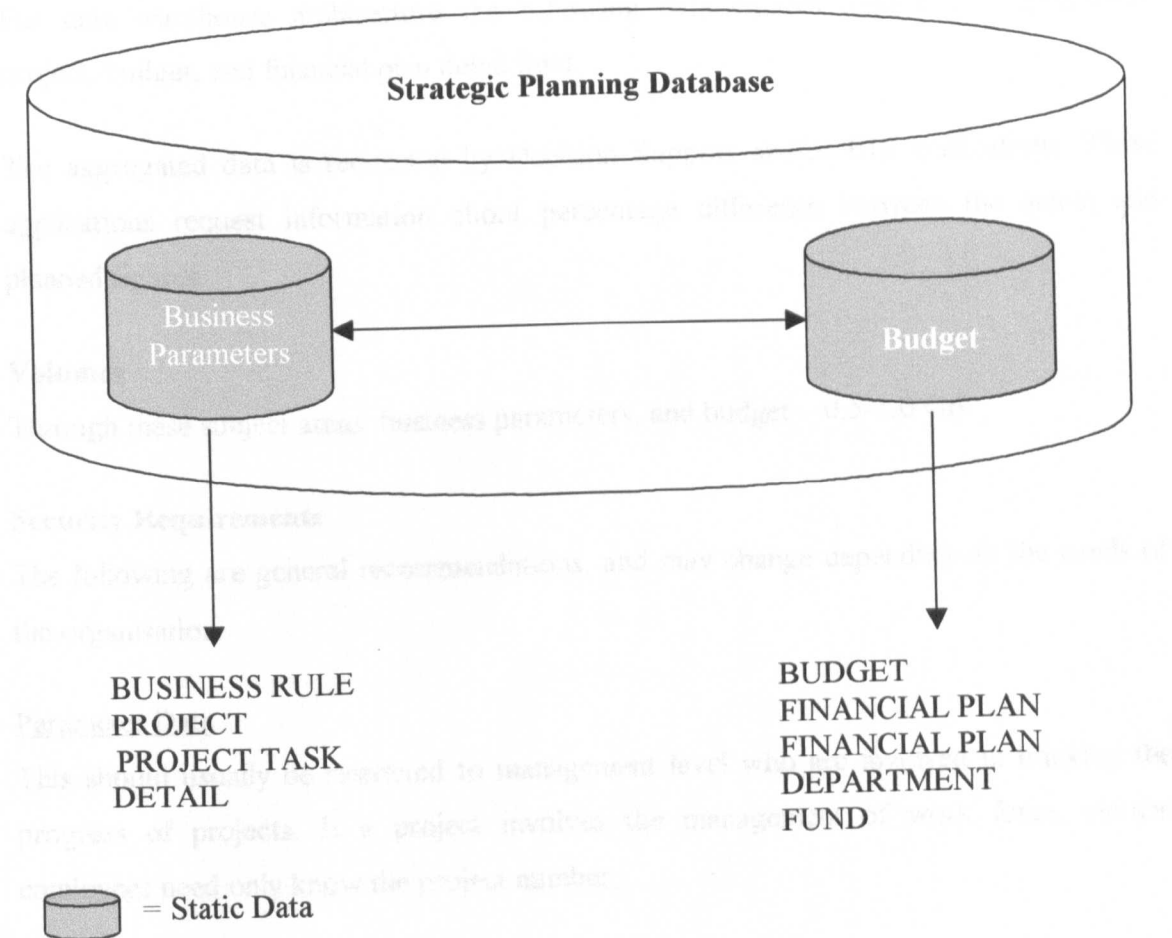


Figure 13. Strategic Planning Subject Areas

As can be seen in Figure 13 the database is derived from two Strategic Planning subject areas. The first subject area is business parameters, which contains information about

business rules, projects, and project tasks. The second subject area is budget, which contains all data about budget, financial plans, financial plan details, departments and funds that are available and or allocated.

Sources

The sources for such information are the Strategic Planning unit and are entered manually as necessary. Accounting departments provide information for the budget.

Number of Users

There are 250 users of these applications: Strategic Planning, Budget Planning and Tracking, and Enterprise Information Support.

Aggregation

For data warehouse architecture the following data entities require an aggregation: project, budget, and financial plan detail fund.

The aggregated data is requested by Decision Support and/or EIS applications. These applications request information about percentage difference between the actual and planned figures.

Volumes

Through these subject areas: business parameters, and budget – 0.5-1.0 GB.

Security Requirements

The following are general recommendations, and may change depending on the needs of the organisation.

Parameter Data

This should usually be restricted to management level who are involved in tracking the progress of projects. If a project involves the management of work force, clerical employees need only know the project number.

Budget Data

This should usually be restricted to management staff who are directly involved in the funding of a project or Department and those clerks who perform necessary accounting functions or generate financial reports.

It should be noted that the authentication and authorisation of users to specific data and applications are attributes of the technology in place.

2.4.3 Network Operations

The data entities in the figure below have been grouped into the Network Operations business area. The hierarchy of entities in the diagram indicates which entities are created before others. The data relationships can be determined from the data entity diagrams in Appendix A. This hierarchy has been used to illustrate some characteristics of the architecture of the Network Operations database described in Figure 14. What follows is a definition of each entity.

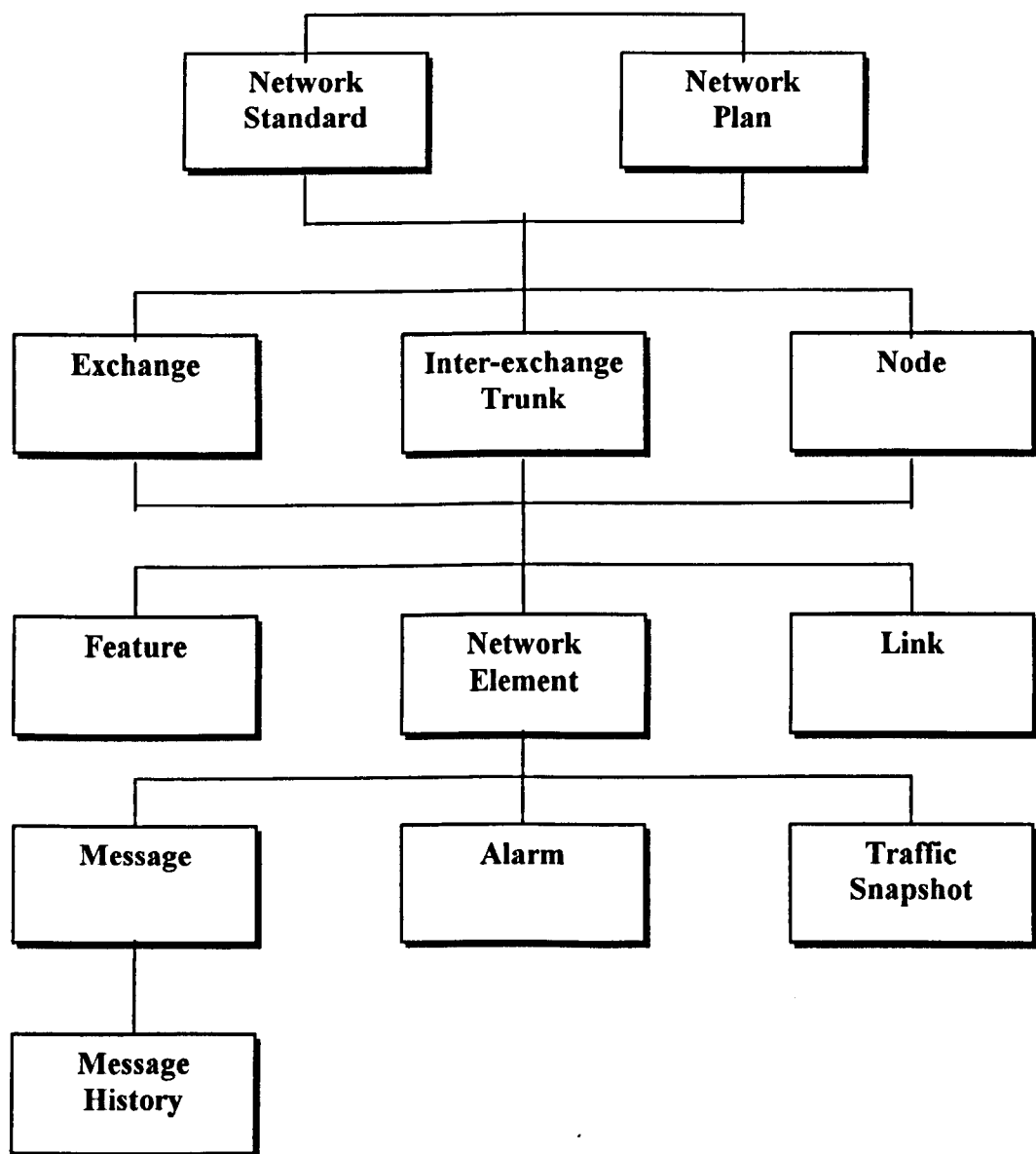


Figure 14. Network Operations Data Collection

Network Plan: This is the formal plan for managing and maintaining the network so that it meets expected performance and quality standards. A primary key for this entity is PLAN_ID, REFERENCE.

Network Standard: This is the standard for managing and maintaining the network so that it meets expected performance and quality standards. A primary key for this entity is STD_ID, REFERENCE.

Network Element: This is a component of the network. Examples of components are network switches, trunk and feeder circuits, and access lines. A primary key for this entity is ELEMENT_ID.

Exchange: This represents the general information about the central office as a location for sources of dial tone and telephone numbers and as a node in a greater network of inter-exchange circuits. A primary key for this entity is CO_ID, LEN.

Inter-exchange Trunk: This data entity represents the details of all circuits between exchanges whether they are toll or extended area service trunks or non-switched circuits. A primary key for this entity is TRUNK_ID, CHANNEL.

Node: This represents the terminating points found in a network to which customers are connected by service wire. This can also be used to describe central offices as pivotal points of a greater network of inter-exchange circuits, or of distribution points in fibre networks. A primary key for this entity is TERM_ID.

Link: This represents details of the transmission path between nodes of the network. This link can be either copper cables, microwaves, fibre optics or any other type of signal delivery system. A primary key for this entity is CABLE_ID, PAIR.

Feature: This represents characteristics of a switch, whether it is implemented or not, which may become a product to satisfy customer needs. A primary key for this entity is FEAT_ID.

Alarm: This is an error that occurs within the network that causes malfunctioning of the network. Faults can be detected by network management processes or be reported by

other functions such as Customer Services as a result of customer complaints. A primary key for this entity is ELEMENT_ID, FAULT_NMBR.

Message: This is a telephone call or other information signal carried over the network. It identifies the length of message, the origination and destination, and the length of the call in minutes and seconds. A primary key for this entity is MESS_ID.

Message History: This is the summary of archived messages to be used for analysis, forecasting or billing. A primary key for this entity is MESS_ID, TIME_STAMP.

Traffic Snapshot: This is an image taken of the network or of a network element to determine how well it is operating. A primary key for this entity is IMAGE_ID, TIME_STAMP.

The MoPTT Network Operations logical database encompasses all the data and data relationships specified in the Network Operations entity-relationship model from Appendix A.

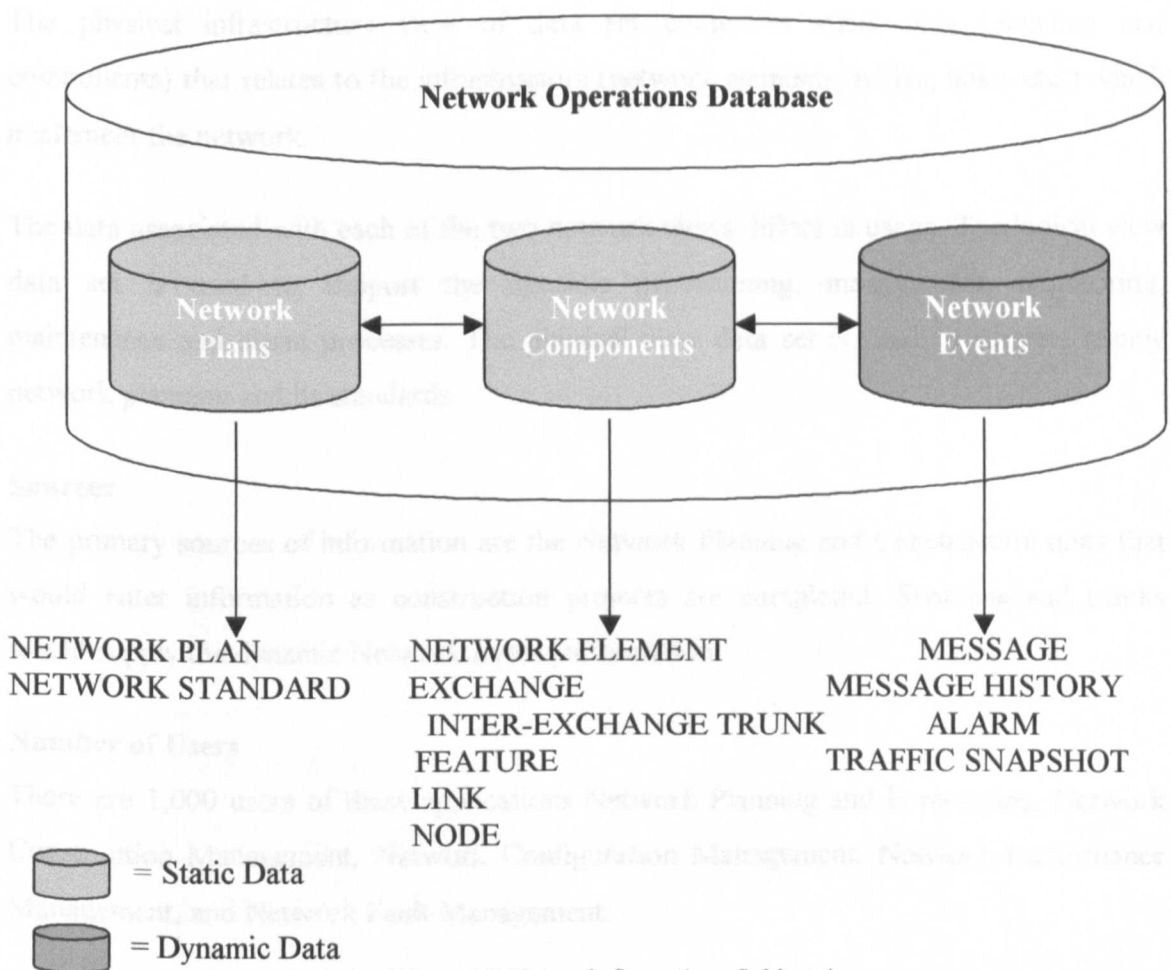


Figure 15. Network Operations Subject Areas

Figure 15 shows that the Network Operations database is derived from three subject areas, which are network plans, network components and network events. Network plans contains all data about network planning activities and network standards. Network components encompasses all the network elements, exchanges, features, inter-exchange trunks, links and nodes. Network events contains dynamic information from the exchanges and trunks in relation to the activity of the network. This includes alarms, messages, message history and traffic snapshots. The reasons for partitioning the Network Operations database into physical (planning and construction) and logical (operations) views involve differences in data **characteristics**, and differences in data **usage**.

The physical view of the network emphasises the network physical infrastructure - the components that are physically connected to one another to build this network. The data associated with each of these two network views is different in character. The logical view data set comprises dynamic data (network events) that deals with signalling and transport paths through the network and the resources that provide services to customers. The physical infrastructure view of data set comprises static data (planning and components) that relates to the infrastructure (network elements, nodes, links, etc.) which implement the network.

The data associated with each of the two network views differs in usage. The logical view data set is used to support the dynamic provisioning, management, monitoring, maintenance and alarm processes. The physical view data set is used to support mainly network planning and its standards.

Sources

The primary sources of information are the Network Planning and Construction units that would enter information as construction projects are completed. Switches and trunks would supply the dynamic Network Events information.

Number of Users

There are 1,000 users of these applications Network Planning and Forecasting, Network Construction Management, Network Configuration Management, Network Performance Management, and Network Fault Management.

Aggregation

For data warehouse architecture the following data entities require an aggregation: network element, exchange, inter-exchange trunk, message history, alarm, and traffic snapshot.

The aggregated data would be requested by Decision Support and/or EIS applications. These applications would request information about, for example, installed exchange lines, and percentage objective met.

Volumes

Through these subject areas: Network Plans, Network Components, and Network Events – 100-250 GB due to the size of Network Events data.

Security Requirements

The following are general recommendations, and may change depending on the needs of the organisation:

Network Plans

This should usually be available to management and engineering employees and those clerks who will verify plant maps after an installation is complete.

Network Components

Except for Network Elements, the data in this subject area should usually be restricted to engineering and craft personnel who are involved with the maintenance of the physical network. Network elements are assigned to customer plant records by Customer Services employees.

Network Events

This data is often massive and sometimes sensitive, and it ought to be restricted to those engineers, technicians and analysts who are directly responsible for reporting or acting upon the information. Responsible handling of the message history is important as direct billing of customer toll proceeds from this data.

It should be noted that the authentication and authorisation of users to specific data and applications are attributes of the technology in place.

2.4.4 Customer Services

The data entities in the figure below were grouped into the Customer Services business area. The hierarchy of entities in the diagram shows which entities are created before others. The data relationships are determined from the data entity diagram in Appendix A. This hierarchy has been used to illustrate some characteristics of the architecture of the Customer Service database described in Figure 16. There then follows a definition of each entity.

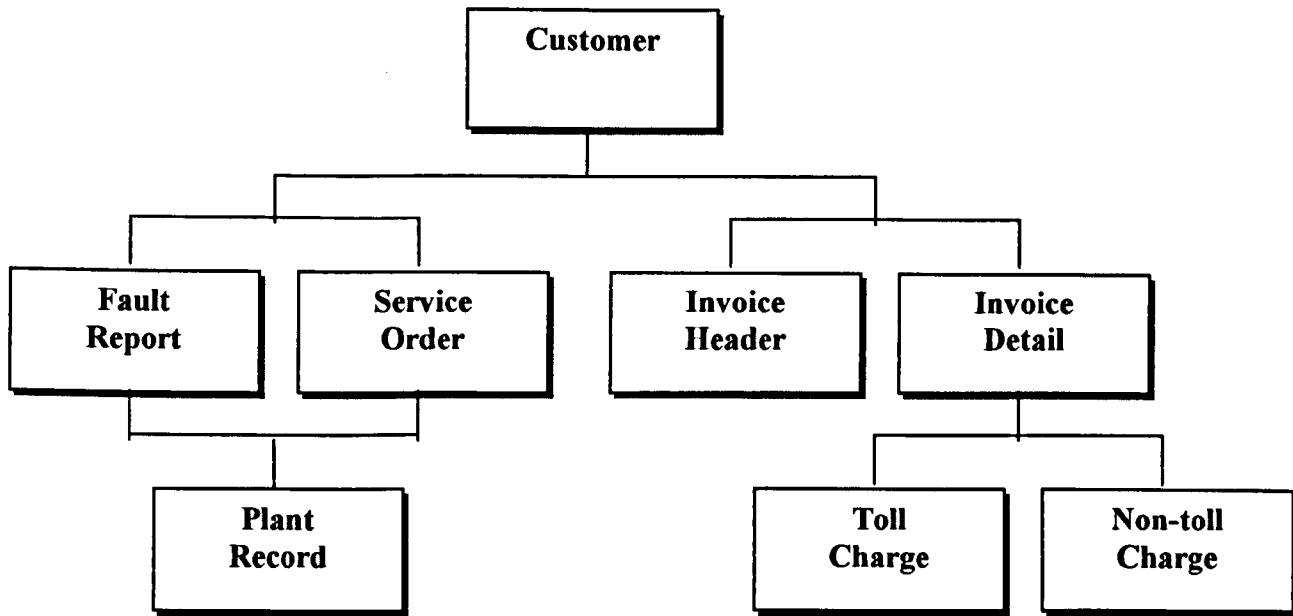


Figure 16. Customer Services Data Collection

Customer: This data entity relates to the individual who buys products and services from the MoPTT. A primary key for this entity is CUST_ID.

Service Order: The details of a customer request for service and how the business handles the request. A primary key for this entity is SO_ID.

Fault Report: The document created to report and track the correction of faults and response to customer problems. A primary key for this entity is TT_ID.

Plant Record: The details of the actual address at which a customer lives and the details of the network elements used to provide that customer with service. A primary key for this entity is SERV_AREA_ID.

Invoice Header: The customer name, address, and account number to be entered into each customer bill statement. A primary key for this entity is INVOICE_NMBR.

Invoice Detail: The summary and detail of toll and non-toll charges to be entered into each customer bill statement. A primary key for this entity is CUST_ID, BILL_CYCLE.

Toll Charge: The details of charges which result from a customer making long distance calls. A primary key for this entity is TOLL_CHG_ID, TIME_STAMP.

Non-toll Charge: The details of charges that are not a result of long distance calls. These charges include basic services, incidental fees for service orders or fault reports, value added services, and non-switched services that may or may not be measured. A primary key for this entity is NON_TOLL_CHARGE.

The MoPTT Customer Services logical database encompasses all the data and data relationships specified in the Customer Services entity-relationship model from Appendix A.

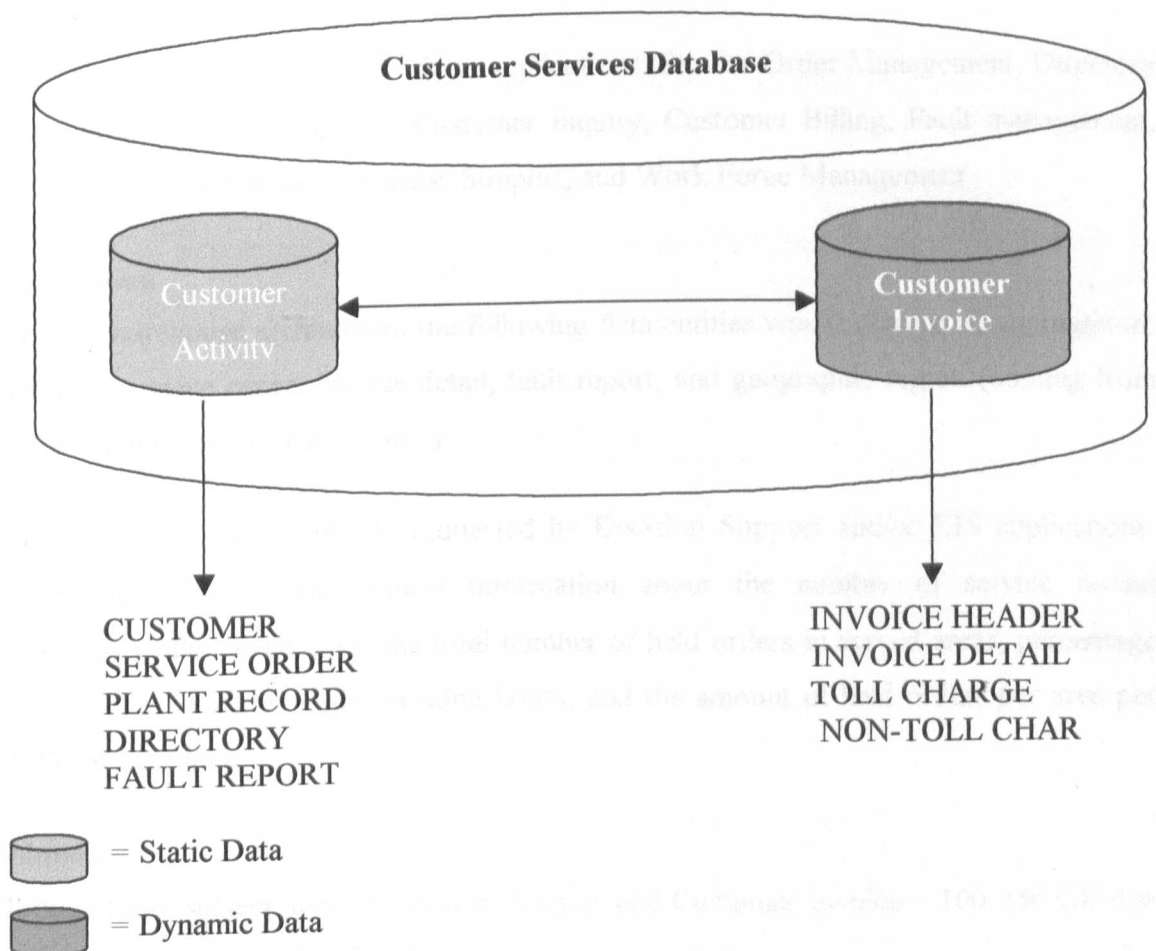


Figure 17. Customer Services Subject Areas

As shown in Figure 17, the Customer Services database is derived from two subject areas, which are customer activity and customer invoice. Customer activity contains all data about customers, service orders, plant records, directories and fault reports. Customer invoice encompasses all the invoices, toll and non-toll charge data. The reasons for partitioning the Customer Services database into a customer activity component and an invoicing component involve differences in functions supporting the Customer Services applications. The customer care component of the database supports the provision of service orders, directory assistance, performance, trouble maintenance and support. The Billing functions support collecting billing information, calculating and rendering customer bills.

Sources

The source of this information is from the units dealing with Customer Services such as the business offices and the assignment departments. Billing information is assembled by the data centres.

Number of Users

There are 2,000 users in total of these applications: Service Order Management, Directory Production, Directory Support, Customer Inquiry, Customer Billing, Fault management, Customer Survey Support, Decision Support, and Work Force Management

Aggregation

For data warehouse architecture the following data entities would require an aggregation: customer, service order, invoice detail, fault report, and geographic region (coming from external demographics data source)

The aggregated data would be requested by Decision Support and/or EIS applications. These applications could request information about the number of service orders completed within seven days, the total number of held orders in served areas, percentage of faults cleared within eight working hours, and the amount of held orders per area per 1,000 working lines.

Volumes

Through these subject areas: Customer Activity and Customer Invoice – 100-250 GB due to the size of Customer Invoice data.

Security Requirements

The following are general recommendations, and may change depending on the needs of the organisation:

Billing Data

This data should be restricted to Customer Services personnel who directly address the needs of the customer who calls or comes into an office for information or help.

Customer Care Data

Depending upon the level of detail this information can usually be available to all staff in the Customer Services and Network Operations environments. Those within the Financial Management area may require access when processing customer payments.

It should be noted that the authentication and authorisation of users to specific data and applications are attributes of the technology in place.

2.4.5 Human Resources

The data entities in the figure below were grouped into the Human Resources business area. The hierarchy of entities in the diagram demonstrates which entities are created before others. The data relationships are determined from the data entity diagram in Appendix A. This hierarchy has been used to show some of the characteristics of the architecture of the Human Resources database described in Figure 18. Definitions of each entity follow.

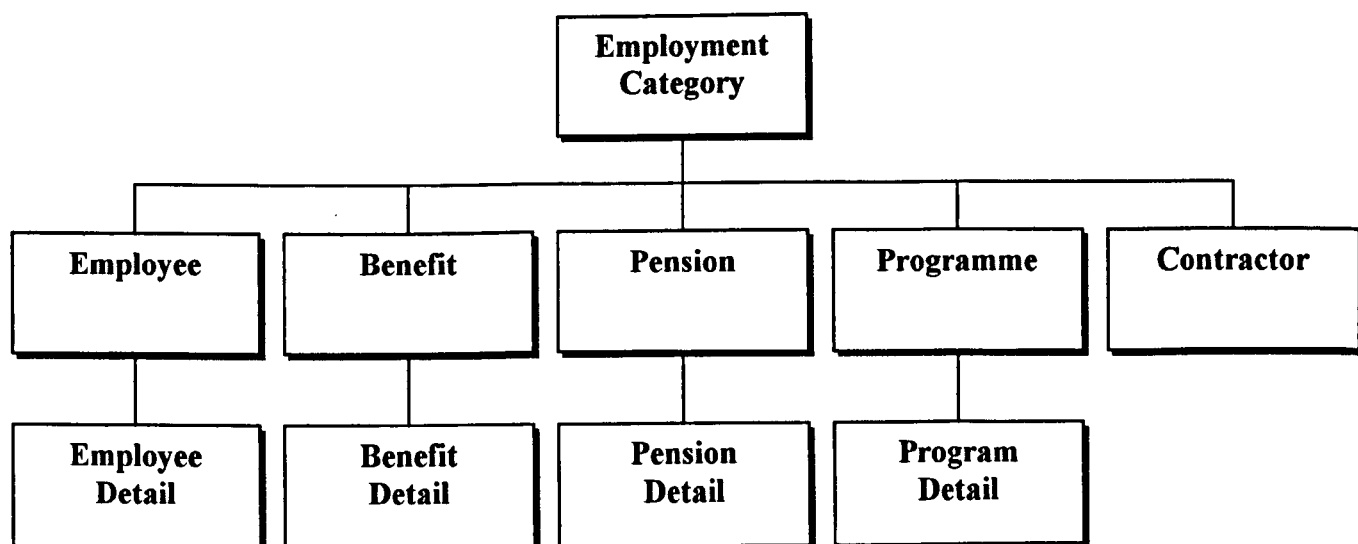


Figure 18. Human Resources Data Collection

Employment Category: This is the job title and description within the MoPTT that determines wages, benefits, pensions and eligibility for certain programmes. A primary key for this entity is CAT_CODE.

Employee: This is information on individuals who work for the MoPTT and contains items such as name, address, pay grade, job title, date of hire and years of service. This information is used to develop work force information. A primary key for this entity is EMPL_ID.

Pension: The details of retirement programmes designed for employees. A primary key for this entity is PENSION_CODE.

Pension Detail: The pension records of the MoPTT. It contains histories of pension payments and accruals. A primary key for this entity is EMPL_ID, YEAR, MONTH.

Benefit: This holds details of the benefit plans offered to employees; they may include medical, social or educational benefits. A primary key for this entity is BENEFIT_CODE.

Benefit Detail: This contains history of benefit payments, incentives and accruals for each employee. A primary key for this entity is EMPL_ID, YEAR, MONTH.

Programme: Information on health and safety programmes planned or implemented within the MoPTT. A primary key for this entity is PRGM_CODE.

Programme Detail: Information on implementation of the MoPTT's special programmes. It contains history of employee participation in programmes. A primary key for this entity is PRGM_CODE, LINE_NO.

Payroll Detail: Time card and time recording data by employee. A primary key for this entity is EMPL_ID, YEAR, MONTH.

Contractor: An individual from outside the MoPTT who may work as if an employee but is employed by another company. A primary key for this entity is CONT_ID.

The MoPTT Human Resources logical database encompasses all the data and data relationships specified in the Human Resources entity-relationship model from Appendix A.

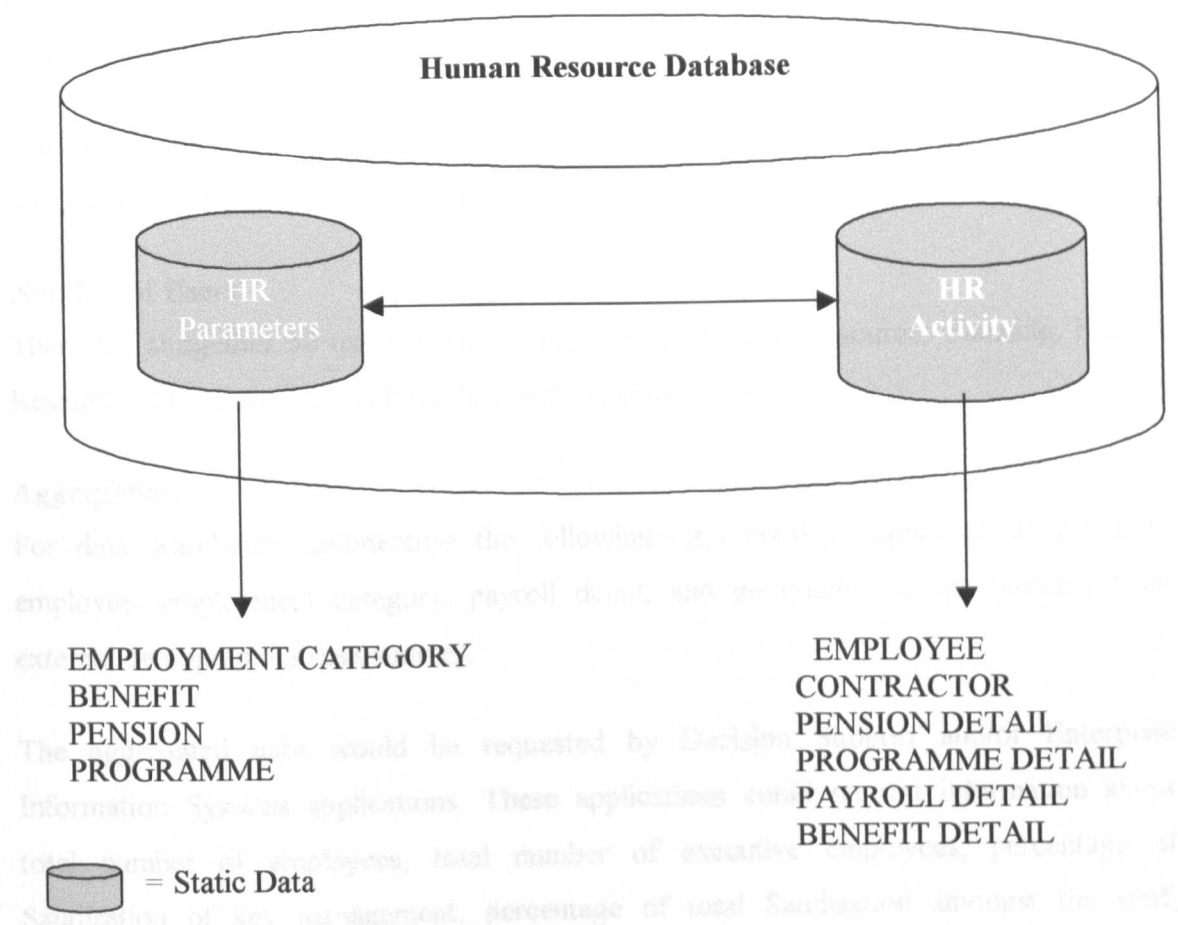


Figure 19. Human Resources Subject Areas

In Figure 19 the database is derived from two Human Resources subject areas, which are Human Resources parameters and Human Resources activity. Human Resources parameters contain all data about employee benefits, programmes, pensions and employment categories. Human Resources activity encompasses all other employee and contractor data as well as the detailed data related to employee pension, programmes, payroll and benefits.

The Human Resources data set comprises static data (planning and maintenance). It primarily deals with the Human Resources infrastructure that may be implemented at any organisational level (section, group, department, branch, directorate, commission, etc.).

The data associated with each of the two Human Resources subject areas differs in usage. The maintenance data set is used to support the various frequent, although not dynamic maintenance sub-processes (e.g. payroll). The planning data set is used to support mainly less frequent sub-processes (e.g. administer/manage/develop benefits, pension and programmes).

Sources

The source of this information comes from the Human Resources unit.

Number of Users

There are altogether 50 users of these applications: Human Resources Planning, Human Resources Management, and Payroll/Benefit Administration.

Aggregation

For data warehouse architecture the following data entities require an aggregation: employee, employment category, payroll detail, and geographic region (coming from external demographics data source).

The aggregated data would be requested by Decision Support and/or Enterprise Information Systems applications. These applications could request information about total number of employees, total number of executive employees, percentage of Saudisation of key management, percentage of total Saudisation amongst the staff, percentage staff loss (Saudi) per geographic region.

Volumes

Through these subject areas: Human Resources (HR) Planning Data and HR Maintenance – 1.5-2.0 GB.

Security Requirements

These are general recommendations, and may change depending on the needs of the organisation:

HR Planning Data

This data can often contain sensitive information about employees and should be restricted to Human Resources personnel and management.

HR Maintenance

This data is often the most sensitive as it pertains to remuneration to employees with salaries and benefits. This should be restricted to a small handful of payroll officers who are responsible for the maintenance of this data.

It should be noted that the authentication and authorisation of users to specific data and applications are attributes of the technology in place.

2.4.6 Financial Management

The data entities in the figure below were grouped into the Financial Management business area. The hierarchy of entities in the diagram describes data relationships as picked out from the data entity diagram in Appendix A. As a departure from earlier models, this diagram does not reflect dependencies, but rather a flow of information. This hierarchy has been used to illustrate some characteristics of the architecture of the Financial Management database described in Figure 20. What follows is a definition of each entity.

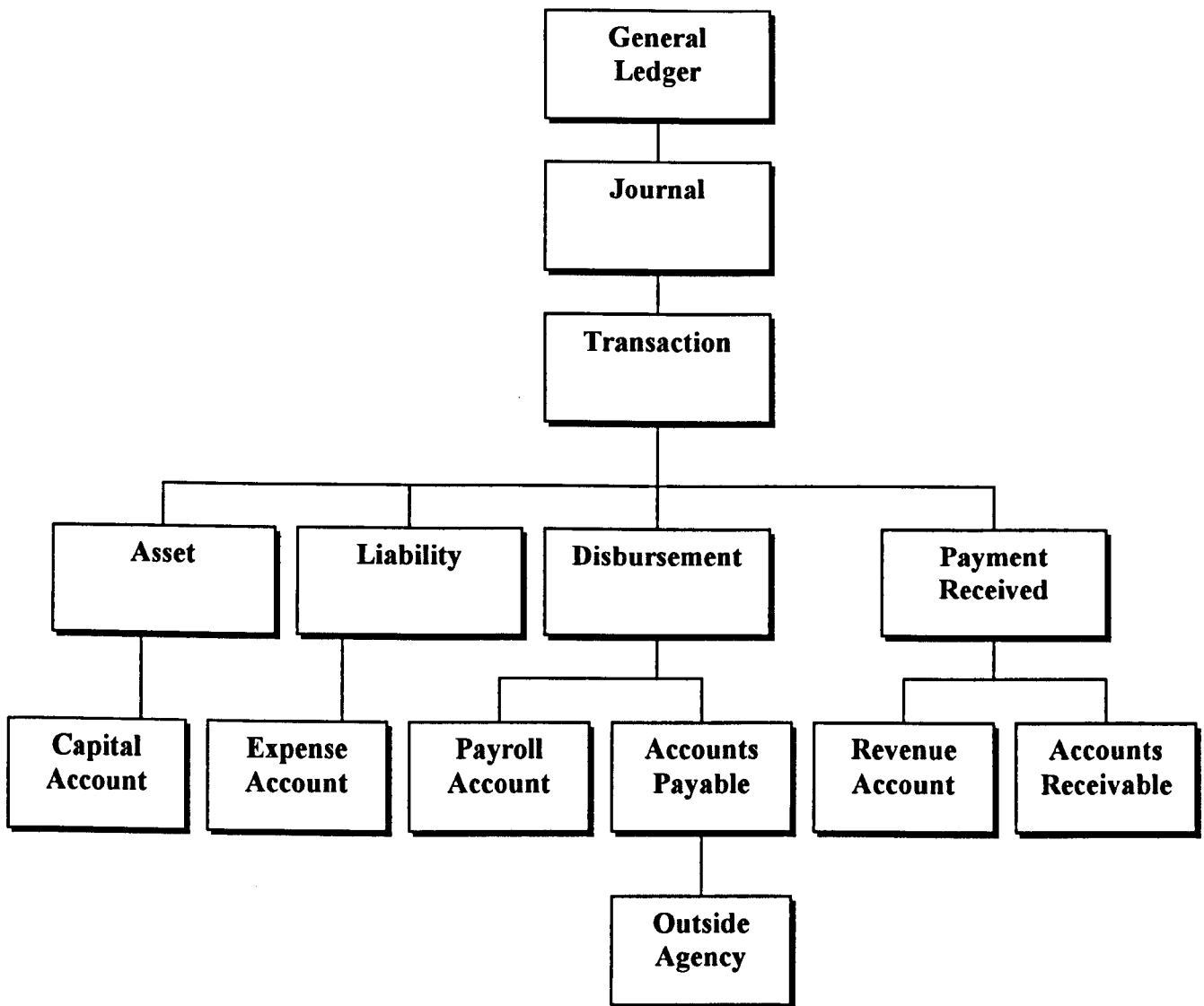


Figure 20. Financial Management Data Collection

General Ledger: This is the chart of accounts of the MoPTT. It contains information necessary for financial accounting, cost accounting and budgeting. A primary key for this entity is GL_ID, JRNL_ID, TRANS_ID.

Journal: This contains the current months financial activities. It contains all financial transactions generated during the current month. A primary key for this entity is JRNL_ID, TRANS_ID.

Capital Account: This data entity represents the value of assets or liabilities in which costs are capitalised for allocation over the useful life for depreciation. A primary key for this entity is CAPACCT_NO.

Liability: This is information about a financial obligation of the Ministry. It contains information about debts owed by the MoPTT. A primary key for this entity is LIAB_NO.

Asset: This is information about major assets owned by the MoPTT. Assets are buildings, telecommunications equipment, tools and furniture. Assets have a long life and can depreciate over that life. A primary key for this entity is ASSET_NO.

Expense Account: An account that tracks costs incurred by the MoPTT while doing business. A primary key for this entity is EXACCT_NO.

Accounts Payable: This is the account that contains payment obligations that have been accrued by the MoPTT and have yet to be satisfied. A primary key for this entity is APACCT_NO.

Payroll Account: Information about employee payroll accounts. It contains the number of Saudi Riyals to be paid to an employee. A primary key for this entity is PAYACCT_NO.

Accounts Receivable: This is the account that contains payment obligations due to the MoPTT that have not yet been satisfied. A primary key for this entity is ARACCT_NO.

Revenue Account: Account information about details of revenues earned by the MoPTT. It includes source and amount of income received by or obligated to the Ministry. A primary key for this entity is REVACCT_NO.

Disbursement: This is an authorised payment to satisfy a financial obligation of the MoPTT. Disbursements are made to vendors for payment of materials or services received, to employees, pay checks, and to outside agencies for payments made on behalf of employees (e.g. garnishment). A primary key for this entity is PAYMENT_NO.

Payment Received: Payments made to the MoPTT from customers, vendors and employees. A primary key for this entity is PR_ID.

Transaction: This is an event documented in the course of doing business that will affect the chart of accounts. Transactions will result in one or more accounts being updated, disbursements being made and payments being credited. The transactions are generated

by all functions and sent to the Financial Management function to be added, balanced and processed. A primary key for this entity is TRANS_ID.

Outside Agency: Information about outside individuals, agencies or companies that the Ministry provides disbursements to outside the realm of suppliers or contractors or customers. A primary key for this entity is OA_ID.

The MoPTT Financial management logical database encompasses all the data and data relationships specified in the Financial Management entity-relationship model from Appendix A.

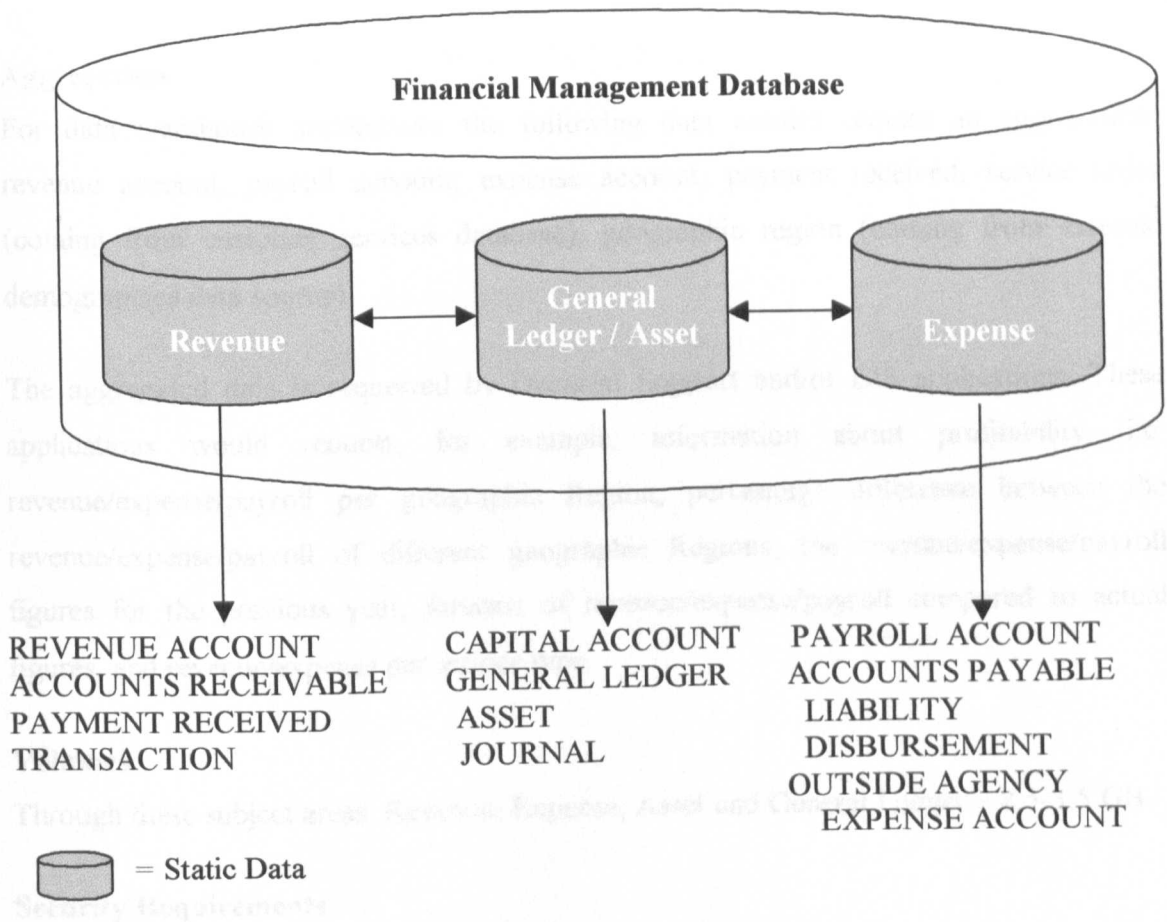


Figure 21. Financial Management Subject Areas

As can be seen in Figure 21, the database is derived from three Financial Management subject areas, which are Revenue, Expense, and General Ledger and Asset. Revenue contains all data about revenue accounts, accounts receivable, payments received and transactions made. Expense encompasses all the accounts payable, payroll and expense

accounts, liability, disbursement and outside agency data. General Ledger and Asset relates to information about capital accounts, general ledger, assets and journals.

Sources

The Financial Management revenue and expense processes are important sources of data related to the initialisation and the start of populating the MoPTT General Ledger database.

Number of Users

There are 50 users of these applications: Accounts Payable, Payments, Accounts Receivable, Assets Management, and General Ledger.

Aggregation

For data warehouse architecture the following data entities require an aggregation: revenue account, payroll account, expense account, payment received, service order (coming from customer services database), geographic region (coming from external demographics data source).

The aggregated data is requested by Decision Support and/or EIS applications. These applications would request, for example, information about profitability, i.e. revenue/expense/payroll per geographic Region, percentage difference between the revenue/expense/payroll of different geographic Regions, the revenue/expense/payroll figures for the previous year, forecast of revenue/expense/payroll compared to actual figures, and revenue/expense per service type.

Volumes

Through these subject areas: Revenue, Expense, Asset and General Ledger – 2.5-3.5 GB.

Security Requirements

The following are general recommendations, and may change depending on the needs of the organisation:

Revenue Data

This should usually be restricted to accounting personnel and management and those who will take customer payments and record those transactions in batch.

Expenses

This should usually be restricted to accounting personnel and management.

Assets

This should usually be restricted to accounting personnel and management and those individuals in Network Operations, Materials Management, Vehicles Management or Buildings and Land Management who have to verify assets.

General Ledger

This should usually be restricted to accounting personnel namely the Chief Financial Officer and those directors to whom he reports.

It is to be observed that the authentication and authorisation of users to specific data and applications are attributes of the technology in place.

2.4.7 Marketing

As a result of the Chapter 5 the data entities in the figure below have been grouped into the Marketing business area. The hierarchy of entities in this diagram shows which entities are created before others. The data relationships can be ascertained from the data entity diagram in Appendix A. This hierarchy has been used to indicate some characteristics of the architecture of the Marketing database described in Figure 22. A definition of each entity follows.

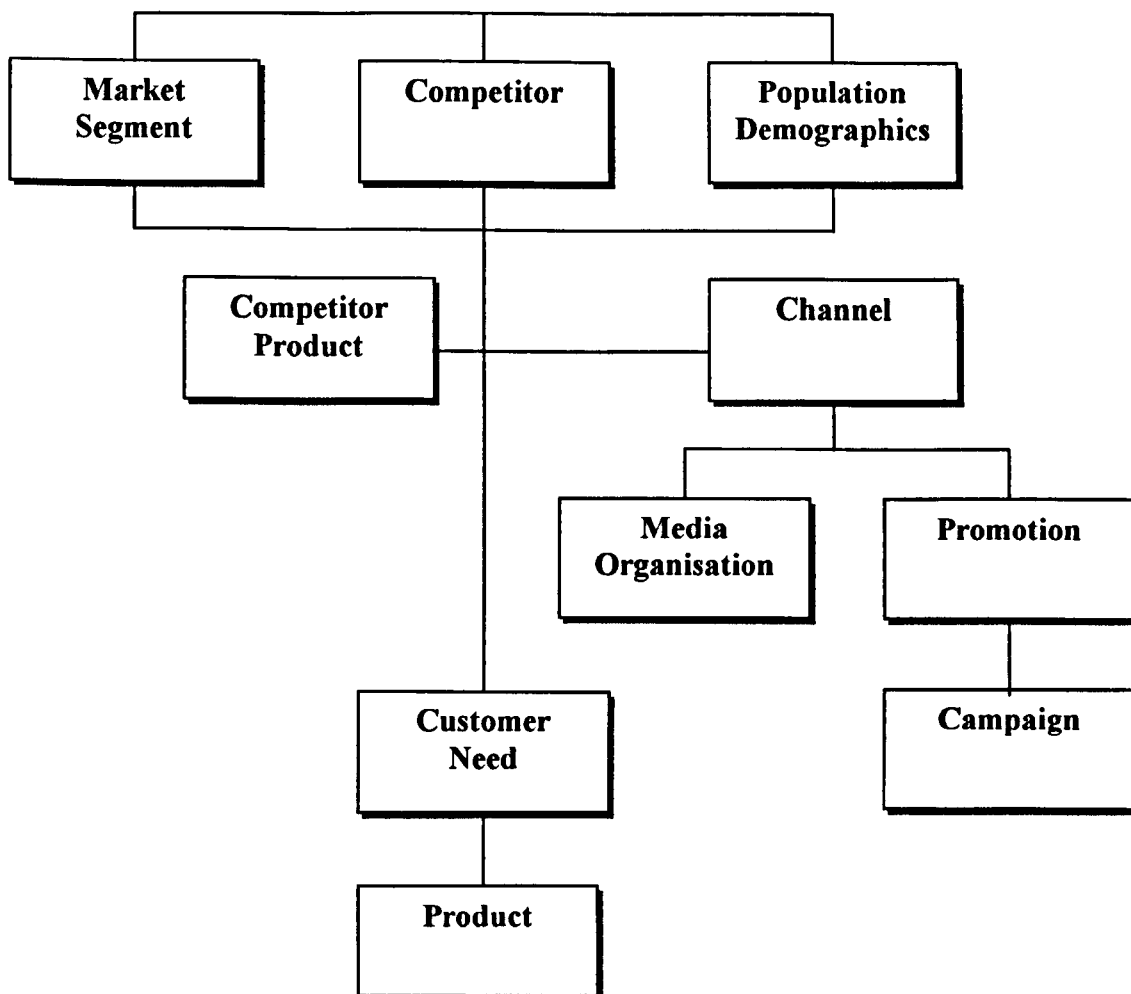


Figure 22. Marketing Data Collection

Market Segment: This data entity represents the individual groups of customers that share a common market, be it geographical, monetary, or business oriented. A primary key for this entity would be SEGM_NAME.

Competitor: This data entity represents those organisations which provide competition to the MoPTT. A primary key for this entity is COMP_NAME.

Competitor Product: This data entity relates to those goods and services provided by the competitor. A primary key for this entity is COMP_NAME, PROD_REF.

Population Demographics: This data entity is information on population and how it uses the network. A primary key for this entity is DEMOG_ID.

Customer Need: This data entity represents the customer's requirements for goods and services as defined by the Marketing function. A primary key for this entity is NEED_ID.

Product: The collections of goods and services that the organisation is prepared to sell to the customer. A primary key for this entity is PROD_CODE.

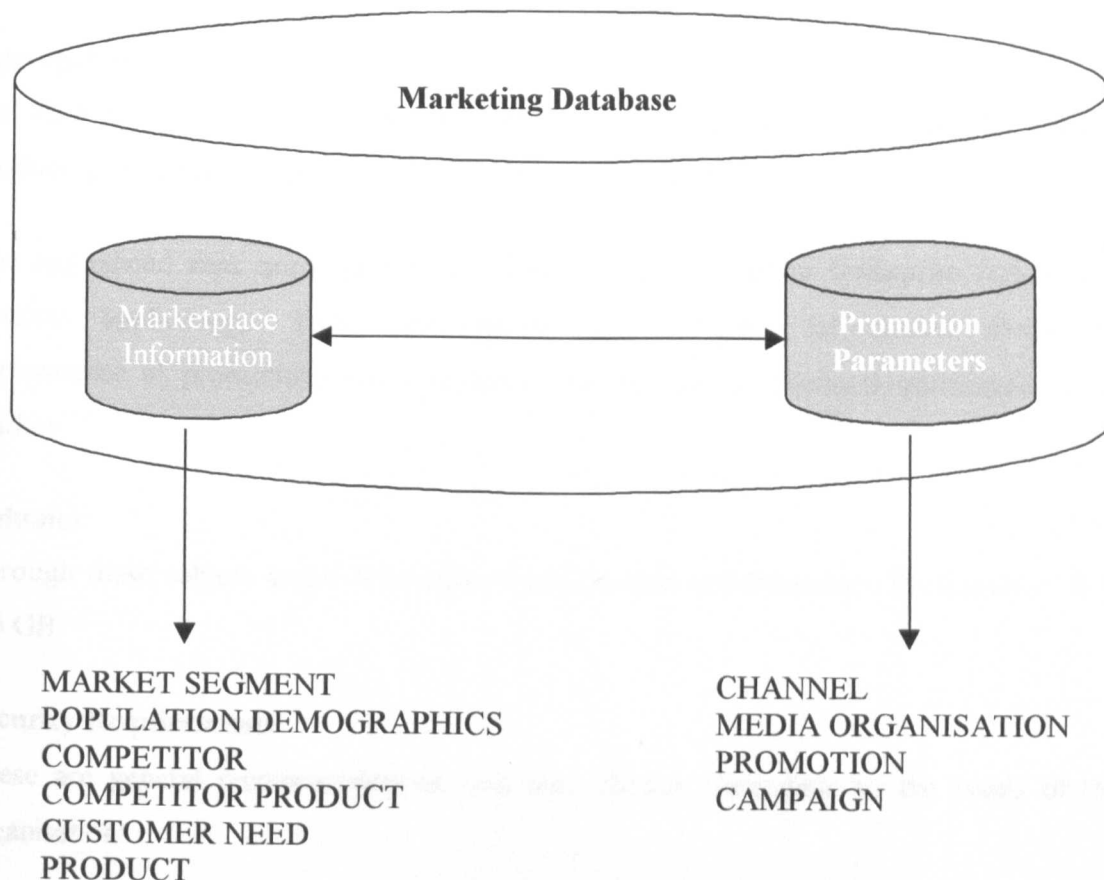
Channel: Those organisations employed by the MoPTT to deliver campaigns to the marketplace. A primary key for this entity is CHAN_ID.

Media Organisation: This data entity represents those organisations that would carry out the MoPTT's campaigns to the public, such as television and radio stations, newspaper and magazine publishers. A primary key for this entity is MEDIA_CODE.

Promotion: This data entity concerns how a campaign will be delivered to the marketplace. A primary key for this entity is PROMO_CODE.

Campaign: This data entity relates to the means to deliver marketing efforts to the public through radio, television, newspaper and magazines. A primary key for this entity is CAMP_CODE.

The MoPTT Marketing logical database encompasses all the data and data relationships specified in the Marketing entity-relationship model from in Appendix A.




 = Static Data

Figure 23. Marketing Subject Areas

In Figure 23 the database is derived from two Marketing subject areas, which are marketplace information, and promotion parameters. The first subject area, marketplace information, contains information about market segments, population demographics, competitors and their products, customer needs and products to be marketed. The second subject area, promotion parameters, contains all data about marketing channels, media organisations, promotions and campaigns.

Sources

This information comes from the Marketing and Customer Services units and would be entered manually as necessary.

Number of Users

There are 250 users of these applications: Product Research and Development, and Campaign Management.

Aggregation

For data warehouse architecture the following data entities require an aggregation: product, promotion, campaign, and population demographics.

The aggregated data are requested by Decision Support and/or Enterprise Information Systems applications. These applications would request information about the performance of promotions and campaigns and the sales of products introduced to the market.

Volumes

Through these subject areas: Marketplace Information and Promotion Parameters – 0.5-1.0 GB.

Security Requirements

These are general recommendations, and may change depending on the needs of the organisation:

Marketplace Information

This information would be restricted to the marketing and customer services organisations as well as those at the corporate level who may wish to monitor trends within the market.

Promotions

This information would be restricted to the marketing and customer services organisations as well as those at the corporate level who may wish to monitor campaign activity.

It is to be noted that the authentication and authorisation of users to specific data and applications is an attribute of the technology in place.

2.4.8 Training

The data entities in the figure below have been grouped into the Training business area. The hierarchy of entities in the diagram shows which entities are created before others. The data relationships are determined from the data entity diagram in Appendix A. This

hierarchy has been used to illustrate some characteristics of the architecture of the Training database described in Figure 24. A definition of each entity follows.

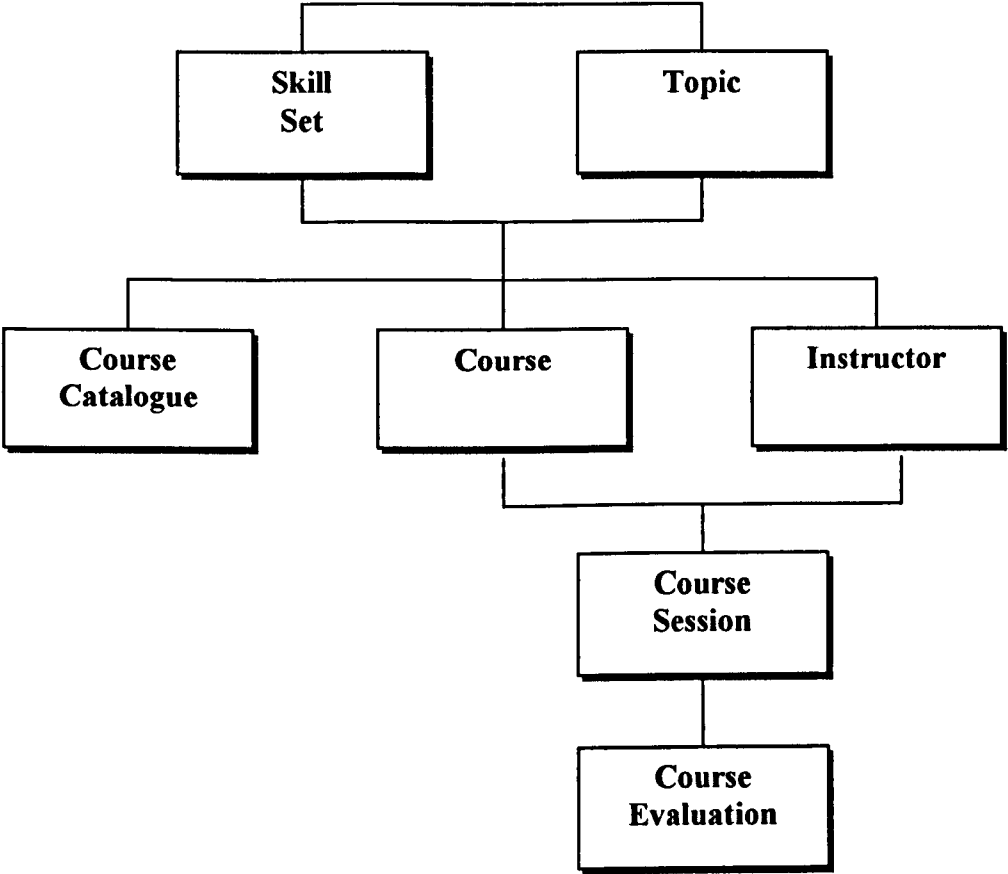


Figure 24. Training Data Collection

Skill Set: The skills addressed by courses and workshops. These are categorised, by attribute, into prerequisite skills and those developed by the courses. A primary key for this entity is SKILL_ID.

Topic: This data entity is the section of course materials that may appear in several courses, for example an overview of relational databases. A primary key for this entity is TOPIC_CODE.

Course Catalogue: A list of courses and workshops available to meet the training needs of the MoPTT. A primary key for this entity is CAT_YEAR.

Course: The course or workshop designed to build on specific prerequisites to develop specific skill sets. A primary key for this entity is CRSE_CODE.

Instructor: This data entity relates to information on teachers and trainers who will conduct courses. A primary key for this entity is INST_ID.

Course Session: The individual course event held at a specific date and time. A primary key for this entity is CRSE_CODE, DATE.

Course Evaluation: This data entity is the assessment of a course. Attributes of this information include assessments by students of the course content and instructor, and by the instructor of the students' performance. A primary key for this entity is CRSE_CODE, DATE, EV ID.

The MoPTT Training logical database encompasses all the data and data relationships specified in the Training entity-relationship model from Appendix A.

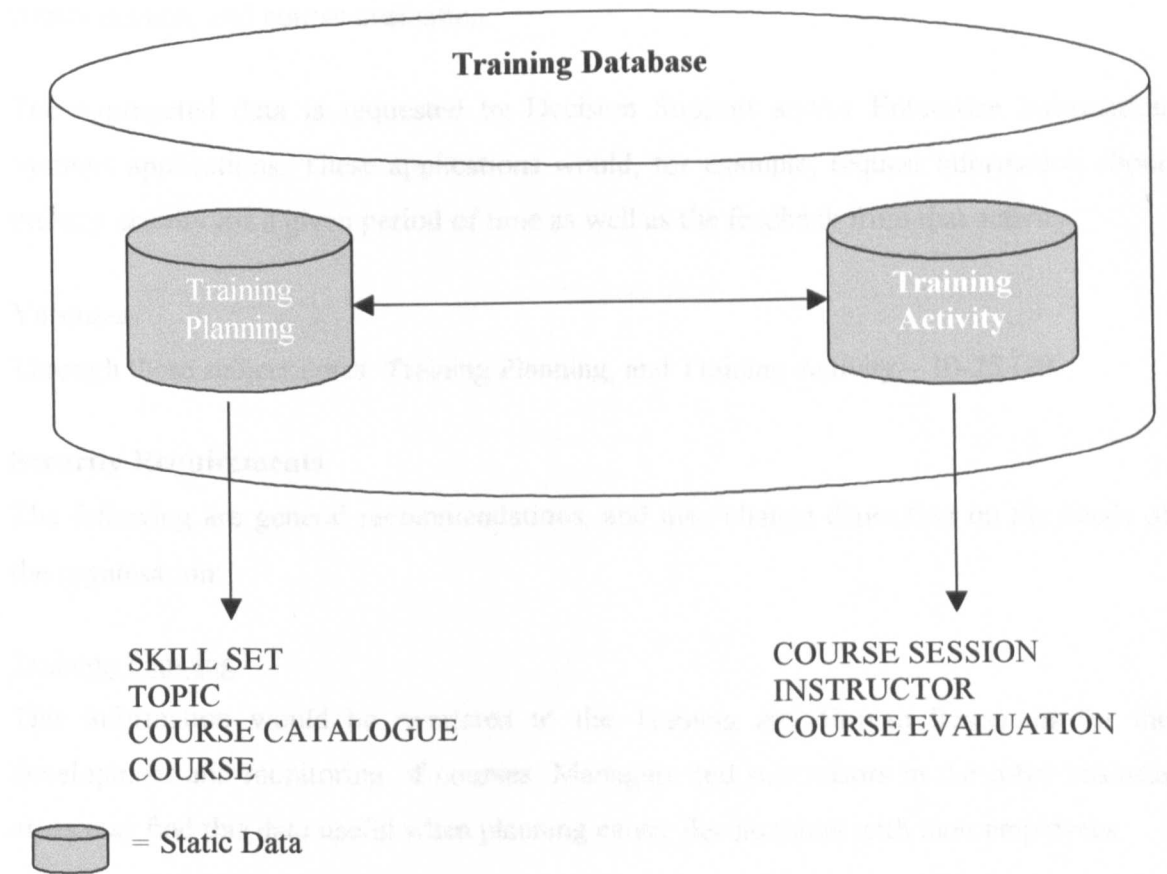


Figure 25. Training Subject Areas

As shown in Figure 25, the Training database is derived from two subject areas, which are Training Planning and Training Activity. Training Planning contains all data about

skill sets, topics, courses and annual catalogues. Training Activity encompasses all the course sessions, the instructors who conduct them and the evaluations that result from their assessments.

Sources

The primary sources of information are the Training and Human Resources organisations that would enter this information.

Number of Users

There are 500 users of these applications: Programme Development, Course Management, and Scheduling.

Aggregation

For data warehouse architecture the following data entities require an aggregation: course, course session, and course evaluation.

The aggregated data is requested by Decision Support and/or Enterprise Information Systems applications. These applications would, for example, request information about training activity for a given period of time as well as the feedback from that activity.

Volumes

Through these subject areas: Training Planning, and Training Activity – 10-25 GB.

Security Requirements

The following are general recommendations, and may change depending on the needs of the organisation:

Training Planning

This information would be restricted to the Training and Human Resources for the development and monitoring of courses. Managers and supervisors in the other business areas may find this data useful when planning career development with their employees.

Training Activity

This information would be available to Training and Human Resources and the managers and supervisors throughout the organisation.

It should be noted that authentication and authorisation of users to specific data and applications is an attribute of the technology in place.

2.4.9 Materials Management

The data entities in the figure below were grouped into the Materials Management business area. The hierarchy of entities in the diagram makes clear which entities are created before others. The data relationships have been established through the data entity diagram in Appendix A. This hierarchy has been utilised to indicate some characteristics of the architecture of the Materials Management database described in Figure 26. A definition of each entity follows.

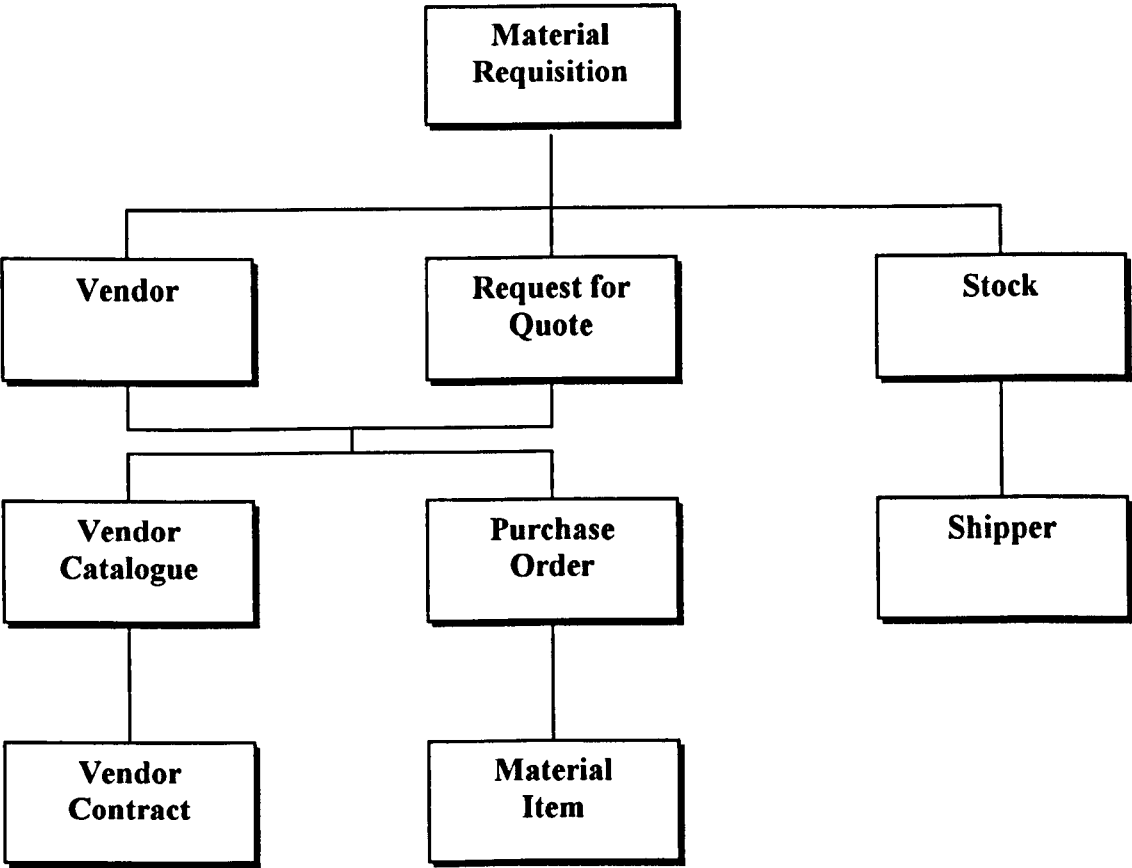


Figure 26. Materials Management Data Collection

Materials Requisition: This data entity relates to a department or employee request for materials from the supply centre for use on a job or project. A primary key for this entity is REQ_ID.

Vendor: This holds information about vendors with whom the MoPTT does business. This includes name, address, and performance information. A primary key for this entity is VENDOR_ID.

Vendor Catalogue: This data entity handles each vendor's list of products. A primary key for this entity is VENDOR_ID, PRODUCT_CODE.

Vendor Contract: This data entity concerns the legal document that provides the contractual basis for the Ministry to purchase inventory items from a vendor. A primary key for this entity is VENDOR_ID, TIME_STAMP.

Request for Quote: This data entity concerns the tender that is sent out to vendors requesting bids on specific materials needed by the MoPTT. A primary key for this entity is RQ_ID.

Purchase Order: This represents the transaction by which inventory items are ordered from a vendor. A primary key for this entity is PO_NUMBER.

Materials Item: This data entity is connected with the list of items needed by the MoPTT to maintain its network, service its customers and conduct day-to-day business activities. A primary key for this entity is ITEM_ID.

Stock: The identity and quantity of materials items at each depot. A primary key for this entity is STOCK_ID.

Shipper: This data entity concerns the transportation company contracted to transport materials from vendors to the MoPTT storage locations. A primary key for this entity is SHIP_CODE.

The MoPTT Materials Management logical database encompasses all the data and data relationships specified in the Materials Management entity-relationship model from Appendix A.

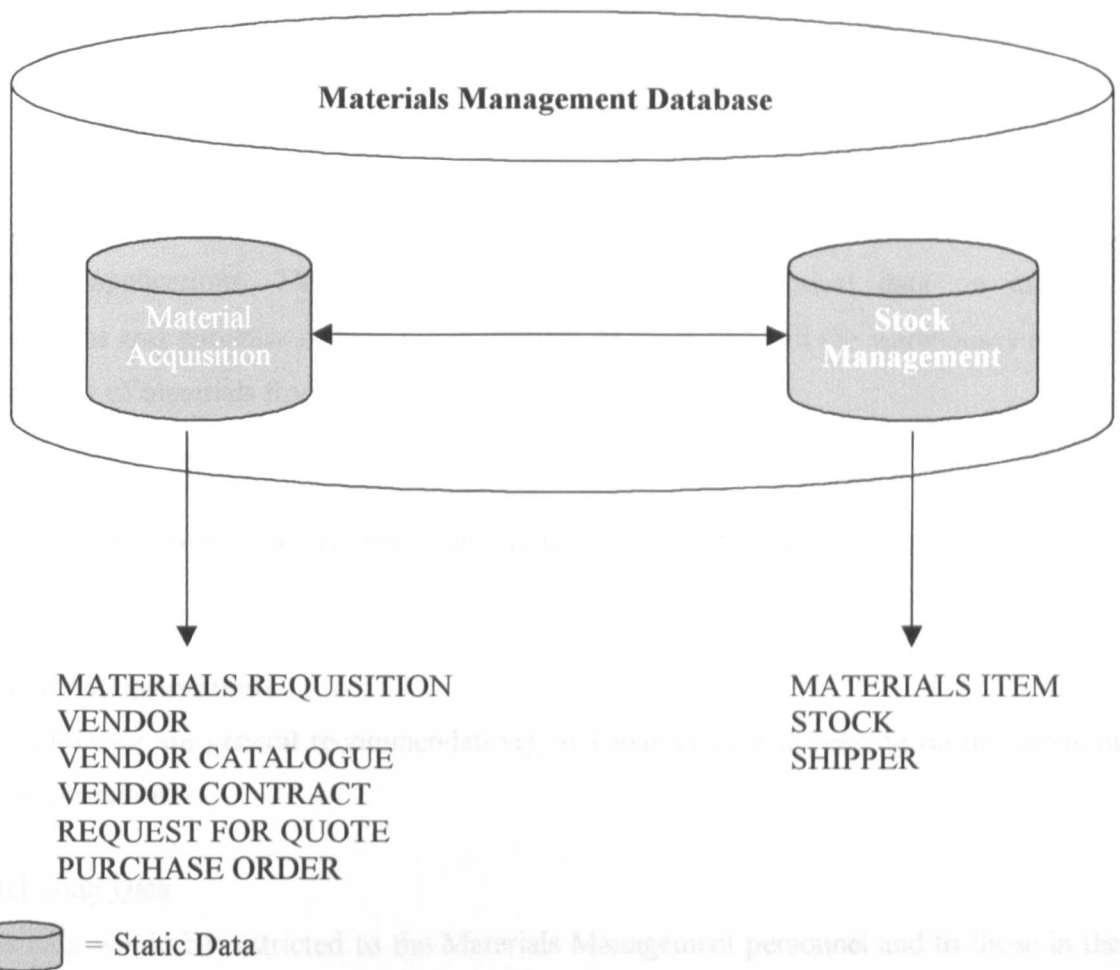


Figure 27. Materials Management Subject Areas

As can be seen in Figure 27, the Materials Management database is derived from two subject areas, which are Materials Acquisition and Stock Management. Materials Acquisition contains all data about vendors, vendor catalogues and contracts, materials requisitions, requests for quotes and purchase orders. Stock Management encompasses all the materials item information, stock quantities and shipper information.

Sources

The source of this information is from the Materials Management organisation that will enter this information.

Number of Users

There are 250 users of these applications: Purchasing and Inventory Control.

Aggregation

For data warehouse architecture the following data entities require an aggregation: vendor catalogue, materials requisition, purchase order, and materials item.

The aggregated data is requested by Decision Support and/or Enterprise Information Systems applications. This information would include historical data on materials requisitions and purchase orders, the movement of stock through the warehouses and the availability of materials from vendors.

Volumes

Through these subject areas: Materials Acquisition and Stock Management – 100-250 GB.

Security Requirements

The following are general recommendations, and may change depending on the needs of the organisation:

Purchasing Data

This data would be restricted to the Materials Management personnel and to those in the corporate area who may wish to monitor the effective use of department budgets.

Inventory Data

This data would be restricted to the Materials Management personnel to monitor stock activity and Financial Management for purposes of calculating asset value.

It should be noted that the authentication and authorisation of users to specific data and applications is an attribute of the technology in place.

2.4.10 Buildings and Land Management

The data entities in Figure 28 were grouped into the Buildings and Land Management business area. The hierarchy of entities in the diagram indicates which entities are created before others. The data relationships come from the data entity diagram in Appendix A. This hierarchy has been used to show some characteristics of the architecture of the Buildings and Land Management database described in Figure 28. A definition of each entity follows.

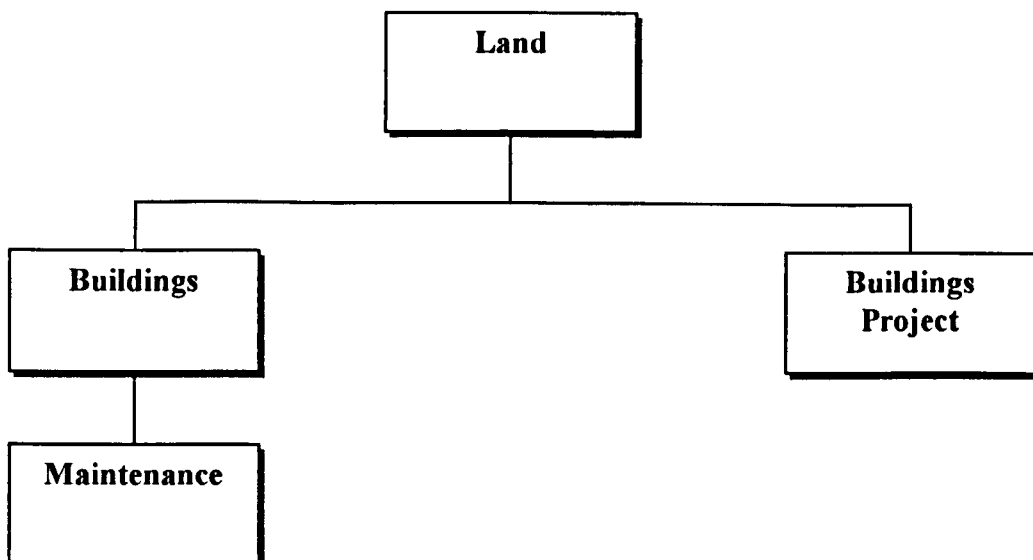


Figure 28. Buildings and Land Data Collection

Land: This data entity deals with the details of land and property purchased, leased or rented for the use by the MoPTT. A primary key for this entity is **LAND_ID**.

Buildings Project: This data entity concerns the details of tasks to build or refurbish buildings. A primary key for this entity is **PROJ_ID**.

Buildings: The details about the buildings in which the Ministry houses its personnel, machinery and materials. A primary key for this entity is **LAND_ID**, **BUILD_ID**.

Maintenance: This data entity relates to the details of scheduled and incidental maintenance performed on buildings and land. A primary key for this entity is **OBJ_D**, **TIME_STAMP**.

The MoPTT Buildings and Land Management logical database encompasses all the data and data relationships specified in the Buildings and Land Management entity-relationship model from Appendix A.

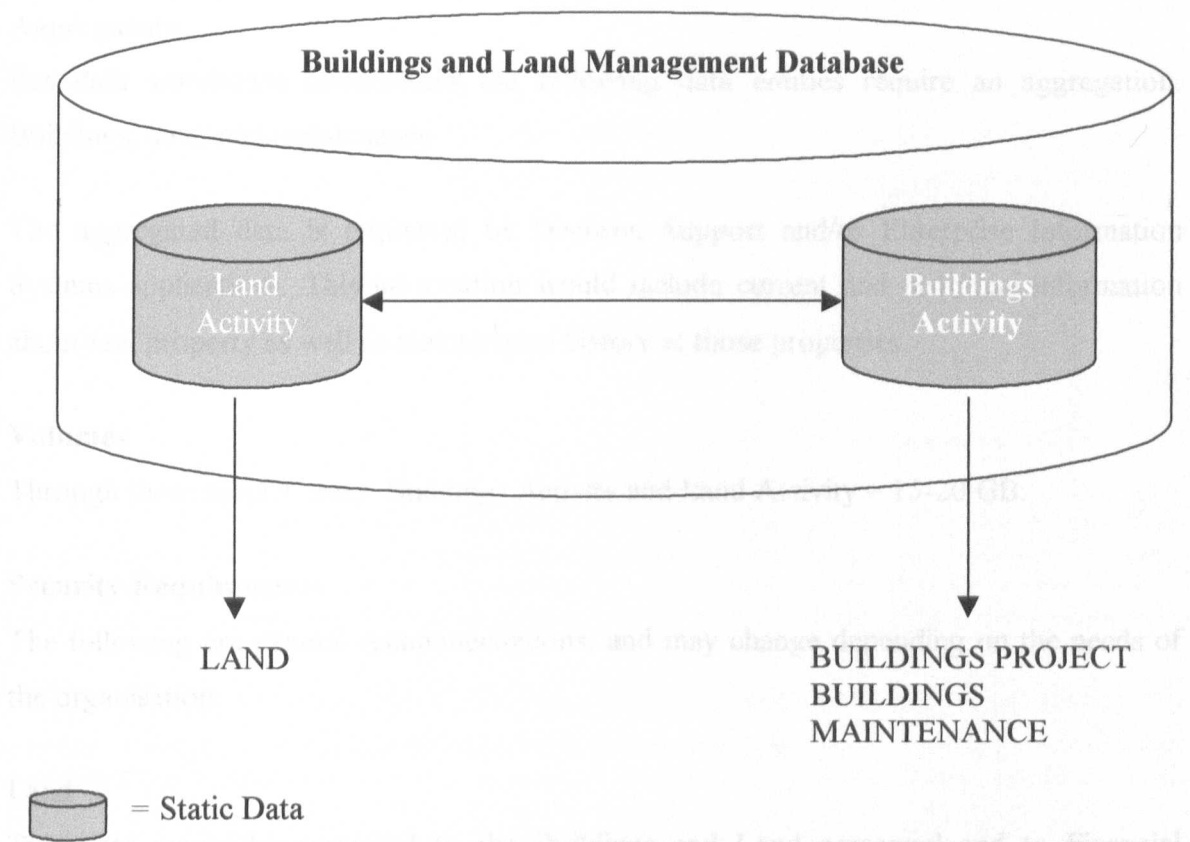


Figure 29. Buildings and Land Subject Areas

In Figure 29 the database is derived from two Buildings and Land Management subject areas, which are Buildings Activity and Land Activity. Land Activity contains all data about the real property and its care, while Buildings Activity encompasses all the data about buildings, their maintenance and care, and the projects for construction or refurbishment.

Normally a subject area would not consist of only one data entity. However, Land is listed by itself in this diagram to facilitate a partition between the two subject areas.

Sources

The source of this information comes from the Buildings and Land Management organisation.

Number of Users

There are 200 users of these applications: Land Management, and Property Management.

Aggregation

For data warehouse architecture the following data entities require an aggregation: Buildings, land, and maintenance.

The aggregated data is requested by Decision Support and/or Enterprise Information Systems applications. This information would include current and historical information about real property as well as maintenance history at those properties.

Volumes

Through these subject areas: Buildings Activity and Land Activity – 15-20 GB.

Security Requirements

The following are general recommendations, and may change depending on the needs of the organisation:

Land

This data would be restricted to the Buildings and Land personnel and to Financial Management for purposes of calculating asset value.

Buildings

This data would be restricted to the Buildings and Land personnel and to Financial Management for purposes of calculating asset value.

It should be noted that the authentication and authorisation of users to specific data and applications is an attribute of the technology in place.

2.4.11 Vehicles Management

The data entities in the figure below have been grouped into the Vehicles Management business area. The hierarchy of entities in the diagram sets out data relationships as determined from the data entity diagram in Appendix A. This hierarchy has been used to give an indication of some characteristics of the architecture of the Vehicles Management database described in Figure 30. A definition of each entity follows.

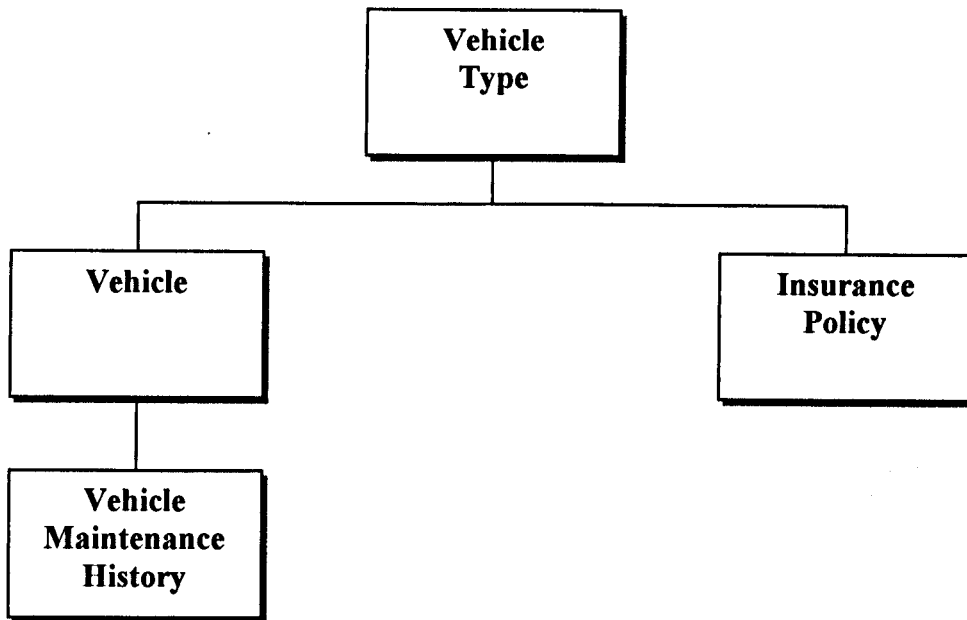


Figure 30. Vehicles Data Collection

Vehicle Type: The types of vehicles that will be considered by the Ministry. A primary key for this entity is VT_ID.

Vehicle: Relates to a vehicle as it is purchased by the MoPTT. A primary key for this entity is VIN.

Vehicle Maintenance History: This data entity deals with the maintenance activity for a vehicle. A primary key for this entity is VIN, TIME_STAMP.

Insurance Policy: This data entity concerns details about the insurance purchased to cover a vehicle. A primary key for this entity is POLICY_ID.

The MoPTT Vehicles Management logical database encompasses all the data and data relationships specified in the Vehicles Management entity-relationship model from Appendix A.

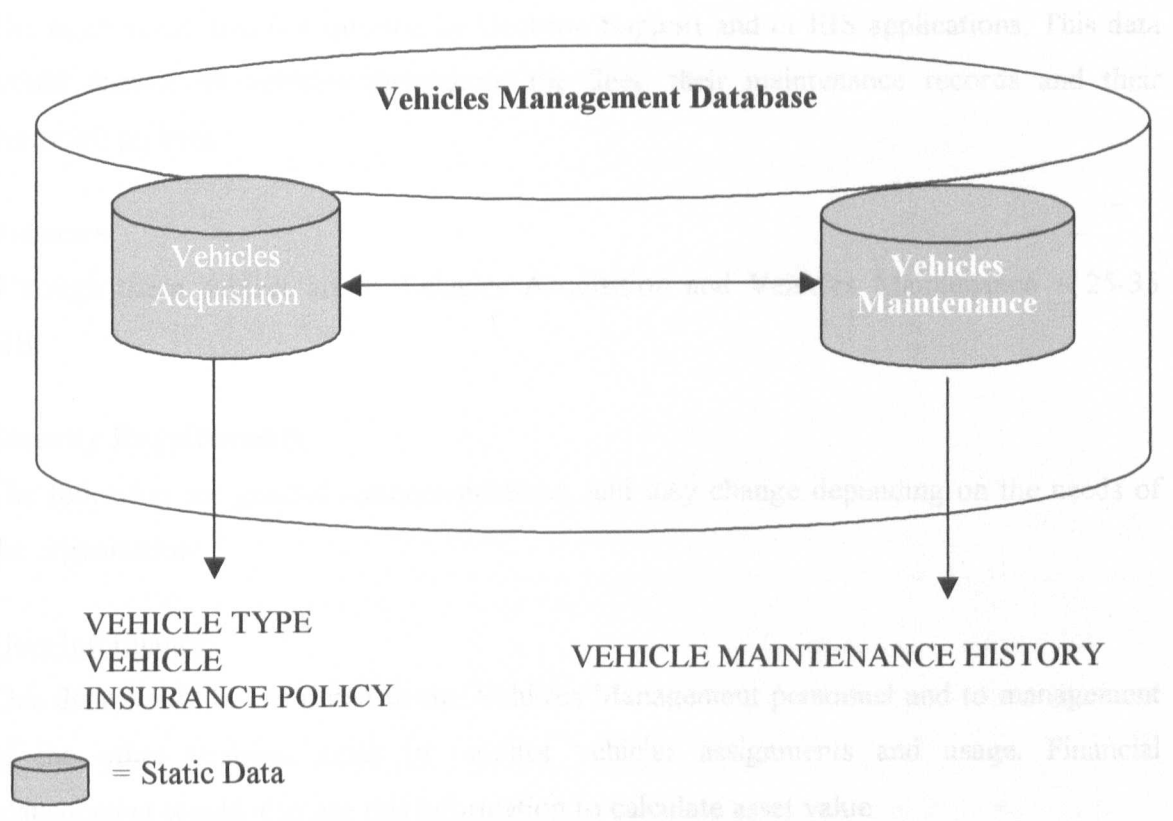


Figure 31. Vehicles Subject Areas

In Figure 31 the database is derived from two Vehicles Management subject areas, which are Vehicles Acquisition and Vehicles Maintenance. Vehicles Acquisition contains all data about vehicles types, vehicles, and insurance policies on those vehicles. Vehicles Maintenance encompasses all the repair activity on each vehicle. Normally, a subject area would not consist of only one data entity. However, because Vehicles Maintenance sees considerable activity, it is more efficient to partition it from the remainder of the database.

Sources

The Vehicles Management information is entered by the Vehicles departments.

Number of Users

There are 250 users of these applications: Fleet Control and Vehicle Maintenance.

Aggregation

For data warehouse architecture the following data entities require an aggregation: vehicle, insurance policy, and vehicle maintenance.

The aggregated data is requested by Decision Support and/or EIS applications. This data would include all vehicles throughout the fleet, their maintenance records and their insurance policies.

Volumes

Through these subject areas: Vehicles Acquisition and Vehicles Maintenance – 25-35 GB.

Security Requirements

The following are general recommendations, and may change depending on the needs of the organisation:

Fleet Information

This data would be restricted to the Vehicles Management personnel and to management of the other business areas to monitor vehicles assignments and usage. Financial Management would also use this information to calculate asset value.

Fleet Maintenance

This data would be restricted to the Vehicles Management personnel for purposes of vehicle care.

It should be noted that the authentication and authorisation of users to specific data and applications is an attribute of the technology in place.

3. *Management and Organisation Architecture*

3.1 Introduction

Management and organisation consist of the following major areas:

- IS management
- IS functions
- skill needs
- the future IS structure (organisation structure)
- service relationships.

3.1.1 IS Organisational Trends and Impact Factors

The major influences upon the structure and functionality of the IS organisation are:

- the requirements from the use and expected benefit of IS
- the defined principles and their impact on the alternatives and priorities
- the size of the enterprise
- the style of computing.

The MoPTT views IS as a factor critical to the success of the business strategies. The IS organisation, if it is to remain cost/benefit oriented, must recommend the efficient use of IS, and it has to be appreciated that the management of new IS technology has requirements additional to those previously in force. The Ministry must consider the use and expected benefit of information systems to prioritise and select organisational design alternatives. These considerations reveal several requirements:

- The organisation of IS must keep up with changes in the company and in technology.
- It must achieve a balance between centralisation and decentralisation, and between effectiveness and efficiency.
- It must align with business goals in order to become effective.
- It depends on guiding principles to determine how decisions are made, executed and evaluated.
- It must its attempt to exercise its expertise throughout the organisation to ensure success.
- The Ministry must fund the pivotal role of planning, control and administration.
- Users' sophistication in technology is growing.
- Technology is growing in ease of use and sophistication.

The requirements and expectations of the users must be considered as well:

- access to problem solving support
- awareness of events that could affect their capacity to do their work
- easy access to tools, knowledge and information
- the ability to influence the creation of new systems or applications
- the ability to influence the acquisition of new tools and products.

The architecture to support the IS requirements will be a three-tiered client/server

architecture. IS will use a common network to communicate with each other and to give easy access to data. The use of client/server applications has a major impact on the new information systems architecture and the necessary support services. Impact areas of client/server on IS organisations are:

- project style
- project processes
- location
- roles
- vendors
- support
- operations
- communications
- team skills
- testing & turnover
- administration
- tools & packages
- funding
- team organisation
- skills.

3.1.2 Scope of Organisational Architecture

The design of the IS organisation is targeted to support all IS that operate on general purpose computer systems. This includes systems that support central operation and maintenance (COM) of the telecommunications network and run on general purpose computers. It is recommended to keep specialised applications on certain equipment of the telecommunications network under the control of the business organisation responsible for the operations of the network.

The organisational architecture deals mainly with supporting the business users and their IS. The described functions are applicable to the systems that are used by the staff of the IS organisation.

3.2 IS Management

IS management is composed of the policies, standards, procedures, and practices required by the MoPTT. IS management enables the IS function to perform effectively and provide the required support to the organisation's business operations.

3.2.1 General

The objective of the IS function is to support the business needs of the MoPTT, and to do this the IS function must be aligned with the business practices of the organisation.

3.2.2 IS Planning

IS Planning organises the framework for IS functions and delivery. It focuses on establishing co-ordination procedures to keep IS plans aligned with the MoPTT business plans. Positive actions for ensuring effectiveness include:

- aligning IS plans with business plans
- tracking progress of IS plans with regular status meetings
- preparing periodical progress reports.

3.2.3 Project Management

Project management is necessary to manage, monitor and control project execution. It enforces defined standards at each stage of project execution and focuses on issues dealing with contractors, developers and end-users. Positive actions for ensuring effectiveness include:

- Establishing guidelines for IS project life cycle management
- Using TQM as a guideline for project management
- Reporting the disposition of project tasks, resources, and risks to the appropriate business manager
- Assigning management of business application development projects to user areas
- Assigning to one key user area the responsibility for providing a chairman for a steering committee to direct the management of key corporate and strategic business application development projects
- User areas provide business analysts for all business application development projects

- A centralised application development unit is responsible for application design, development, unit testing and system testing as per user specifications
- Users conduct acceptance testing and field trials and attend training on new applications.

3.2.4 Organisational Communication

Through procedures and guidelines, IS units establish communication channels between various organisational units to keep the information flow current, concise and clear.

Positive actions to ensure effectiveness include:

- regular meetings with distributed organisations
- newsletters and bulletins highlighting important business events
- meetings with end-user organisations
- exchanging requirements for IS services
- meetings for similar functional support personnel
- resource responsibility being given to end-user organisations.

3.2.5 IS Resource Acquisition

Resource acquisition is carried out and controlled by both IS and end-users. Positive actions to ensure effectiveness include:

- IS acquiring technical resources
- End-user units being responsible for acquiring business resources and contracting out project management
- Central IS developing standards and policies.

3.2.6 Data Administration

All data for corporate and local units are administered according to rules and procedures.

Positive actions to ensure effectiveness include:

- The MoPTT is the owner of all data
- Data held by the MoPTT is corporate as well as local data
- With appropriate approval corporate data is made available for use across the corporation
- Local data is made available for use only by local organisations

- Policies for distributed databases is established and enforced
- User administration for corporate databases is centralised.

3.2.6.1 Data Storage

IS units manage data storage, data retrieval and retrieval authorisation. The planning for data storage and retrieval are centralised. Positive actions to ensure effectiveness include:

- Storing data at a custodian area on behalf of the corporation
- Making data custodians responsible for storage, security of data, and access with approval from authorised user area
- Allowing specific areas, which are authorised by the MoPTT and under the control of notional data owners, to alter the data
- Collecting corporate and local data items only once and store them in master storage
- Using master version data for corporate reporting
- Setting up data set and file ageing control
- Defining and implement backup and recovery procedures.

3.2.6.2 Data Collection

Data at various levels of user organisation is collected through the specified rules, processes and procedures, with editing standards applied before data collection to minimise errors and duplication. Positive actions to ensure effectiveness include:

- Enforcing editing procedures at the data collection points
- Shortening the correction loop and enable the data entry areas to correct the data prior to its storage
- Collecting data items, corporate and local, only once.

3.2.6.3 Data Access

Rules and procedures are applied to safeguard the data from unauthorised users and allowing access only to approved areas. The corporate data has centralised control for security. Positive actions to ensure effectiveness include:

- Securing access to data at all levels
- Centralising access control to corporate data
- Allowing access to data only to approved areas
- Allowing notional data owners to approve access to data

- Allowing notional data owners to modify and update the data for the MoPTT and being responsible for the integrity of stored data
- Allowing users to copy the data for improvement of local access and management.

3.2.7 Network Administration

In contrast with some other areas within the MoPTT, the highest standards and procedures are applied for network administration and configuration to ensure the integrity of network performance and data transmission. IS centralises corporate key functions and standardise LAN configurations throughout the MoPTT. Positive actions to ensure effectiveness include:

- Centralising major administration functions for all IS organisations in the MoPTT
- Subdividing Regions to optimise cost effectiveness and service delivery
- Collecting and analyse network alarms and operational measurements to detect the network failure or service degradation
- Defining and implement the MoPTT standard LAN configuration for all user areas
- Standardising the non-conforming MoPTT LANs, which are currently in use
- Installing standard set of PCs and workstations throughout the Ministry. These are set up and standardised by the centralised IS group. This unit also has responsibility for their purchase and maintenance contracts
- Implementing a backbone data network throughout Saudi Arabia for the MoPTT. Wherever appropriate, this network uses bearer technologies such as direct links with AL-Waseet and the MoPTT's base network facilities
- Transmitting data through the backbone data network for the MoPTT staff
- The backbone data network is managed by a functionally concentrated IS area
- Connecting local work units to backbone data network by LANs and where appropriate.

3.2.8 Management Reporting

Effective management reporting through established communication channels is necessary to update all levels of the organisation about regular progress and performance. This ensures that the appropriate levels of management are kept up to date. Reporting of data centres on-line enables IS to take immediate corrective action to deal with faults.

Positive actions to ensure effectiveness include:

- Defining the reporting requirements for the IS project management
- Defining the type of information required for each recipient
- Defining and report performance indicators for each area of IS function
- Setting up escalation procedures to resolve problems
- Establishing Information Management and Steering Committees for IS issues
- Using corporate data items for management reporting at the corporate level
- Management reporting at the executive level using an EIS
- Using the IS platform for reporting to senior and middle level management
- Reporting for supervisor level in the field done through operational support systems
- Reporting performance of data centres and data networks.

3.2.9 Application Development (Methodologies)

Procedures and benchmarks are necessary to ensure that the development of new applications and modifications of existing applications are carried out under the defined standards. Positive actions to ensure effectiveness include:

- Defining project development procedures and methodologies for IS projects
- Defining development standards according to new technology and case tools for all application developments
- Enforcing these standards for software development
- Categorising applications into corporate, strategic, local and temporary
- Conducting target reporting on individual application performance. These targets are included in the user service agreement between IS and user organisations
- For outsourcing, IS manages the technical aspects and the user unit is responsible for the business aspects
- Each large strategic application project is reviewed, approved and analysed for cost and benefits prior to going into the design phase
- Reviewing and approving corporate and large strategic business application development projects before giving a priority for design and development
- Performing a cost/benefit analysis and preparing a business case for the application before beginning development
- Establishing a centralised application development unit

- Centralising application development for strategic organisation systems
- Developing corporate applications internally or through contracting out administered by the central application development unit
- The central application development unit develops strategic applications using corporate standards
- Local and temporary applications are developed either by the central application development unit or user groups in conformity with corporate standards.

3.2.10 Change Control and Configuration Management

The change control management is centralised for all application and system software and hardware configuration changes, whether implemented internally or through outsourcing. These changes are communicated to all IS organisations and local support units through regular meetings and e-mail. Positive actions to ensure effectiveness include:

- Centralising change control and configuration management
- Advising about changes made to all levels of IS organisation through regular meetings
- Using e-mail for communicating changes and configurations to local support.

3.2.10.1 *Hardware (Workstations, Servers, Host Platforms, Network Components)*

Procedures and guidelines are necessary to centralise the purchase and maintenance of all hardware, host platforms and components for the MoPTT. The purchasing and service costs are charged back to the budgets of applicable organisational units. Positive actions to ensure effectiveness include:

- Centralising hardware purchasing and maintenance contracts throughout the MoPTT
- Referring workstation purchasing and maintenance costs to local units for appropriate cost allocations
- Costs for purchase and maintenance of host platforms, servers and network components should be covered by the central budget for the MoPTT.

3.2.10.2 *Software (Applications, Databases, System Software, Tools)*

Necessary guidelines and procedures are established for centralised purchasing and maintenance of application and DBMS (Database Management System) software. The costs will be charged back to the applicable corporate and local unit budgets. All new

releases will be tested before they are brought into production. Positive actions to ensure effectiveness include:

- Centralising purchasing and maintenance contracts of system and application software
- Costs for software purchase and maintenance should be covered by local area budgets
- Costs for corporate application software and DBMS are allocated to the corporate budget
- Minimising the number of DBMS software packages to reduce the maintenance cost
- New releases of system and application software are managed and controlled by the central application development group
- New releases of system and application software are run and approved as a test in the data centres before they are brought into production.

3.2.11 Quality Management

- TQM principles are applied to improve continually the quality of deliverables
- The IS group is guided by industry standards when measuring quality
- Using resources wisely to avoid waste.

3.2.12 User Technical Support Services

These services adhere to defined procedures and processes to provide prompt technical support to users for various levels of service disruptions and faults. Positive actions to ensure effectiveness include:

- Setting up user help desks with resolution dispatching capability
- Providing first level support from distributed organisations and second level support from the central support group
- Defining escalation procedures for various levels of service disruptions
- Defining levels of severity for faults and corresponding procedures to manage them.

3.2.13 Training Facilities

A central IS Department provides the training facilities that enable the IS function to achieve its objectives of providing high quality standard training for all IS organisations. This is accomplished internally or through contracting out. Positive actions to ensure effectiveness include:

- Defining levels of training for all levels of the business including staff and line management, supporting staff, and field personnel
- Developing training requirements for each level
- Preparing training schedules
- Deciding if the training will be in-house or sourced out
- Selecting quality training providers
- Reviewing the training materials and curriculum and advise if changes are required
- Upgrading the training curriculum in the light of new management strategies and technology
- Establishing regional training centres based on geographic locations.

3.2.14 Standards

Standards are necessary to measure the levels of performance, productivity and information reporting. Positive actions to ensure effectiveness include:

- The central IS Department formulates IS policies and standards and enforce them on behalf of the MoPTT
- Defining performance indicators
- Defining performance standards based on these indicators
- Defining and setting up performance monitoring and reporting standards.

3.2.15 Security

An office environment throughout the MoPTT needs a thorough implementation of security mechanisms. Positive actions to ensure effectiveness include:

- Defining user security and local administrator responsibilities
- Defining physical security measures and site works
- Defining password expirations
- Establishing alarm management
- Monitoring, managing and analysing alarms
- Implementing continuous electronic surveillance, systems monitoring, and reporting of security status to the management
- Checking for intrusions and attempts to intrude
- Analysing the type of intrusions and faults

- Setting up training and development programmes for security staff.

3.2.16 Backup, Recovery and Disaster Planning

Necessary procedures and standards are defined and implemented for backup and recovery planning, to safeguard the data from any disaster, and to enable its complete recovery. Positive actions to insure effectiveness include:

- Defining distributed backup and recovery procedures
- Defining storage and management of local backups
- Establishing centralised backups where possible
- Establishing a help desk for the restoration of data files
- Planning, scheduling and executing disaster plans regularly on a trial basis
- Scheduling and executing disaster recovery action plan on a periodic basis
- Making data recovery transparent to users where possible.

3.2.17 Vendor and Outsourcing Relationships

In order to maintain the IS infrastructure continuously, good relationships with partners of the MoPTT must be maintained. These measures are recommended:

- Controlling qualification and performance of outsourcing staff and manage them effectively
- Ensuring quality service delivery from outsourcing
- Establishing yearly vendor forums for briefing on new technologies (even if the vendor is not given any purchase orders)
- Arranging and scheduling technical forums for Ministry personnel.

3.2.18 Performance and Capacity Planning

One point needs current attention, quite apart from any new IS architecture that might be introduced, is that procedures must be set up to support service agreements on a technical level. Data has to be captured and processed to allow immediate reactions and short-term and long-term planning for appropriate performance and capacity planning. Recommendations include:

- Capture response time data and the delivery of output
- Centrally monitor the distributed network and system operation and bottlenecks

- Distribute responsibilities to local staff where practicable
- Ensure remote system access for the service
- Set up automatic threshold notifications and escalation of performance and capacity.

3.2.19 Availability and Outage Management

Attention needs also to be given to availability for processing, which is a critical part of service agreements with the users. Equipment has to be managed cost effectively and procedures must be defined to ensure the service levels of the IS organisations. Here are some steps to take:

- Define procedure to allow equipment approval for availability during the critical stage
- Keep and manage a supply of spares for emergencies
- Prepare availability and outage reports
- Prepare abnormal condition reports.

3.3 IS Functions

3.3.1 IS Management

The IS management function focuses on the overall guidance of the IS functions within the corporation to assure its effective utilisation. IS management works through committees and regular contacts with the business managers to facilitate communication and decision making processes among IS organisational units. This ensures the alignment of IS strategies to business goals.

3.3.2 IS General

3.3.2.1 Budgeting

Budgeting consists of the processes and functions that plan the investments in IS and control the appropriate expenditures. To be effective, budgeting must have top management support and commitment and must align autonomy with responsibility. It should focus on planning, co-ordinating and motivating. Positive actions to ensure effectiveness include:

- overall budget plans
- budget breakdowns

- alignment of budgets with strategic is plans
- accounting
- periodic control of spending and charges.

3.3.2.2 Contract Management

Contract Management is composed of the processes and functions that deliver the successful and cost effective management of contracts with outsourcers or IS vendors. Positive actions to ensure effectiveness include:

- Participating in the financial planning process
- Controlling the fulfilment of contracts
- Controlling personnel time sheets
- Assisting in service orders through the terms of the contracts.

3.3.2.3 Human Resources

Human Resources is composed of the processes and functions that support the IS organisational units regarding the management and hiring of personnel. Positive actions to ensure effectiveness include:

- recruitment
- training
- HR development, including:
 - incentives
 - performance appraisals
 - career paths.

3.3.2.4 Methodology Support

A central group provides to the IS organisational units expert consultants in standard methodologies used at the MoPTT. These methodologies include information engineering and Navigator. The IS expert group will also evaluate new methodologies for their possible benefit to the MoPTT.

3.3.2.5 Training

Training programs are established for IS personnel and users to ensure effective use of information systems. This applies to both technical and management staff. The

maintenance of an IS and management skill needs matrix allows managers to develop the skill and expertise of personnel.

3.3.2.6 Vendor Relationships

Relationships to software and hardware suppliers must be maintained through regular information exchange, since IS organisational units throughout the MoPTT must be informed about new product developments. Continuous contact assists in the ongoing development of information technology.

3.3.2.7 Project Management

Project management for all IS projects is the responsibility of the IS organisation. A quality processes must be used to minimise risks in the projects, communicate project plans and progress to project leaders and management, and to make the most effective use of IS resources. Project management should follow the highest standards. Five major phases can be identified, as described below.

1. Concept

- Identification of possible needs.
- High-level definition of the purpose and scope of the project.
- Initial evaluation of the risks and opportunities associated with the project.

2. Pre-Award Planning

- Identify project goals.
- Identify necessary resources and organisations and establish responsibilities.
- Define document and schedule specific tasks to be performed.
- Develop cost estimates.
- Develop an acceptance test plan.
- Develop a risk management process.

3. Post Award Planning

- Amend and validate the project plan to reflect requirements accurately.
- Assemble the project team.
- Assign all tasks.
- Finalise the baseline project plan.

4. Implementation

- Carry out tasks as specified in the project plan.
- Monitor information and data to ensure all work is completed on time, within budget and meets requirements.
- Integrate activities of all suppliers or partners involved.
- Validate complete fulfilment of the project charter.

5. Closure

- Prepare official project archival records.
- Supervise the transition from the project environment to an actual operational one.
- Identify and resolve any open issues.
- Verify ability to maintain the new system.
- Ensure satisfaction.

Measurement of project management performance covers areas such as:

- schedule
- budget
- quality
- technical performance
- client satisfaction.

3.3.2.8 Charge-back

One area which requires some attention is the possibility of the future use of a charge-back system for IS services. This is recommended, and should be tailored to the charging and budgeting system used in the MoPTT. The purpose of the system is to:

- Allow proper budget planning according to the usage of IT
- Get an accurate overview of spending for IS
- Allow cost justification and comparison for IS investments
- Provide input for the control of investments in IS.

Under this recommendation, the charge-back system will take the following areas into consideration:

- Strategic IS planning will be an enterprise sponsored area, independent of individual business organisations. The area will allocate a special budget and the costs will only be shown at the level of the overall IS investment report.
- All services will be distributed and shown as number of man days per requesting business unit.
- Investments in computer equipment will be distributed according to usage of the business unit.

The figures will be fed into the budgeting process to allow the budget to be allocated amongst the various business units in the Ministry. The IS budget will be the equivalent of the IS budgets of the business units plus the corporate sponsored planning budget.

3.3.3 Information Systems Development

3.3.3.1 Application Evolution

Application evolution is composed of the processes and technologies that continuously advance and maintain the existing applications. Applications must be maintained by a life cycle management approach. Change control is more important as applications must be upgraded from time to time to new technology, while the technologies themselves must be phased and scheduled with service agreements to meet overall profitability and productivity.

3.3.3.2 Application Development

Application development is the sum of the processes and technologies necessary to develop and maintain applications. Positive actions to ensure effectiveness include:

- *Problem reporting.* The distribution of information about the problems raised from within the development groups.
- *Task management.*
- *Life cycle management.* Support and automation for analysis, design, development, coding, change management, testing, and production set-up.
- *Configuration management for software packages.* Tracking of software to release contents, creation of versions, tracking of patches.
- *Use of standards to allow exchange of information among different development tools and groups.*

- *Software libraries/repositories.* Access by software developers to libraries and repositories to improve reuse of code.
- *On-line documentation reference.*
- *CASE and development tools.* To support the knowledge base and transfer among developers, design data management systems and ensure the implementation.
- *Release management of application software.*
- *Testing.* The testing environment should be provided and supported by debugging tools.
- *Programming standards.* Standards must be defined, communicated by training and documented and checked by quality processes.
- *Analysis of business needs and design of information systems to meet those needs.*
- *Standard interface design.*
- *Standard user request process.* To request improvements and corrections to applications.
- *Production planning.* Definition of task dependencies and scheduling
- *Documentation.* Documentation of applications, work practices, and processes.
- *Backup and restore.* Procedures and requirements should meet availability requirements.

3.3.4 Technical Support

Technical Support consists of the processes and technologies that allow the resolution of faults within the service agreements. Characteristics include:

- access to experts for installed hardware and software components
- integration services
- installation
- fault reporting
- solution management
- inventory of infrastructure
- service according to service agreements
- system testing
- invoking vendor support
- centres of expertise (CoEs) for

- middle-ware
- system software
- hardware support.

Examples of centres of expertise (CoEs) are UNIX CoE, database CoE, network CoE, etc. CoEs will be designed according to needs and the volume of support requests.

3.3.5 Operations, Administration & Maintenance (O,A&M)

System management is the management of the computing infrastructure within the corporation. With modern tools geared to provide a single view of the IS infrastructure, the current system management combines the functions necessary to operate and process the applications, the level of systems software and hardware platforms, and the data network. OA&M operations described are present in the major areas of:

- database management
- application management (data centre and distributed operations)
- network management
- systems management.

Across these operations security, performance, and availability must be maintained according to the policies of the organisation and the requirements of the specific IS. The distributed client/server systems are connected through a common network. In this way some general requirements, some still awaiting full implementation, are set for the implementation of systems which manage these networked information systems (NIS):

1. The management requires a set of integrated systems that allows it to monitor, control and manage remotely the operation of the network and the processing systems within it.
2. Management of NIS is an operation consisting of policies, procedures, people and tools and is executed by both central and distributed people and systems.
3. The network is divided into domains, linked to a higher level management system. This will also reduce the likelihood that a disaster will affect more than one part of the network.
4. The management system must allow NIS management applications to access system wide information.

5. The management systems should support the integration, collection and distribution of management information from and to various components from multiple vendors.

3.3.5.1 Security Management

Security management is the processes and technologies that ensure a reliable environment and protect the corporate asset of information. This includes the issue of guidelines and procedures for software development, system integration and implementation. Positive actions to ensure effectiveness include:

- password ageing
- designing secure communication gateways
- monitoring intrusion attempts
- monitoring and designing physical network addresses
- ensuring safe environment for secure servers
- establishing policies for virus protection
- monitoring user validity
- guiding and auditing access and execution rights of files
- developing automated security procedures
- detecting unauthorised program executions.

Security would be improved even more if the following measures were also fully implemented:

- authorisation control
- authentication control
- control access to security codes
- control access to source routing and route recording
- control access to directories and information bases
- control of updates to directories (including addition, deletion, and modification of directory entries)
- control of distribution of the directory information and routing tables
- control of the setting of threshold levels and accounting tables
- prioritised access to requested network resources
- maintenance of general network user profiles, and usage profiles for specific resources, to control access to security resources.

Furthermore, the security administrator needs to be able to gather and retrieve information for analysis and control purposes. This includes:

- event logging
- monitoring security audit trails
- monitoring usage and the users of security related resources
- reporting security violations
- receiving notification of security violations
- maintaining and examining security logs
- maintaining redundant or backup copies for all or part of the security related files
- maintaining general network user profiles, and usage profiles for specific resources, to check conformity to designated security profiles.

3.3.5.2 Capacity Planning

Capacity planning is composed of the processes and technologies that plan for the future state of information systems. This includes workload forecasting for data processing, data storage requirements, number of users to be supported, device types supported, applications and network component requirements.

Characteristics include:

- workloads
- trend analysis
- change management
- forecasting
- historical processing data
- performance characteristics
- service agreements
- multi-platform
- tool sets
- periodic management reporting
- metrics.

3.3.5.3 Processing Management

Processing management consists of the processes and technologies that manage and control the operation of IS. Processing management for the distributed environment is centralised as much as possible and is typically required for all multi-user systems. It provides a control mechanism for the turnover function using the applications development repository. Linkage exists with the applications processing services model via the operations controls repository. Processes include:

- system start-up and shutdown
- job scheduling and control of job flow
- on-line application control
- resource allocation
- load balancing
- equipment service management
- management of peripheral devices
- production control
- subsystem initiation
- system automation
- remote operations
- production turnover of business applications
- print spool scheduling and control
- management of back-ups and disaster recovery
- data transfer operations
- interoperability
- control of software versions.

3.3.5.4 Data Storage and File Archival Management

Data storage and file archival management is comprised of the processes and technologies which manage the organisation's data and file storage resources. Overall planning and control take place centrally for business systems. Processes include:

- on-line data storage management
- tape management
- off-site storage

- backup and recovery
- versions and generation data groups
- definition and control of storage hierarchy
- data set and file ageing control
- different media support; types include:
 - floppy diskette
 - optical disk
 - digital cassette storage
 - cartridge tape
 - reel tape
 - hard disk
 - disk arrays
 - automatic tape handlers
 - stacker.

3.3.5.5 Change Management

Change management is composed of the processes and technologies which control enhancements and changes to business applications for all business systems. Processes include:

- change control system
- access to inventory information
- management approval for changes
- guidelines for use
- management of application enhancements.

3.3.5.6 Performance Management

Performance management is the processes and technologies that ensure that an IS meets or exceeds user performance requirements. Processes include:

- service agreements
- tracking tools
- trend analysis
- periodic management reporting
- statistical tools

- capacity information
- usage statistics
- metrics
- change management information
- problem management information
- performance management.

3.3.5.7 Resource Management and Accounting

Resource management and accounting is comprised of the processes and technologies that control and account for the IS service resources used by the business units. Processes include:

- tracking tools
- periodic management reporting
- metrics
- monitors
- accounting procedures
- rates
- budgets
- dynamic allocation and reallocation of resources, equipment and staff
- cost centres
- technology asset inventory
- software licence management
- IS service resources including:
 - employees
 - support
 - computing resources.

3.3.5.8 Problem Management

Problem management consists of the processes and technologies which manage and correct problems with business applications on all platforms. Processes include:

- problem management system
- access to change management system
- access to inventory information

- history information
- tracking and follow-up information
- access to external resources
- access to monitoring results
- access to performance results.

3.3.5.9 Fault Management

Fault management is composed of the processes and technologies which manage and correct faults occurring in the networking IS. Processes include:

- fault monitoring
- determining and displaying status of devices
- escalation procedures
- internal and external notifications
- monitoring thresholds of critical devices
- diagnosing systems and devices, tests, checks
- fault tracking
- service agreements
- creating fault reports.

3.3.5.10 Version Management

Version management is specific to the application development repository and provides a control mechanism for the distribution of business applications and software packages acquired from suppliers. Processes include:

- providing inventory of license information
- tracking installation locations
- automating distribution of updates
- providing audit trails
- being platform independent
- monitoring usage of corporate licenses
- using push and pull versions of software distribution
 - servers should get the accurate software version pushed from central locations
 - clients should verify software versions and packages against server and update as necessary.

3.3.5.11 *Log File Management*

Log file management is the processes and technologies which control the log file sizes and contents of the different log files in the distributed environment. Processes include:

- logging file archiving and resets
- logging file contents check for preventive maintenance
- system activity monitoring.

3.3.5.12 *Configuration Management*

Configuration management is composed of the processes and technologies which maintain the configurations of the IS infrastructure. Components include:

- configuration database
- graphical representations
- configurations of hardware components
- network configuration
- mainframe configuration
- server configurations
- end-user configurations.

3.3.6 Information Centre Management

3.3.6.1 *Information Architecture Management*

Information architecture is composed of the processes and functions which provide an overview of and data descriptions for the enterprise data model. This function is responsible for the co-ordination of data dependencies, location of data, and access procedures. The design of the 'data steward', as described in Chapter 9, is done by information architecture. Information architecture management includes work at several different levels:

- *Executive Level.* This is a high-level data model which deals with retention periods, executive presentations, definition of data stewards.
- *Implementation Level.* At this level information architecture management designs databases, constructs data access methods, constructs information brokerage, handles

low level data design, designs security mechanisms, and implements service orders for data access.

- *Operational Level.* Information architecture management ensures data availability, operates data synchronisation and updates procedures, and ensures data distribution.
- *User Level.* At this level information architecture management accepts service orders for data access, gives information about data locations, and distributes data storage information.

Components of information architecture management include:

- data models
- data dependencies
- data steward design
- design of data management layer
- information services to user and development groups
- co-ordination of business rules across the corporation
- information updating and access services and procedures
- security guidelines and policies
- data distribution co-ordination
- access co-ordination to external data sources
- data warehouse repository information
- physical location of databases and data files
- access rules
- external data sources
- data editing rules
- data update rules
- definition and maintenance of data quality information.

3.3.6.2 Library Function

The library function is composed of the processes and technologies which store and retrieve information for users who need to reference the MoPTT IS information. The tendency is to have access to as much on-line information as possible. Components include:

- application documentation

- subject matter literature
- internal documentation
- system documentation
- security documentation
- standards and policy documentation.

3.3.7 End-User Computing

End-user computing consists of the processes and technologies that support the needs of the end users. This is accomplished by general purpose, information technology-based, productivity tools for use in day-to-day activities. Components include:

- recommendations for PC-based tools
- end-user support
- configuration support
- programming tools
- electronic mail usage
- office automation concepts
- standards and procedures.

3.3.8 On-site Maintenance and Support

On-site maintenance and support is the processes and technologies that ensure the continuing availability of information systems. This support carries out service agreements given to on-site maintenance support. Components include:

- service agreements
- dispatching
- stock control
- administrative support
- operational performance
- execution of preventive maintenance procedures.

3.3.9 Auditing

Auditing is composed of the processes and technologies which verify the delivery of specified IS services. Generally this function is outside of an IS unit, though it does

receive support from IS. Positive actions to ensure effectiveness include:

- auditing of installed software versions
- verification of indicators
- tracking of service fulfilment
- verification of faults and problem-solving according to service agreements
- customer satisfaction
- application processing and control, and audit trail.

3.3.10 Planning

Planning is composed of the processes and technologies which are designed to plan the maintenance and evolution of information systems and their supporting architecture. High level and strategic plans and detailed implementation plans must be developed for IS units. Planning has to ensure a unified approach to address the total business information needs of the organisation. Positive actions to ensure effectiveness include:

- participation in architecture work groups
- participation in strategic plan development with the business managers
- resource planning
- forecasting
- alignment with business goals
- incorporating new technologies
- setting standards
- methodology support.

3.3.11 Quality Management

Quality management is necessary to ensure delivery of good IS services. TQM is used to improve the effectiveness of the proposed IS. Components include:

- TQM
- training
- guidelines for procedures
- measurable indicators
- quality councils
- orientation and adaptation of world best practices

- applying and using standards
- improving management skills
- improving the quality of service to customers.

3.3.12 Application Portfolio Management

Application portfolio management is an area of operation which is not yet in place within the IS area. Its function will be to provide an overview of the available applications and their functional coverage of business processes. It will be implemented at the corporate and end-user level. At the corporate level, it will provide information about the functional coverage of corporate applications. It will prioritise plans to develop solutions for business functions. At the end-user level, it will provide information about small applications that are available from different business organisations. These applications can be applied across the other business organisations to reduce the duplication of development efforts.

3.3.13 Help Desk

Also awaiting introduction is the help desk, which will be a central contact point for users with problems, inquiries and IS service orders. The future technology architecture requires a comprehensive user service to solve the complex problems that may occur within the MoPTT infrastructure, and the user contact point offered by the help desk will deal with issues related to the operation of the technology infrastructure. To facilitate this the architecture must focus on the inter-networking capabilities of applications and the connectivity of end-users. The implementation of the help desk will also integrate the shift of the IS focus from fault handling to the fulfilment of service agreements.

The following process model (Figure 32) shows the flow of input from the users (problems, inquiries, service orders) and the distributed information systems (faults, usage and performance data), integrated to ensure the fulfilling of service agreements with those users. fault reports - first level support - are created to follow the resolution of problems. They may be routed to local support staff to give on-site support.

Second and third level support is in the form of technical support and application support if changes to applications are necessary. This support comes from either within the

MoPTT, from a third party or a combination of both.

Requests for application enhancements will be channelled through the business analysts of the appropriate business unit.

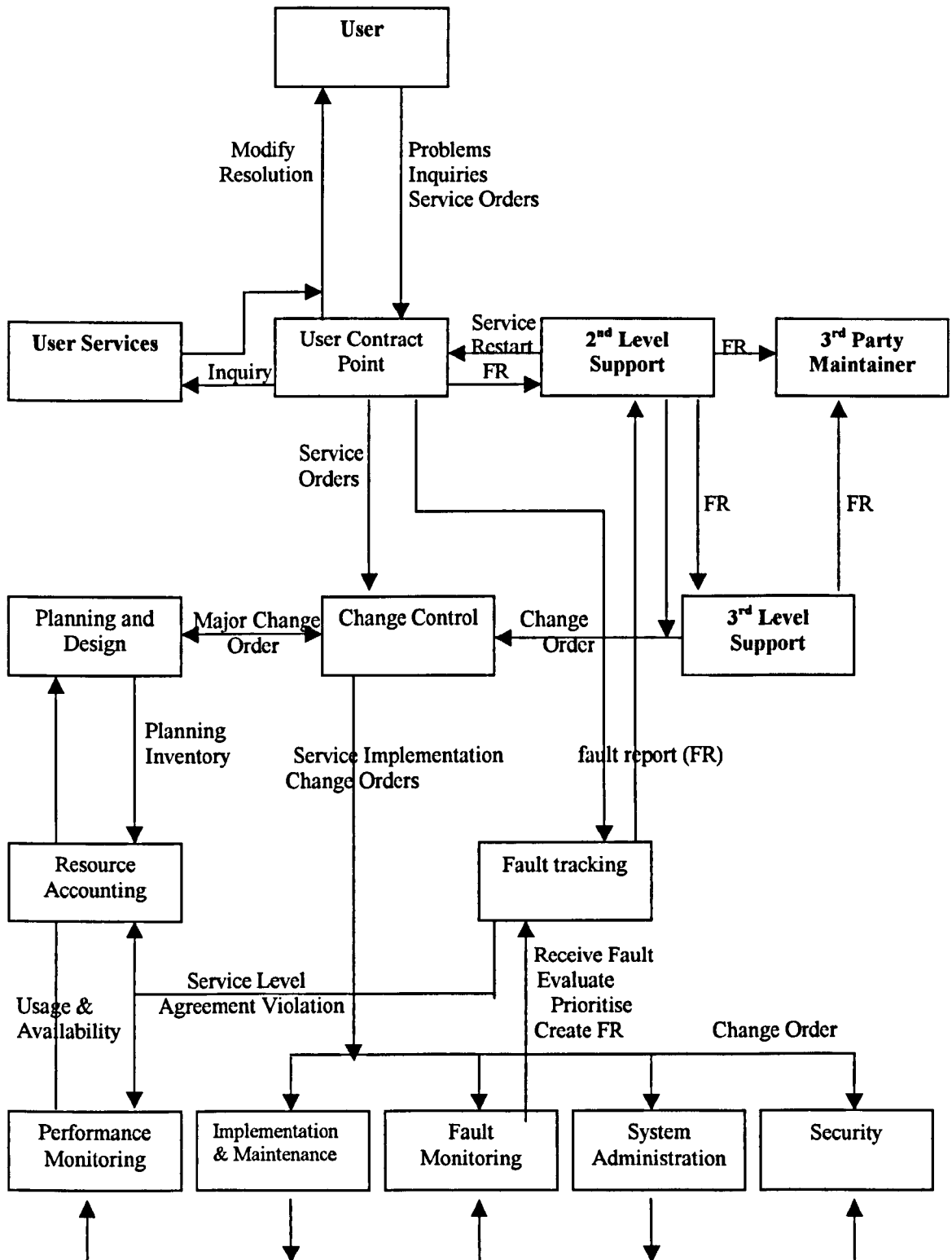


Figure 32. Network Information Systems Infrastructure

3.4 The Future IS Structure

The detailed description which has been provided of the current IS organisation of the MoPTT will provide the background for an outline of the direction in which IS now has to move, in order to equip the business units and operations which it supports for a competitive telecommunications market.

3.4.1 Overview of Skill Needs

The most important skills required by managers in the IS unit are indicated below. They are derived from the functions to be carried out, and are:

- Experience of computer departments with knowledge of the environments.
- Demonstrable senior management qualities in large IS projects and/or major IS function leadership.
- Experience in IS functions concerning electronics, telecommunications and hardware engineering, with knowledge of IBM, VAX, AT&T GIS, HP platforms, applications, software and communication environments.
- Experience of direction and strategy guidance for IS in the area of system architectures.
- Experience of technical responsibility for at least two large and complex telecommunication projects which have been completed and delivered.
- A thorough knowledge of LAN concepts, PCs, LAN topologies, operating systems (LANs and PCs), tools for administration, security, performance, etc.
- A thorough knowledge of IBM hardware and operating systems software, and a thorough knowledge of UNIX operating systems, LANs, server technology and related hardware and software.
- The necessary technical and management experience in telecommunications and IS to call for any specialised expertise that may be required to assist in system design, construction, delivery and operation.
- A good knowledge of current industry trends in IS.

A mix of people with a high experience of 10 years or more and people with only a few years of experience is recommended. This provides a balance of knowledge between older and newer technologies.

3.4.2 Overview of IS Structure

The IS organisation structure will be described according to the functions and services that it has to provide. This is independent of the implementation of this structure, especially regarding the outsourcing of one or more functions.

The main input to the design of the organisation structure will come from:

- application architecture
- data architecture
- management functions
- IS services to be provided
- geographic distribution of authority and functions.

The guideline for the organisation structure is the alignment of IS practices and effective support of the users of information systems with respect to the defined IS functions throughout the MoPTT.

The key organisational characteristic of the new IS infrastructure will be the management of distributed and integrated co-operative computing devices. These consist of a series of diverse technologies communicating via a common network. With tasks becoming increasingly more complex and interdependent, the IS function must provide a structure that will effectively support those IS services it provides. One important aspect is the end-to-end user support.

An organisational framework must be maintained with regard to communications, data resource management, processing management, and application development and support. This framework must address local priorities and business requirements, something which can best be achieved by integrating a strong central support group with local support staff. The main parameters for the IS organisational structure will be:

- Corporate planning functions will be necessary.
- IS strategies and objectives should be aligned with business strategies.
- Integration of IS services will be necessary for the effective management of a distributed environment.
- IS organisation must reflect a functional structure.

- The internal MoPTT user support will be a key issue for the coming infrastructure.
- Responsibility for the successful implementation of information systems projects by both business organisations and IS organisation will be necessary.
- There is a strong need to provide the corporation continuously with information about the latest IT.
- The importance of IT for the future business must be reflected in the MoPTT organisational structure.
- End-user computing support is an increasing key issue for the future infrastructure.

These parameters are the basis for the recommended organisation, which is indicated in the following organisational charts (Figure 33):

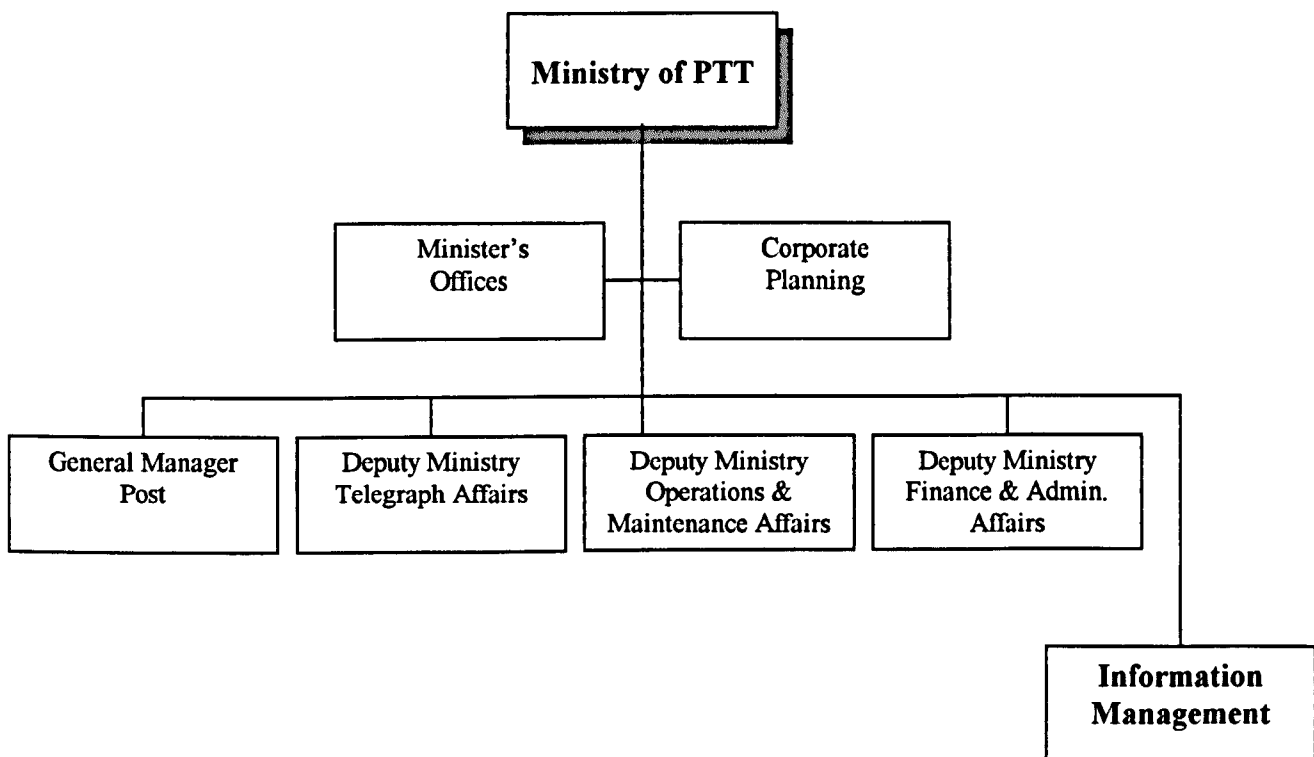


Figure 33. Future IS Organisation Architecture Chart, MoPTT

IS has been identified in Chapter 8 as one of the Critical Success Factors for the MoPTT. The new Information Management Department provides all Deputy Ministries with services. An alignment with the strategies of the Ministry requires the attention of and direct reporting to the Ministry. Cost effective control of the infrastructure has to be aligned throughout the Deputy Ministries.

The advantages of having the central Information Management Department report to the MoPTT are:

- There will be empowerment of the IS organisation to acquire resources to fulfil its charter
- There will be a direct link to business strategies by reporting to the same executive
- All business organisations, as customers of 'Information Management', can expect equal treatment in service delivery
- Service distribution and alignment with all Deputy Ministries and the Post Division of the MoPTT will be easier.

It is imperative that both the business units and the IS unit participate in an ongoing process of corporate planning. A high level of MoPTT corporate IS management commitment will be necessary to make decisions about the strategic directions and implementation of IT. A sub-committee, the IS Planning Group, will work to propose future technology and directions, prepare necessary proposals and documents, and support the decision-making process.

The current IS support units must align with corporate strategies. However, they must be allowed as much initiative as possible to be truly effective. Stated below are some basic assumptions about the structure that will result from this paradigm shift.

- Restructuring and alignment of the IS service organisation into the 13 new Districts of the Kingdom of Saudi Arabia will take place.
- Business organisations will be authorised to initiate, manage and complete IS projects directly.
- Business managers will have measurable objectives regarding business performance within their areas.
- Corporate applications and information management will be provided from a central IS support group, thus reducing duplication of effort.
- Authority of the 13 Districts to structure and ask for IS services for their areas will be given.
- A crucial back-up data centre function in the event of a disaster must be featured in the future design.
- A client/server environment facilitates the distribution of processing and will be the umbrella for end-user computing.

- The client configurations, which will be standardised, can then be managed centrally. The expected level of standardisation is higher in the business offices than at the corporate or District levels. This is because the users at the corporate and District levels use a greater mix of applications in order to support their specific needs.

The distribution of IS service sites will be closely related to the deployment of technology. IS units must ensure the efficient operation of the equipment in place. The following units supporting the IS function will be necessary within the MoPTT:

1. A management committee at corporate level to set corporate IS direction, and to make policies, approvals and priorities
2. A sub-committee to prepare issues and proposals for the corporate committee
3. Business analysts to be located in the business units as working staff
4. Audit function outside the IS units
5. Planning and major application development centralised in Riyadh
6. Data Centre in Riyadh
7. Data Centre in Jeddah
8. System administration and end-user support in districts according to equipment deployment and as needed
9. On-site technical maintenance as appropriate
10. A regular end-user computing forum to be held for communication, feedback and education purposes between IS personnel and the senior management of the MoPTT.

As we have already indicated, local IS teams should be given two reporting lines: one is to report to a central IS control group, and the other is to report to the local business unit. Both sides must agree to set objectives and measurable targets for these teams. To realise this strategic organisational direction, the MoPTT must take advantage of several opportunities:

1. Some of the new applications and technology will require extensive knowledge transfer to the MoPTT business units. A central Information Management (IM) Department will be created, which can become the main provider of this information and so bring value to the distributed ISSCs (see Section 3.4.3 below)
2. There is the possibility of introducing corporate standards effectively with the new information systems and applications
3. Business organisations rely more and more on the usage of IS.

4. These IS require corporate integration with existing systems and with each other
5. Business managers will have business performance objectives, thus creating interest in supporting the effective implementation of IS to support those objectives
6. IS support groups outside the direct control of the central IM Department will increase competition and increase the momentum of quality support of the group.
7. Integrated corporate IS require a corporate view of the infrastructure
8. Audit functions will support the objective view of service quality and delivery accuracy.

The distributed organisations will work together only if they see value in doing so. A framework has to provide the incentives for them to work with each other. This means that the co-operative support of IS must be agreed upon and supported by all levels of management throughout the MoPTT. Some issues may need to go up to the level of corporate planning with decisions that are made at Ministry level.

3.4.3 Central IS Organisation

While the new technical architecture will facilitate decentralised systems development, access to data, and operation by end users, there will be a need to centralise some functions in order to ensure that the MoPTT obtains effective use of its investment in information technology and resources.

To manage these functions, a central Information Management Department will be formed to gather together all existing IS development and operations groups. Some groups currently located in the business units must be integrated into this central IS support group. The F&A Division of the Ministry, parts of Strategic Resources, the Western Region Data Centre in Jeddah, and possibly others units which currently undertake IS functions need to be relocated under direct control of the central Information Management Department.

The central IM Department will be structured on a plan-build-run-support basis and will be responsible for the following broad functions:

1. planning the MoPTT's ongoing investment
2. management of the MoPTT IS budget
3. IS facilities and services planning

4. development and promulgation of IS policies and standards
5. provision of an internal systems development and support capability
6. management of the technical aspects of IS projects
7. design, development and support of an appropriate data network
8. provision of a kingdom-wide effective data processing service
9. operation of the data centres and local processing/network nodes
10. system software planning, installation and support
11. provision of support consultants to end-users
12. ongoing performance monitoring and provision of the IS service to users
13. management of technical IS training and development of staff
14. management of the contracts for acquisition and maintenance of IS hardware, software, and technical staff
15. relationships with computer vendors.

To enable the central IM Department to provide effective high quality service and facilities, it must be responsible for:

- the development and support of strategic IS applications (in-house or outsourced)
- the storage and distribution of corporate data (as distinct from local data)
- the development of corporate IS infrastructure and systems
- the maintenance of all technical IS planning and direction for local application development
- the promulgation of appropriate IS policies, standards and procedures for use by the IS user community.

Only by the allocation of these responsibilities to the central IM Department will the MoPTT be assured consistency in:

- access to corporate data
- installation of effective and standardised end-user LANs. PCs, etc.
- connectivity to the national kingdom-wide data network
- end-to-end user service and performance management
- cost effectiveness of IS investment
- corporate IS infrastructure alignment (corporate direction for integration and deployment of IT).

These assumptions, guidelines, and requirements lead to the following future organisational chart (Figure 34) for the central IM Department.

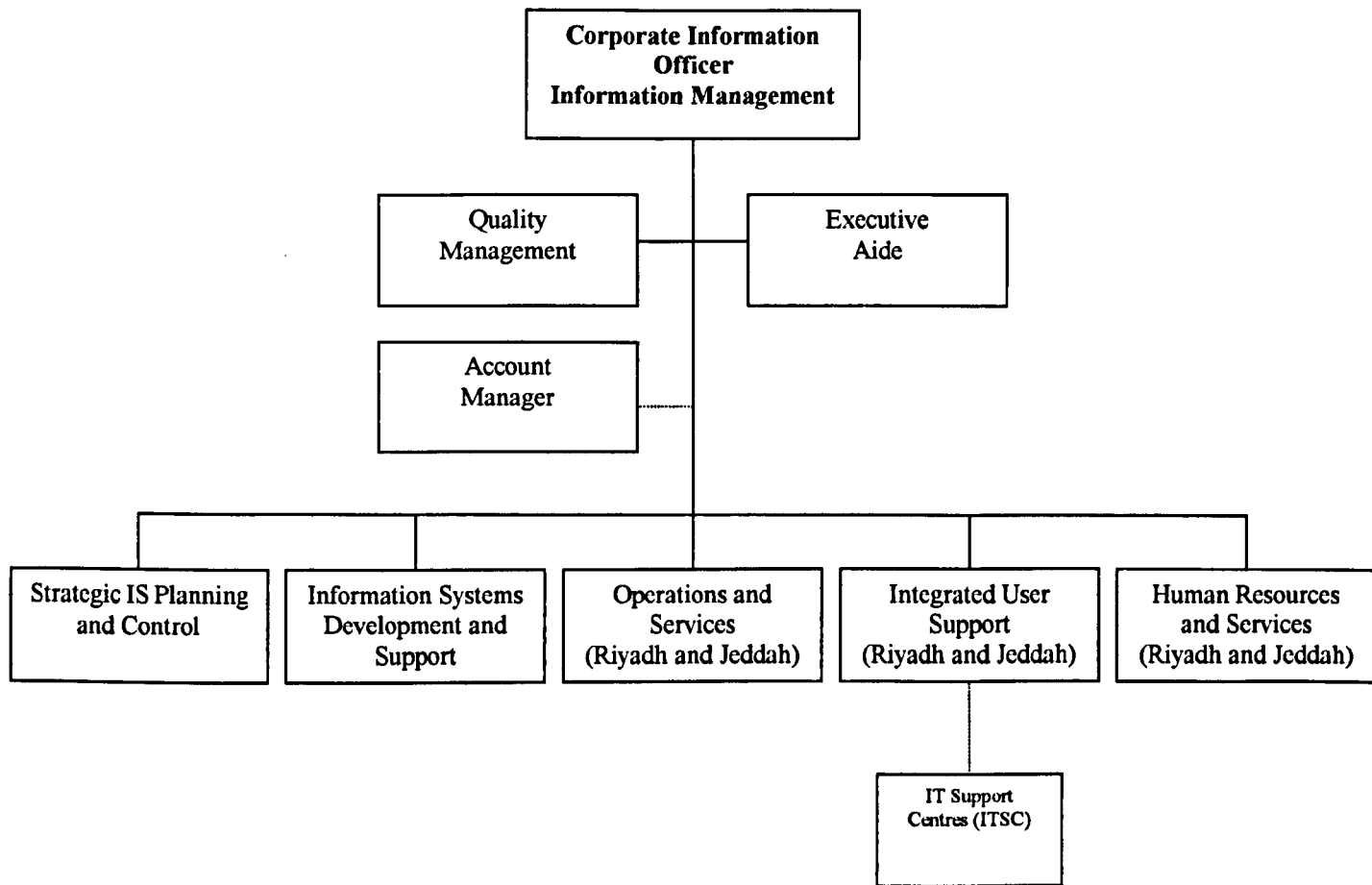
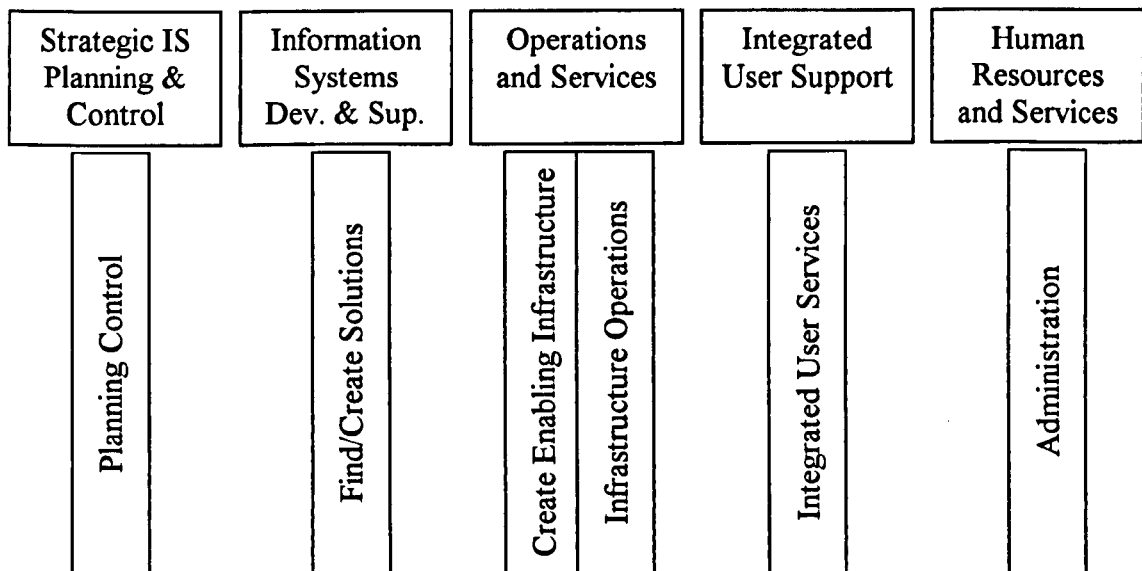


Figure 34. Future Organisational Chart for Central IS Management Group

The main IS functions/processes described at the beginning of this Appendix will be supported by this organisation in the following way:



HR and Administration should be a separate organisational unit. The creation and operation of the IS infrastructure will be combined in one organisational unit to fit best the complex requirements of a distributed processing infrastructure.

3.4.3.1 CIO Information Management (Corporate Information Officer)

The central IM Department will be led by a Corporate Information Officer (CIO) who will lead the MoPTT in the evaluation and development of a World Class IS service facility. The CIO will align the IS activities and service deliveries with the business activities of the Deputy Ministries and report their progress to the Minister and the organisational management. This will support the evolving needs of the MoPTT. The CIO will provide leadership to make IS a strong supporter of the enterprise goals, and he will head the IS forum. This forum consists of the CIO, the area managers of IS, and senior executives from the business units. The CIO will be responsible for the development and execution of guiding standards and principles at the enterprise level. The alignment of IS to the enterprise business goals will be of strategic importance. An ongoing review of IS investments, costs, and defined metrics will be necessary to ensure the overall performance of IS. The CIO must initiate proper actions to ensure the service delivery and quality of all IS organisational units. Strong co-operation with the dispersed units will be essential.

The occupant of the CIO position must be highly qualified and experienced in leading an IS group within a large organisation. He must be energetic and willing to provide the necessary leadership to IS staff and the business organisations where IS support is concerned. He must also be able to work co-operatively with and have the trust of the other senior MoPTT management.

3.4.3.2 Quality Manager

The individual appointed to the Quality Management position is responsible for quality recommendation and implementation plans, strategies, and procedures. These will be approved by the top executive officer of the MoPTT. He will implement the quality processes within the IS groups. He must also regularly check and report the progress of TQM implementation.

3.4.3.3 Account Management

The Account Management group will have representatives from each major business unit. This position of the Account Manager will communicate the needs of the business unit to the central IM Department. Knowledge of the business processes is a prerequisite along with an understanding of IS. The holder of this position will work closely with business management to prioritise projects. An assignment duration of one to two years will ensure that the individual does not lose touch with his original working environment and can continue on his career path. He will also have to manage the level of IS investment the business organisation will apply to support its business activities.

3.4.3.4 Strategic IS Planning and Control

This area will develop and monitor the strategic plans for IS. Co-operation with the Corporate Planning group will be essential to receive plans for corporate information technology investments. Outside relationships and knowledge transfer for advanced technologies will be part of this area. Maintaining control of the enterprise information systems will guide developments of application portfolios and future projects to invest in IS architecture and infrastructure. This group must also accurately report appropriate IS parameters to the CIO and the MoPTT upper management.

3.4.3.5 Information Systems - Development and Support

The term 'IS' is used rather than 'application', as the latter term refers to only a part of the whole system as described in the technology architecture. The Ministry will develop IS that account for all layers of the technology. A large part of the development will deal with issues of integration, applications, data, and diverse technologies. The emphasis will be on the acquisition of packages, customisation, the development of interfaces and ongoing systems support. The acquisition of a large number of packages requires close management of their implementation. This group will provide management for the technical part of IS projects undertaken by the business units. This can range from the full management of the IS portion of projects to the steering of smaller end-user projects.

3.4.3.6 Operations and Services

This area is responsible for operating and supporting the technology infrastructure. It must cope with a multi-vendor environment and provide expertise for all

implementations. An integrated view will allow the management of available resources and performance. Centres of expertise will combine skills and apply them over products or implementations. The Operations and Services area will help to implement different levels of service agreements and provide a way to monitor them.

3.4.3.7 Integrated User Support

The Integrated User Support area will be an integrated set of services to the user community with a central contact point. It will assist in knowledge transfer, service orders and dispatching of such to appropriate personnel for second level support. It will contain the support for the office automation environment.

3.4.3.8 Human Resources and Services

This area will determine the procedures and hiring strategies for recruiting IS personnel. In addition, it will provide administrative services and contract management for outsourcing contracts. This area will collect data about the use of IS organisation resources and report it to management for budget planning and investment control purposes.

3.4.3.9 Computing Centres

There will be two main computing and data centres for IS services, Riyadh and Jeddah. The two computer centres in Riyadh and Jeddah will provide equivalent service for operations and technical support to serve as backup centres in times of disaster recovery. However, there will be a different level of expertise for certain functions. Jeddah will be equipped to allow continued processing after a disaster at Riyadh for the corporate strategic applications, as defined by the IS Forum.

The two computing and data centres will look after the following areas:

- equipment
- capacity
- skills
- tools/documentation
- communications facilities.

Two main centres will suffice, under the assumption that there is enough network

bandwidth for client access from Districts and for corporate use. It will simplify the deployment of skilled support personnel for administration and maintenance of the processing systems.

The local administrators will report to the districts or departments within the unit. In addition, they will report to the Integrated User Support area of the central IM Department. Education plans and regular update and performance assessment meetings will be scheduled centrally.

3.4.4 Service Distribution of Central IM Department

Planning and Information Systems Development and Support will be centrally located in Riyadh. HR and services will have an integrated function for human resources. As well as centrally in Riyadh, IS human resource personnel will also be located in Jeddah and in the districts. Operations services will be split according to application requirements. The main application responsibility will be determined on an application-by-application basis in later stages of analysis. The second level support for products and applications will be distributed between Jeddah and Riyadh, and it should be noted that the Integrated User Support unit will have personnel in both Jeddah and Riyadh. According to the two administration domains (Riyadh and Jeddah; see Section 3.4.5 below) in the Kingdom, users will call the appropriate support line.

3.4.5 Administration Domains

The 13 Districts will be supported according to their geographic location in Saudi Arabia. The Districts to be supported by the MoPTT (in alphabetical order) are:

- | | | | | | |
|------------|------------|-----------|---------------------|------------|----------|
| 1. Al-Baha | 2. AI-Jouf | 3. Asir | 4. Eastern | 5. Hail | 6. Jizan |
| 7. Madinah | 8. Makkah | 9. Najran | 10. Northern Border | 11. Qassim | |
| 12. Riyadh | 13. Tabuk. | | | | |

Two data processing domains will be set up on the computing centre facilities in the Kingdom:

- Riyadh domain: districts 2, 4, 5, 10, 11, and 12
- Jeddah domain: districts 1, 3, 6, 7, 8, 9, and 13.

This is the most efficient way to provide service to these Districts.

The main character for operations and services will be the central, integrated management of the distributed systems. Tools will be provided for applications, systems and network administration, and maintenance to minimise the need for local support personnel.

Two user contact points, each with its own call number, will be established in Riyadh and Jeddah. The dispatcher at the user contact point may dispatch the calls to the appropriate service person or may create a fault report. The support individual will create fault reports, service orders, and inquiries. The problem or request will be dealt with according to service agreements or escalation procedures.

3.4.6 Distributed User Support Groups

End-to-end responsibility for response time and reliable service to end-user terminals will belong to the centralised IM Department and the distributed user support groups. However, the responsibility for guidelines, policies, service definition, and service agreements will be with the central IM Department alone. This group will be required to manage and co-ordinate members of staff who are involved in the various stages of service delivery. This includes personnel involved in local LAN support, network support, application use support, and the mainframe data centre.

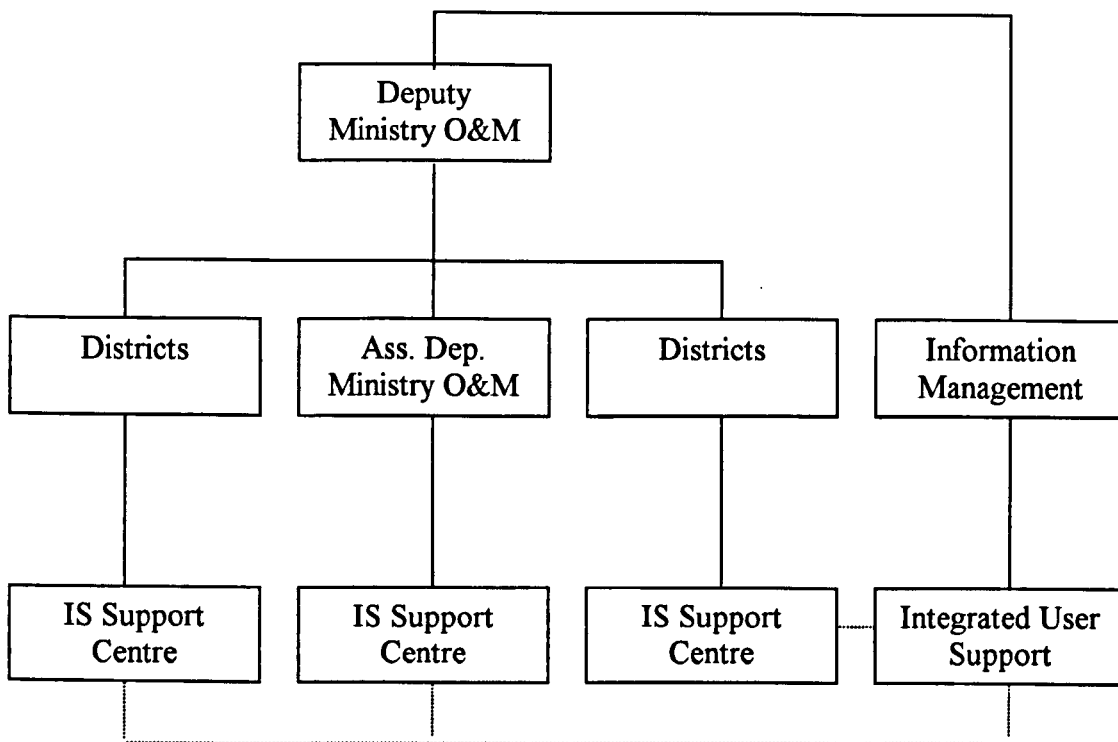
Application user support, user computing, and business organisation LAN activity at the corporate and district level will require that IS staff be located on-site. These individuals will follow standards and procedures created and approved by the centralised IS group. From time to time, this local user computing staff will need to meet with the central IM Department staff, as this permits training on new standards and procedures and an opportunity to share service needs in the user environment.

Each District will have an IS support unit reporting to the Ministry's District Manager. At the corporate level, the business units will supply groups of IS support personnel as appropriate. These groups will have a functional responsibility to the User Computing Department within the central IM Department. The responsibilities of the IS support units in the Districts are:

- assistance to central help desk with first level help-line support to local users

- local maintenance of IS systems (all functions that cannot be carried out from a central maintenance centre, e.g. printers, technical service, maintenance of locally developed applications)..
- local installation and system software maintenance.
- local administration functions that cannot be performed from a remote location, such as tape management for backups and restores
- local end-user computing support
- functional linkage and communication with central IM Department
- advice on how best to implement IS to meet local user business needs
- dissemination of technical information concerning IS use
- distribution of technical standards and procedures for local IS use and facilities, (reporting violations)
- co-ordinating the purchase of all PCs and associated facilities in their areas
- co-ordinating plans for the future local use of computing facilities.

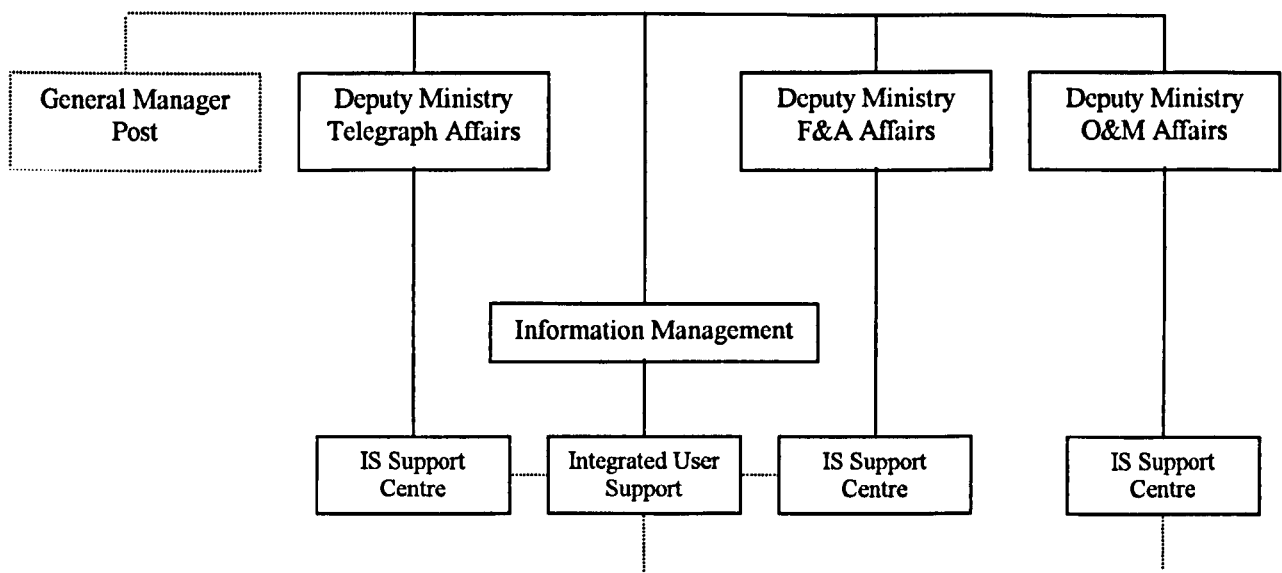
The groups at the District and corporate levels will be staffed locally. However, they will be supported by the Riyadh and Jeddah central IS support units. The centres will dispatch requests, fault reports and service orders to the local personnel if such action requires an on-site visit. This can be seen in Figure 35.



The Integrated User Support Group has functional responsibility for the IS support centres

Figure 35. IS User Support Organisations (O&M)

The Deputy Ministries will be supported in the same manner as the districts and the headquarters of the O&M Division, as can be viewed in Figure 36.



The Integrated User Support Group has functional responsibility for the IS support centres

Figure 36. IS User Support Organisations (Deputy Ministries)

3.4.7 Business Analysts

Every business unit will provide sufficient resources to meet the strategic plan for information systems and this includes the provision of business analysts for IS projects.

How this will operate is that the sponsoring business unit will specify the business requirements and undertake user acceptance testing for an application system, whether it is to be developed internally, acquired as a package, or developed by an external organisation. Analysis of the business needs of an application requires full and current knowledge of the business processes involved and the plans for future operations. This is best done by business staff with analytical skills, who are taken out of the field for a short time and returned after completion of the project. This staff will work in a project team with skilled IS resources.

It is recommended that staff skilled in business analysis should be retained in the various business units. However, the staff concerned should not operate as a separate specialist unit but be integrated into the business activities to retain up-to-date business knowledge.

Where an application is to be developed or acquired as a corporate system covering the business needs of a number of business units, only one business unit, the sponsoring unit, will need to contribute the appropriate business analysts.

3.4.8 Systems Analysis and Design

These functions will be undertaken by professional IS staff whether MoPTT staff or outside contractors. The MoPTT internal IS systems analysis and design staff will be located in the central IM Department, which will be responsible for all dedicated professional IS staff. User computing will be undertaken by users with assistance from the central IM Department or contracted out as appropriate.

3.4.9 Application Development

Application development will be available across the organisation, but the use of a large number of application packages and the need for sophisticated tools will not permit a wide spread of application development expertise throughout various Ministry localities. It would be too costly for the MoPTT to retain skilled personnel such as CASE tool

specialists in each business unit. These units will be able to use productivity tools and office automation tools to develop small local applications as needed, but large scale and corporate or strategic development should be centralised. Application development and support for corporate and strategic applications should therefore be located in Riyadh, as should management of outsourced application development, while application development with local productivity tools should be located at user sites for local needs only.

The central application software development and support unit in Riyadh will be responsible not only for corporate applications but also for defining development and support standards and guidelines. The business units within the MoPTT will be responsible for project starts and project management, specification and acceptance. IS Development and Support will have to provide skilled staff to maintain and develop applications. The application can be either developed internally, externally or as a package that needs customisation.

The development and support area will be divided into groups serving the major MoPTT business units in application development and maintenance in order to concentrate business and application knowledge. However, it is possible that local applications not requiring corporate involvement can be developed with local staff. Examples of these would be reports, automation of functions with macros, and applications with local productivity tools. Application software development will be undertaken and managed more in the headquarters of the various business units and less in the District offices.

3.4.10 IS Auditing and Support of Corporate Auditing

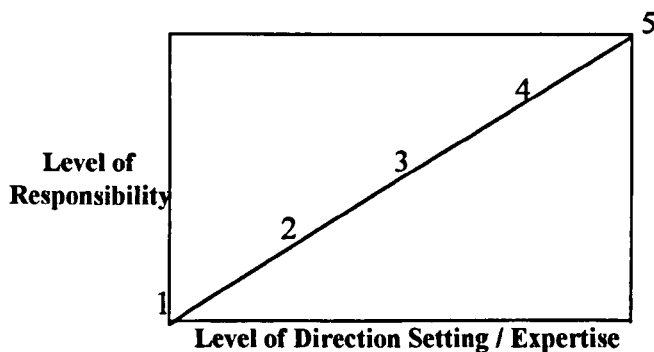
The audit function for IS services and infrastructure will best be located in a corporate auditing group with support of the central IM Department. It will monitor the performance of the IS units and ensure their conformity with IS policies. Positive actions to ensure effectiveness include:

- Audit of system and/or application software releases on IS equipment
- audit IS service performance according to service agreements
- audit communication behaviour among IS units
- audit approval, operation and processing throughout the IS units.

The central IM Department will help set up the audit procedure such as developing programs to automate the auditing of IS and providing data from fault tracking.

3.4.11 Functional Distribution

Matrix 1 shows the distribution of functions over the main IS units. The numbers indicate the level of expertise required. The higher the number, the greater the required skills and the more the organisational unit is responsible for the setting of directions and the level of control.



Matrix 1. Distribution of Functions

Currently the actual staffing and final personnel distribution in relation to the centralisation of services in the main computing centres and at the corporate and Districts levels will depend on:

- the deployment of technology geographically
- the geographical spread of user sites
- the availability requirements from the applications.

3.5 Service Relationships

This section describes the relationships among the various IS organisational units, and their relationships to units outside the MoPTT. Figure 37 depicts the ability of any unit to interface both within the central IT Department and with external business organisations. Not all interface paths are used and not all are bi-directional.

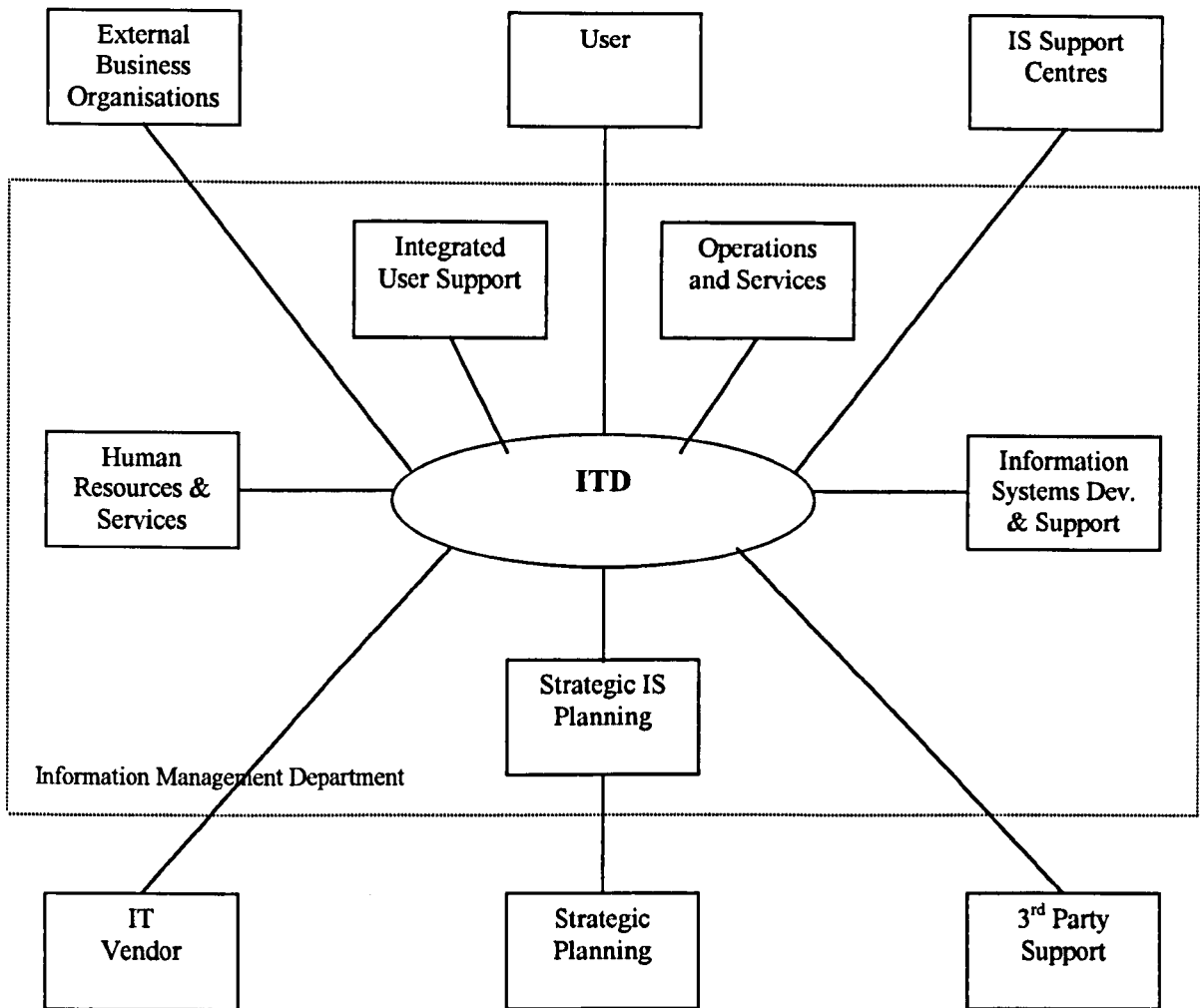


Figure 37. Service Relationships of IS Organisations

The description of these service relationships shows the main communication flows. The following notations are used:

⇒ From Unit to *Unit*

⇐ To Unit from *Unit*

⇔ Co-operation

3.5.1 Relationships External to Central IS Units

External Business Organisation

The business organisation will channel IS requests through a decentralised support unit. The following internal information flow will be necessary:

Strategic IS Planning

- ⇒ update information to strategic IS plan.
- ⇒ updates information to corporate Models (organisation concerned, processes required, etc.)
- ⇒ requirements for IS

Information Systems - Development and Support

- ⇒ application change requests
- ⇒ requests for project management
- ⇒ requests for development of IS
- ⇒ functional definitions of new IS

Operations & Services

- ⇒ change of orders for application processing
- ⇒ performance requirements

Integrated User Support

- ⇒ IS services

Human Resources & Services

- ⇒ receiving account balance for IS services
- ⇒ service agreements

IS Support Centre

The IS support centre will be guided by the central IT Department. The centre will give local administration support where central units need it. In the event of necessary software development at a local level, personnel will be supporting the local users.

Strategic IS Planning

- ⇒ information about infrastructure planning

Information Systems - Development & Support

- ⇒ information and recommendations about development tools

Operations & Services

- ⇒ monitoring of activities
- ⇐ fault reports and service orders that must be handled locally
- ⇐ execution schedules that must be supervised locally
- ⇐ local OA&M procedures

Integrated User Support

- ⇒ problems and fault reporting
- ⇒ local application information
- ⇐ standards and policies
- ⇐ training schedules

Human Resources & Services

- ⇐ hiring policies
- ⇐ job descriptions and skill requirements
- ⇐ co-ordination of IS staffing requirements
- ⇒ issues on human resources

Third Party Support

Third party support will be involved according to service contracts and service agreements. The main contact is Operations.

Strategic IS Planning and Control



Information Systems - Development and Support

- ⇐ requests for support of tools and software as appropriate

Operations and Services

- ⇒ bug fixes or recommendations for fault resolutions/work-arounds
- ⇐ fault reports as appropriate (according to escalation procedures)
- ⇐ managing fault reports to third level support

Integrated User Support

- ⇐ problems and fault reporting
- ⇐ violation of service agreements

Human Resources & Services

- ⇔ contract management with third party company

Strategic Planning

Strategic IS Planning mostly works with Strategic Planning. High level plans and project progress reports must be exchanged.

Strategic IS Planning

- ⇐ reports on key indicators and performance measurements.
- ⇒ business strategies and goals

Information Systems - Development and Support



Operations and Services



Integrated User Support



Human Resources and Services

- ⇔ resource planning and human resource policies

3.5.2 Relationships within Central IS Organisations

Strategic IS Planning

Strategic IS Planning will develop the overall information systems strategies. It will work closely with the other IS areas to ensure the implementation of those plans.

Information Systems - Development and Support

- ⇒ high-level data and process models
- ⇒ application portfolio management (application priorities)
- ⇒ technology direction
- ⇒ architecture

Operations and Services

- ⇒ service planning
- ⇐ architecture and infrastructure issues
- ⇐ service level monitoring

Integrated User Support

- ⇒ policies and standards
- ⇐ architecture issues

Human Resources and Services

- ⇒ budget plans

Information Systems - Development and Support

IS Development and Support will have to co-ordinate all application development at the corporate level. Project management and implementation of the information architecture will be:

Operations and Services

- ⇔ change control
- ⇒ performance requests
- ⇒ application releases
- ⇐ administration requirements

Integrated User Support

- ⇐ problems and fault reporting

Human Resources and Services

- ⇔

Operations and Services

The business units will channel IS requests through a decentralised support organisation. The following information flow will be necessary:

Integrated User Support

- ⇐ problems and Fault reporting
- ⇐ violation of service agreements

Human Resources and Services



Integrated User Support

Integrated User Support will be responsible for keeping the user community up-to-date with the latest news about IS. It is further responsible for ensuring quality service regarding inquiries, problems, and orders.

Human Resources and Services

- ⇔ resource planning

The main characteristic of these service relationships is the overall end-to-end user support for IS. Even though the MoPTT is divided into different units, the service relationships have to ensure efficient and effective support of the user. This support will adhere to service agreements and strategic goals and objectives of the external business organisation. The organisational units will participate in the process described earlier for user contacts in the following way:

Appendix G

1. Questions that were asked to Scoping Agent of the MoPTT

1. What are the common elements of information strategy that apply throughout the MoPTT? (Direction.)
 - *No elements expect budgeting (in isolation)*
2. What are the current business strategy, objectives, resources, processes and the culture and values of the business in the MoPTT? (The internal business environment) (Direction) [Strategic Planning, Marketing]
 - *No current business strategy yet. [PA addressing the Question]*
3. What is the economic, industrial and competitive climate in which the MoPTT operates? (The external business environment (Management.) [Strategic Planning, Marketing]
 - *MACI Government Economy, Telecommunications industry, Monopoly, Demands exceed supply.*
4. Does the MoPTT ensure that a sound information systems architecture is created so that high quality systems can be built and maintained? (Management) [Strategic Planning, Marketing]
 - *Contracted: EIS*
5. Does the MoPTT determine policies for the management, creation, maintenance, control and accessibility of the corporate information resource? (Direction) [Marketing, Material Management, Network Development and Network Management]
 - *Not yet*
6. What are the key business in the MoPTT? (Direction) [Marketing]
 - *Services of Land Line, GSM, Pager, Satellite, ISDN, Directory Services and Internet.*
7. What is the financial health of the MoPTT, in terms of its debt, liquidity and assets?

(Direction) [Financial Management]

- *High Revenue, High Overhead, Best Turnover, and liquidity, High assets.*
8. What is the proportion of turnover reinvested into researching new products and markets?
(Direction) [Marketing, Financial Management and material management]
- *Ad hoc not assigned % of turnover.*
9. What are the attitudes and culture of the MoPTT? (Management)
- *Government oriented culture and attitudes*
10. Does the MoPTT have the ability to adapt to changing circumstances (privatisation)? And if so, how? (Direction) [Strategic Planning, Marketing]
- *Potentially Yes, Building Corporate Model, capability of change structure, Flexible infrastructure, and Information*
11. Who are the MoPTT's competitors, both current and potential? (Direction) [Marketing]
- *Not yet clearly identified, but are ready to enter the market once open.*
12. After privatisation, is the MoPTT going to be a joint stock company? If so, what is the opportunity for increasing the MoPTT share of the market, or for increasing the total size of the market? (Direction, Management) [Strategic Planning, Marketing and Financial Management]
- *Yes, Both the share and (he she of the market are suffering from of excess of demands. This is affected by the network capacity. Increasing the size and the share will be feasible.*
13. Is there a description of the information architectures of each unit in the MoPTT?
- *Within the Saudi Telecom unit of the MoPTT, there is a description of the information architectures. This is not the case for the post unit.*
14. What are the policies and strategies for the management of technology and specialist resources in the MoPTT? (Direction) [Strategic Planning, Material Management]
- *No policies, service management strategy for the IT sector.*

15. How should the new applications and supporting technology be managed and who should be responsible for that in the MoPTT? (Management) [Strategic Planning, Material Management]
- *Should be managed by each business units and be supported by the IT Sector.*
16. Should the role of the IT departments be extended or should such systems be the responsible of users in the MoPTT? (Direction) [Strategic Planning, Human Resources Management]
- *The role of IT departments should be extended us service management.*
17. Will the new office systems be an extension to a department level of personal computing or an integral part of the MoPTT's information processing ability and resources? (Management.) [Strategic Planning]
- *Not clear.*
18. How will the management of personal computing and of office systems relate in the MoPTT? (Management)
- *They will be related.*
19. To what degree is the MoPTT top management involved in the impetus? (Management) [Strategic Planning]
- *Heavily involved.*
20. Does the MoPTT use consistent information definition, in order to allow for effective Inter-communications? (Management).
- *Yes.*
21. How does the MoPTT select new IS/IT environments for the future? (Direction) [Strategic Planning, Marketing]
- *According to the strategic choices of the PA.*
22. How does the MoPTT distribute data and systems development capabilities to end-users? (Management) [Strategic Planning, Customer Service].

- *Client service approach and empowering the user.*
23. What is the relationship between the MoPTT and the other business in the telecommunication market? (Direction)
- *Membership.*
24. How does the architecture of the service systems need to be re-built after privatisation? (Direction) [Strategic Planning, Marketing]
- *PA considered the privatisation as an assumption.*
25. What are the MoPTT main business areas and processes? (Direction) [Marketing]
- *COM, Customer Service and Business Support.*
26. Who is responsible for determining the business scope of the MoPTT now and after privatisation? (Direction) [Strategic Planning]
- *B.O.D.*
27. Will there be a Regulator and if so, what will the scope of regulation be? (Direction) [Strategic Planning]
- *There will be, not yet established.*
28. What was the structure of the previous IS/IT strategy of the MoPTT, and how much change is needed for the current one? (Direction) [Strategic Planning, Marketing]
- *The structure was a scattered one moving towards integration, great change is needed.*
29. What is the current and future information that the MoPTT needs in order to reflect close alignment of business and IS strategies, objectives and functions? (Direction) [Strategic Planning, Marketing]
- *Adapting the PA and its methodology (Navigator of E & Y).*

2. Questions that were asked to Resourcing Agent of the MoPTT

1. What are the main stimuli promoting the need for IS planning in the MoPTT? (Direction) [Strategic Planning]

- *The enterprise had conducted the planning phase (Review of the Corporate Model). The IT Sector within the STC.*
2. What issues, constraints, underlying problems and risks are likely to affect the conduct and outcome of IS planning? (Management) [Strategic Planning, Marketing]
 - *Resources and appreciation of the planning function.*
 3. How much responsibility for planning decision lies within the MoPTT? (Direction) [Strategic Planning]
 - *Not very much, yet.*
 4. Where should the MoPTT IS planning be focused - at the strategic business unit or on specific core business processes? (Direction) [Strategic Planning, Marketing and Network Development]
 - *The concept of strategic business unit is not defined in the MoPTT. IS planning focused on all business areas.*
 5. What are the MoPTT expectations and objectives to be met by its IS planning? How will these be demonstrated? (Management) [Strategic Planning, Marketing and Network Development]
 - *To understand, document, promoting and creating planning function across the enterprise.*
 6. How should the IS strategy be marketed and consolidated with the other elements of the business strategy to ensure that optimal support and co-operation are obtained from the MoPTT? (Direction) [Strategic Planning, Marketing and Network Development]
 - *IS strategy should be aligned with business strategies.*
 7. Should the approach employed be totally prescriptive, tailored or a mixture of both in the MoPTT? (Management) [Strategic Planning]
 - *A mixture of both*
 8. How can the MoPTT build on its previous experience of IS planning? (Management)

[Strategic Planning, Network Management]

- *Improving the process.*
9. What IS planning approaches have already been found to be effective in the MoPTT? (Management) [Marketing, Network Management]
- *Defining and analysing the requirements.*
10. What IS planning resources are already owned by the MoPTT? (Management) [Network Management]
- *Subject matter experts in analysing the IS requirements.*
11. Where is the IS planning responsibility located in the MoPTT? (Direction)
- *In the IT Sector.*
12. Which skills should ideally be involved in the MoPTT planning process and are they available? (Management) [Strategic Planning]
- *Communications, Consolidation of Information, Follow-up, Monitoring. Not widely available.*
13. What training for these skills is required in the MoPTT? (Management) [Training Management]
- *Inter-personnel skills and management.*
14. How long will the MoPTT IS planning process take and what will it cost? (Management) [Strategic Planning, Financial Management]
- *The first iteration is concluded in November 1995.*
15. How is the IS planning process steered and managed in the MoPTT? (Management) [Network Management]
- *Was steered and managed by Deputy Ministers.*
16. What are the resources available within the MoPTT? (Management) [Material Management, Financial Management]

- *Material Management, Financial, Training, Human Resources, Planning, Land & Building, Contracts & Procurements, Vehicles, and Marketing.*
17. What are the MoPTT's employees skills, training, experience and motivation?
(Management) [Human Resources Management]
- *High % not very skilled, lack of highly qualified staff.*
18. What are the resulting business competencies available in the MoPTT? (Management)
[Material Management]
- *Fairly business competencies on old products.*
19. What is the age of physical assets, the technology employed and its usefulness?
(Management) [Material Management]
- *Varies.. From 30 years to less than one year.*
20. What is the effectiveness of the operational and management process in the MoPTT?
(Management)
- *Not very effective... Margin for improvement exists.*
21. Does the MoPTT equip the IS function in order to be responsive to fast changing business needs, and to be able to meet urgent requirements? (Direction) [Strategic Planning) Marketing and Material Management]
- *Case tools are intend to enable the STC to respond fast to change.*
22. Does the MoPTT plan to reposition the IS function more centrally in the business after privatisation with representation at top management level? (Direction) [Strategic Planning]
- *IT function is represented by a VP.*
23. Does the MoPTT identify a portfolio of skills that will be required over the lifetime of the IS plans, and develop migration plans in order to overcome weakness and exploit the skills in the IS function? (Direction, Management) [Strategic Planning, Network Development and Network Management]

- *A portfolio is identified. Not yet implemented or adapted.*
24. Does the MoPTT provide an effective and achievable organisation structure for the IS function? (Direction.) [Strategic Planning, Marketing]
- *The current IT sector needs substantial support and resources to be effective.*
25. What is the current IS perspective in the business, its maturity, business coverage and contribution, skills, resources and the technological infrastructure in the MoPTT? (The internal IS environment) [Marketing, Material Management]
- *Growing in some areas, matures in others.*
26. How will each unit or function deploy IS in achieving its business objectives in the MoPTT? (Management) [Strategic Planning]
- *Each unit (Business unit) will deploy IS as defined by the planning and analysis Phases, of the Program Analysis.*
27. What is the current application portfolio of existing systems and systems under development, or budgeted but not yet under way in the MoPTT? (The internal IS environment) (Management, Direction) [Marketing]
- *Integrated Customer Management Systems (ICMS) for the customer care and services, to be interfaced with the central operation management and business support systems.*
28. What are the technology trends and opportunities for the MoPTT? (The external IS environment) (Direction) [Marketing, Material Management]
- *Telecommunications industry Trend... Ever changing and dynamic.. New technologies may present new opportunities (i.e. Internet, Multimedia, and ISDN..).*
29. What is the use made of IS by competitors of the MoPTT? (The competitive IS environment) (Direction) [Marketing]
- *Research is requested in this area.*
30. How will IS be used at some future date in the MoPTT in order to help the units to achieve their objectives? (Direction) [Strategic Planning, Marketing]

- *Through corporate data and executive information systems.*
31. Does the MoPTT ensure that the IS function is outward looking and not focused internally on technology issues, and that the aims of the function are not only clearly linked to business needs but also widely communicated? (Direction, Management) [Strategic Planning, Marketing]
- *The analysis was done to align IS with business. The aims of the function are widely communicated.*
32. Does the MoPTT ensure that there is an acceptance of shared responsibility between IS and business people for the successful exploitation of information and technology? (Management) [Strategic Planning, Marketing and Material Management]
- *There is acceptance and improved insurance.*
33. How constraining is the current IS portfolio in the MoPTT? (Management)
- *Not really constraint.*
34. What is the relationship between IS and the business in the MoPTT? (Management)
- *Alignment.*
35. What are the objectives of IS in the MoPTT? Is it the same objectives as the business? (Direction) [Strategic Planning, Marketing]
- *Both IS and Business have corporate goals and objectives to achieve.*
36. What sort of information systems does the MoPTT need to support its business? And once the MoPTT privatised, what sort of information systems will the new MoPTT need? (Direction) [Strategic Planning, Marketing]
- *The current (under developing) IS arc based on a flexible analysis and architecture that will roughlyly cover the need for privatisation.*
37. What are the contents and features that information systems might be relevant to the privatisation of the Saudi PTT? (Direction)
- *Shares and Stock exchange in Finance, Marketing, Human Resources, and Strategic*

plan.

38. How could IS affect the product, and services, markets and economics of production in the MoPTT? (Management) [Marketing, Customer Service, Material Management and Financial Management]
- *Using the technology to help the decision-makers of these functions.*
39. How could IS affect the nature and value of the product or service and its life cycle in the MoPTT? (Management) [Customer Service, Material Management and Financial Management]
- *The telecommunications industry and IT in general has short life cycle. IS should enable the STC to cope quickly with imposed or emerged threats and opportunities.*
40. Who has the responsibility of justification of the IS/IT budget in the MoPTT? (Direction) [Strategic Planning]
- *VP for finance in co-operation with VP of IT.*
41. Do users, management and IS professionals understand the key elements of the IS strategy they have to carry through the MoPTT? (Management) [Strategic Planning, Customer Service, Network Management and Human Resources Management]
- *No, efforts are needed to market the IS strategy across the organisation.*
42. What is the IS/IT management strategy of the MoPTT? (Direction) [Strategic Planning, Network Management]
- *Service management to business.*
43. What is the business IS strategy of the MoPTT? (Direction) [Strategic Planning]
- *Not answered.*
44. What is the IT strategy of the MoPTT? (Direction) [Strategic Planning]
- *Not answered.*
45. Who is responsible for making resourcing decisions in the MoPTT, now and after privatisation? (Direction) [Strategic Planning]

- *Now: Human Resources.. ?*
46. From where is the MoPTT getting resources (now and after privatisation) (Management) [Strategic Planning]
- *National, International and through Contractors.*
47. What resources will the MoPTT own and from whom will it resource those that it does now own? (Management) [Strategic Planning, Material Management]
- *The STC owned its core business, systems and equipment direct employment of the majority of Human Resources. Will recruit from all over the world.*
48. What information systems does the customer domain in the MoPTT contain? (Management) [Customer Service]
- *Integrated Customer Management Systems (ICMS).*
49. What information systems does the service domain in the MoPTT contain? (Management) [Customer Service]
- *Integrated Customer Management Systems (ICMS).*
50. What information systems does the network, domain in the MoPTT contain? (Management) [Network Management]
- *Variety of systems, mainly Lucent based systems, and other telecommunications vendor (SIEMENS & ERICSON, etc.)*
51. What information systems does the billing domain in the MoPTT contain? (Management) [Customer Service, Financial Management]
- *Integrated Customer Management Systems (ICMS).*
52. What information systems does the equipment domain in the MoPTT contain? (Management) [Material Management]
- *Oracle package for Material Management.*
53. What information systems does the employee domain in the MoPTT contain?

(Management) [Human Resources Management]

- *Oracle package for Human Resources.*

54. What is the relation between each of these domain information systems? (Management)

- *Supposed to be interfaced with the ICMS.*

3. Questions that were asked to Delivering Agent of the MoPTT

1. What are the products and services currently being offered by the MoPTT?
(Management) [Material Management, Customer Service]

- *Landline*
- *GSM*
- *Telex*
- *Pager*
- *Satellite Based Services*
- *ISDN*
- *Directory Services*
- *Internet.*

2. What is the number of new products awaiting development? (Direction) [Strategic Planning, Material Management]

- *Not known.*

3. What was the quality of the past history of the resource and development function?
(Management) [Strategic Planning]

- *Sufficient / below the standard.*

4. How will the large new investment required in hardware and software for the MoPTT be justified? (Direction) [Strategic Planning, Material Management and Financial Management]

- *By alignment of IT strategies with business strategies.*

5. How the products and services being offered by the MoPTT? (Management) [Material

Management, Customer Service]

- *By automation of the business requirements and integration of systems.*
6. What is the number of new products awaiting development? (Direction) [Strategic Planning, Material Management]
 - *No Research and Development for products development.*
 7. What are the products that are nearing obsolescence in the MoPTT? (Execution) [Strategic Planning, Material Management]
 - *Telex is dying and in its late life cycle. Pager is perhaps in declining life cycle.*
 8. What are the products that are mature in the MoPTT? (Direction) [Material Management]
 - *Land Line.*
 9. What are the products that are of strategic importance to the MoPTT? (Direction) [Strategic Planning, Material Management]
 - *GSM (as still growing) and LL.*
 10. Is there going to be competitive action in the future for the MoPTT? (Direction) [Strategic Planning]
 - *Once the market is opened.*
 11. How appropriate are the IT supply services? (Management)
 - *Gaining momentum, high potentiality.*
 12. What is the architecture of the operational networking systems in the MoPTT? (Management) [Network Management]
 - *WAN, LAN, INTRANET and INTERNET.*
 13. Who is responsible for making business delivery decisions in the MoPTT, now and after privatisation? (Direction) [Strategic Planning]
 - *Not yet matured.*

14. What is the information required for making these decisions? (Direction)

- *Business understanding find access to executive information systems.*

15. Who is expressing the customers' demands to the MoPTT direction (now and after privatisation)? (Direction) [Marketing, Customer Service]

- *Customers' demands are not really taken care due to the fact of exceeding demands.*

4. General questions

1. Why privatising the Saudi MoPTT?

- *Facing international competition, enhancing the customer services, creating a market for local business.*

2. Is the Saudi market capable to finance the MoPTT privatisation, or foreign investment is needed to support this privatisation?

- *The STC is capable and the Saudi Market is capable, foreign investment is a choice for strategic alliance rather than finance.*

3. If the market can not cover that, will the government, take care of supporting the MoPTT privatisation?

- *The Government is and will remain a major shares holder.*

4. If the Saudi financial institutions and individuals are incapable or unwilling to provide the necessary funds for the MoPTT privatisation, then who will fund that?

- *Individuals are waiting to provide the necessary funds.*

5. What are the contents and features that information systems might do to the privatisation of the Saudi MoPTT?

- *All IS had considered privatisation as a must. New systems are needed to efficiently run the enterprise as profit oriented organisation.*

6. What are the main marketing domains in the MoPTT?

- *All population, companies, governmental institutes and authorities.*

7. How the MoPTT is relevant to the other business in the telecommunication market?
 - *As supplier (Internet) as service (retailers of equipment) as provider (cabins, and public pay phones.)*
8. What sort of information systems does the MoPTT need to support its business? And once the MoPTT is privatised, what sort of information systems does it need?
 - *The STC is currently implementing contracted IS systems, as well as tendering new systems that take privatisation into account. New Internet based IS would be needed.*
9. Would principal architecture of organisation and of service system needs to be re-built in the MoPTT after privatisation?
 - *Not quite, the established architectures needs fine tuning and updating, however IT is a client/server architecture with emphasis on empowering the end user through a corporate functions.*
10. What it is the internal and external environment of the MoPTT?
 - *The internal environment is still suffering from the governmental inertia. The external environment is described as unsatisfied customer due to the excess of demands.*
11. What are the MoPTT main business areas and processes? Ex: sell and bill service, maintain service quality, and manage portfolio and platform.
 - *Main business areas are defined as business with sameness need for information, they are: Care Business Area, Central Operation Management, Customer Service, Billing and Business Support Systems. The Business Supports include: Finance, Material Management, Human Resources, Contracts & Procurements, Vehicles, Building, Training, Strategic Planning, Marketing.*
12. Is the scoping agent in the MoPTT internal or external (is the scoping agent going to be with the business or with the government)?
 - *Was with the government. Expected to be with the business.*
13. What is the scope of the business in the MoPTT (should be value-added service, network

operator or video provider etc.)?

- *Should be value added and network provider. Competitors can compete with the STC using its network.*

14. Who is making the scoping decision in the MoPTT, now and after privatisation? (The government, minister, chair holders, board of directors or all of them?)

- *Minister & BOD.*

15. Who is making the resourcing decision in the MoPTT, now and after privatisation?

- *Human Resources based on departments requests. Should be the strategic needs of the enterprise.*

16. Who is making the delivering decision in the MoPTT, now and after privatisation?

- *Human Resources, Contractors and Consultants.*

17. Is the resourcing agent in the MoPTT internal or external?

- *Both internal and external.*

18. Is the delivering agent in the MoPTT internal or external?

- *Both internal and external.*

19. Where is the scoping decision making responsibility in the MoPTT?

- *BOD.*

20. Where is the resourcing decision making responsibility in the MoPTT?

- *VP of Administration.*

21. Where is the delivering decision making responsibility in the MoPTT?

- *VP of Finance.*

22. What is the information required in making these decisions?

- *Corporate information.*

23. Are the plans that usually send from the scoping agent to the resourcing agent internal or

external (now and after privatisation)?

- *Mainly internal.*

24. From where is the MoPTT getting resources (now and after privatisation)?

- *From all over the world and from the Saudi Market as well.*

25. Who is discussing the decision of the budget in the MoPTT?

- *The General Directorate of Budgeting.*

26. If the MoPTT is privatised, how will it guarantee the immediate access to the others government information, without any impact between different information in the government?

- *Interfaces with external agents are addressed to a certain extent in the Program Analysis.*

27. Who is expressing the customer's demand to scoping agent in the MoPTT (now and after privatisation)?

- *Public awareness of customer's needs and demands.*

28. If the MoPTT asked for product and this product came with different quality of service to the one required, who is fault is that (delivering agent or scoping agent)?

- *If the scoping agent specifies their requirement, then it is the fault of delivering agent.*

29. Is the MoPTT see it-self as a delivering agent because scoping agent and resourcing agent are the government body? What is the MoPTT (scoping and delivering agent, only delivering agent or what)?

- *Currently yes. Strategically the STC should be a scoping and delivering agent.*

30. Is the service in the MoPTT internal or external?

- *Both internal (for the Saudi market) and external (international settlement accounts).*

31. Does the MoPTT own the products or from where does it get them?

- *STC get the products on owned based principles or license based.*

32. Who is the supplier that the MoPTT deals with, and is that a political decision?

- *Lucent is the main supplier for the time being.*
33. What is the relation between each of these domain modules?
- *These domains are interfacing with each other.*
34. What is the mechanism between the scoping agent and resourcing agent and what is the structure between them (scope structure)?
- *(In theory) Scoping agent (BOD) setting the direction and scope, the resourcing agent allocates resources accordingly.*
35. What it is the mechanism between scoping agent and delivering agent and what is the structure between them?
- *Not clear mechanism.*
36. What is the mechanism between the regulator and scoping agent and what is the structure between them?
- *Regulation of the telecommunication industry in Saudi Arabia is not yet fully established.*
37. What is the mechanism between resourcing agent and suppliers and what is the structure between them?
- *Suppliers are governed by contracts to the resourcing agent through contracts and procurements.*
38. What is the mechanism between delivering agent and customer and what is the structure between them?
- *Delivering upon request of service through commercial service department.*
39. When privatisation comes to light, what services you could outsource?
- *The STC could outsource specific services to minimise costs, long-term investment, coping with technology, without affecting its strategic services.*
40. What is the political scene to take a place in the MoPTT privatisation?
- *Not answered.*

41. What is the political and marketing waves scene to take a place in the MoPTT?
- *Not answered.*
42. How is the MoPTT going to manage itself after privatisation?
- *Not answered.*
43. Is there any process and systems architecture to assist the MoPTT in this design?
- *Yes, enterprise information architecture.*
44. Is there any operational networking architecture?
- *Yes, as part of the enterprise information architecture.*
45. What does the customer domain in the MoPTT deal with and what does it contain?
- *Customer Service and Customer Care.*
46. What does the service domain in the MoPTT contain?
- *Refer to the Future Operation Environment of CS.*
47. What does the network domain in the MoPTT contain?
- *Refer to the Future Operation Environment of COM.*
48. What does the bill domain in the MoPTT contain?
- *Refer to the Future Operation Environment of Bill.*
49. What does the equipment domain in the MoPTT contain?
- *Refer to the Future Operation Environment of Material Management.*
50. What does the employee domain in the MoPTT contain?
- *Refer to the Future Operation Environment of Human Resources.*
51. What does Saudi Arabia offer as a potential place for business?

- *It offers a stable political system and a very free market with no restrictions on currency exchange and the repatriation of capital. It also has a very solid and advanced banking system, and a large consumer market with a disposable income.*

5. Questions about Network Information Systems Infrastructure

1. What is the flow of information from the 'users' to the 'user contract point'?
 - *They are problems, inquiries, service order.*
2. What are the distributed IS?
 - *They are faults, usage and performance data.*
3. Why the Fault Reports were created?
 - *They were created to follow the resolution of problems. They may be routed to local support staff in order to give on-site support.*
4. What sort of support will the 2nd and 3rd level support be?
 - *They will be technical support or application support, if changes to applications are necessary. This support will be either within the MoPTT, with a third party or mix of both.*
5. Which channel will the requests for application enhancements be through?
 - *They will be channelled through the business analysts of the appropriate business organisation.*

6. Questions regarding the management domain of the MoPTT

1. What does the customer domain in the MoPTT deal with and what does it contain?
 - *The customer domain deals with all aspects of the MoPTT's customers and includes all of the information about customers and their interactions with the MoPTT. It also includes the functions which support communication with the customer.*
2. What does the service domain in the MoPTT contain?

- *The service domain is about the instances of all services that have been delivered to customers. It also includes the functions for delivering the services, managing problems and analysing performance and usage.*
3. What does the network domain in the MoPTT contain?
 - *The network domain is about the combination of various network technologies into a service-bearing platform and cover network design, analysis and resolution of problems and management of traffic. This domain deals only with the logical functions, features or capabilities of the network.*
 4. What does the bill domain in the MoPTT contain?
 - *The bills domain is about the customer accounts, invoices for usage of products, and billing problems. It includes the functions to raise charges for usage, generate invoices, and handle payments, problems and debts.*
 5. What does the equipment domain in the MoPTT contain?
 - *The equipment domain is about the physical equipment which provides the functions to support the services, planned changes, faults and performance of the physical equipment.*
 6. What does the employee domain in the MoPTT contain?
 - *The employees' domain is about the employee name, position and job. It contains the job that the employee should do and other aspects of human resource management.*
 7. What does the work domain in the MoPTT contain?
 - *The work domain is about the manual work which needs to be carried out on the network and the workforce which performs that work. It includes functions to schedule and allocate work to the workforce.*

7. Questions regarding application requirements

- What transactions and what data about each transaction must be handled?
- What reports, documents, and other output must the system produce?

- What files and databases drive the system? What transaction files are needed to maintain them?
- What is the volume of data to be stored? What volume of transactions will be processed?
- Are there unique features about this application that require special consideration when selecting software?
- What inquiry requirements must the software support?
- What future enhancements are possible and which will be supported?
- What hardware and communication features does the software require?
- What are the limitations of the software?

8. End-users

Users were asked in the researcher's fieldwork questionnaire to rate the quality of the applications along eight dimensions:

Ease of use	(How easy is the application to use?)
Accessibility	(How accessible is the application to all who need it?)
Appropriateness	(How appropriate is the application to the business needs it supports?)
Availability	(How readily available is the application when needed?)
Functionality	(How well does the application deliver the required degree of functionality?)
Reliability	(How reliable is the application?)
Maintainability	(To what degree is reliable help support available?)
Response time	(How satisfied are you with the response time?)

9. Planning Related

- Is there a clear understanding of the organisation's goals and a linkage between the organisation's strategy and the project's strategy?
- Is there a comprehensive project plan? Are all the deliverables specified?
- Is ownership of each plan and project work product established clearly?

- Are roles and responsibilities defined clearly?
- Does the project plan define the migration strategy clearly? Are the systems and software engineering teams fully supportive of the migration strategy?
- Does the plan include estimates of the resources and time required for each task?
- Are there subsidiary plans covering risk management, configuration management, quality assurance, and software development? Have the plans been suitably coordinated?
- What are the cost and schedule for completing the effort?
- Is a network activity diagram included which identifies the inter-task dependencies?
- How will the project obtain and integrate the necessary interdisciplinary skills?
- What kinds of infrastructure support do the systems and software engineering activities require from the project? Are they included in the project plan?
- Has training been arranged for the system developers and software engineers?
- Are all phases of the project's life cycle addressed adequately in the project plan?
- How will progress be measured and reported?
- Is there a process in place to ensure that the project plan is updated as changes occur?
- Is there a chief systems engineer, or group, who is accountable for the systems engineering and software engineering effort?
- Will a project team composed of key task leaders and interdisciplinary engineers be established to serve as a system design team? If not, how will global systems engineering issues and specialty engineering requirements (e.g., security) be addressed and coordinated adequately?
- Do plans include training for customers and users of the system?

10. Technology Related

- Is the cost, schedule, and impact of applying the new technology acceptable?
- Is adequate training available? Are key members of the project team already well versed in the technology? Can they act as mentors to other team members?
- Have the pros and cons of alternative technologies been weighed carefully (preferably using a formal risk assessment process)?

- Has the impact of the new technology on existing customers and users been analysed? Do the customers and users have any strenuous objections? Or unheeded cautions?
- Is management aware of the technology adoption plans? Are these plans consistent with the organisation's strategic plan? Are there any reservations or cautions?
- Is a suitable measurement program being adopted to quantify and evaluate the actual benefit of applying the technology?
- Is there a contingency plan in the event that any unforeseen technology arises?

11. Risk Related

- How will risks be managed and mitigated?
- Are a process and criteria in place for make/buy decisions?
- Has an effective contracting strategy been developed?
- Is the project adequately funded?
- Is there evidence of overly optimistic schedule compression?

12. Operational Environment

- Are all of the customers, customer sites, and user groups identified?
- Are all of the legacy system products and services on which the users depend identified?
- Is there a profile to accurately characterise the current system workload?
- Are all of the external artefacts, system files, and procedures on which the users depend identified?
- Are there operational usage scenarios to ensure that there is a common understanding of the system's capabilities and operation from a user's viewpoint?
- Is there an accurate, up-to-date network configuration diagram that specifies the subsystems and their interfaces?
- Are all of the external system interfaces identifiable and documented?
- Are the hardware and software interoperability dependencies with external sites identified and documented?
- Are the software communication protocols identified? Are they documented?

- Are the system's security provisions and features clearly understood by the project team?
- Are the logistic, support, and system administration operations (and roles and responsibilities) itemised? Are they traceable to specific subsystems (and agents)?
- Will the operation of the legacy system be sustained to allow adequate time for users to obtain training and fully make the transition to the proposed system?

13. Requirements Related

- Has a common concept of operations for the proposed system been developed and communicated?
- Does the project have a requirements change management process?
- How are the customer and user requirements prioritised?

14. Decision-making

- Is there a prescribed means for eliciting and validating the target system requirements? Has it been used before? Is there evidence of its effectiveness?
- Is there a Concept of Operations to describe the proposed target system?
- Have operational scenarios been developed to describe how the proposed system will operate?
- Have the Concept of Operations and operational scenarios been validated with customers, users, and key systems personnel?
- Is the difference between the current "virtual requirements" of the legacy system and the new target system requirements well understood?
- Are there standards with which the target system must comply?
- How robust is the current legacy system architecture? Is it practical to evolve this architecture to meet the target system requirements?
- Should the system be re-hosted on a new platform or operating system? Is the use of a new programming language justified?
- What process is used to determine the target system architecture requirements?
- What are the desired performance, availability, and security attributes?

- Can the target system be evolved incrementally over a period of time? Or is a major reengineering effort required to bring about the desired changes?
- What changes are required in the operational environment to accommodate the new target system requirements?
- What is the projected impact of the proposed changes on current business operations? How will these affect the customer and the organisation?
- Do the customer and user requirements include explicit changes to the operational environment? How do these changes affect the target system (hardware and software)?
- What is the projected impact of the proposed changes on performance and availability?
- What differences are there between the existing legacy system environment and the proposed target environment? Are there incompatibilities that will need to be resolved?
- Will support for some of the existing products and services be dropped? What customers and users will be affected?
- Which external interfaces need to be modified? How will these modifications be coordinated with external systems and users?
- What testing is needed to assure interoperability?
- What is the plan for “roll out” and “cut-over” to the new system?
- What parts of the target and legacy systems need to coexist during operational transition?
- In the event of a crisis, to what degree can support be rolled back to the legacy operational environment?
- Will the new target environment impose new operating procedures?
- Will operators or system administrators require training on the new operating environment?
- Have training needs been identified for customers and users of the system?

15. System Evolution

- Is an enterprise-wide business and technical strategy in place? Has it been communicated to all affected parties?
- Are roles and responsibilities clearly defined?

- Are the enterprise-wide activities, processes, and work products identifiable? Are they adequately described and understood? Do they reflect a unified approach consistent with the organisation's life-cycle model?
- If one or more of the framework activities is not covered, what is the default condition? What impact will using the default condition have?
- If some processes or work products are not being addressed, is it an oversight? Is it indicative of a problem? What are the risks?
- Has ownership and accountability for the activities, processes, and work products been clearly established?
- In the absence of an 'enterprise' type of approach to system evolution:
- How will global issues be resolved?
- How will priorities be determined?
- How will enterprise-wide coordination be ensured?
- How will work products from other ongoing (or planned) efforts be leveraged?
- How will progress and quality be assessed?
- How will lessons learned be captured and communicated?
- How will practices be improved?

16. The technical development of the automated environment

- What tools did you use to construct the automated environment?
- How did you select the tools (to support both process and applications)?
- How were integration issues (tool/data/control/process) handled within the environment?
- How effective were the mechanisms for constructing the automated processes?
- Does the environment often crash?
- In which applications, if any, does your organisation use CASE tools?
- Have you used any CASE tools - independent of the automation activities?
- Has your organisation performed any CASE-tool integrations?
- Are there other technologies that you have used on a trial basis?
- Were the end-users involved in defining the automated processes?
- Tell us about end-user experiences with using the automated process.

- Was the automated process perceived as being too constraining on the end-users?
- Did the end-users get training in the automated process?
- Did the automation team get training in the automation technology?
- Describe your implementation plan
- Do you have someone responsible for maintenance of the automation process?
- If you could start from scratch again, what would you do differently?
- What were the most technically challenging issues in developing the automated process?
- What were the most socially challenging issues in developing the automated process?
- Describe tangible benefits of implementing process automation in your organisation.
- With which applications do you think process automation can be most effective?

17. Training

- Are the training programs effective in both qualities of content and relevance to the skill needs?
- Are the instructors getting the best out of the class sessions and participating students?
- Are the students making a full use of the training opportunities that are presented to them?

18. Skills

For each of the skill-sets, representatives of various Departments in the MoPTT have been asked to identify what types of people within their Departments possessed the skills, and how often these skills were used. The questions were designed to give rough estimates of the number of staff in various departments who demonstrate some command of the skill in question.

- “How many people in your department use a computer daily?”
- “How many people in your department can speak and write English?”

19. Privatisation

General questions concerning how the government will implement the privatisation, and how the Saudi Arabian telecommunications industry might be structured and regulated after privatisation.

- What characterises the operator today, what are its strengths and weaknesses?
- What is the regulatory environment that the MoPTT is operating in or will operate in the very near future?

20. Information Modelling

The following important strategic questions were asked to the MoPTT executives:

- Who are your customers
- What are your markets
- Who are your competitors
- What are your products

21. Systems

In order to develop a full profile of the system under investigation the following questions, for each manager of business area (function) in the MoPTT, were asked:

Volume:

- What volume of activity occurs?
- How frequently does the activity occur?
- Does the activity occur according to any cycle?

Control:

- What areas need specific control?
- What control methods are currently used?
- What yardsticks are used to measure and assess performance?
- What methods of detecting lapses in control are used?

- Are specific security precautions taken to safeguard against improper activity?
- Are there methods of avoiding the system? Why do they occur?

Process:

- What separate processes, steps, or functions make-up the activity?
- What triggers the activity?
- How long does each activity take? What factors govern the amount of time taken?
- What delays (can) occur?
- What is the cost of system operation?
- Are there specific management objectives to be satisfied?
- Are there processes that serve multiple purposes?

Data:

- What data enter the system and what is the origin of the data?
- In what form are the system data received? Stored?
- Which data items are stored in the system or as part of the activities of the system?
- Who uses the information produced by the system? What is it used for?
- What is not used (extraneous parts)?
- What data are often missing?
- Are any data developed or used on an ad hoc basis?
- What reference tables, charts, or other data are used?
- How are data or activities coded or abbreviated?
- Are there data stores that are never referenced?
- Is the inflow of data adequate to perform the process?

Other:

- Does the system contribute to the overall objectives of the organisation?
- Can the system be implemented using current technology and within given cost and schedule constraints?
- Can the system be integrated with other systems which are already in place?
- Who are the key persons in the system? Why are they important?

- What obstacles or political influences affect system efficiency?
- How would the organisation cope if this system was not implemented?
- What are the problems with current processes and how would a new system help alleviate these problems?
- What direct contribution will the system make to the business objectives?
- Can information be transferred to and from other organisational systems?
- Does the system require technology which has not previously been used in the organisation?
- What must be supported by the system and what need not be supported?

22. Data flow diagram

The following questions were asked to evaluate each data flow diagram:

- Are there any unnamed components in the data flow diagram (data flows, processes, stores, inputs, or outputs)?
- Are there any data stores that are input but never referenced?
- Are there any processes that do not receive input?
- Are there any processes that do not produce output?
- Are there processes that serve multiple purposes? (If so, simplify by exploding them into multiple processes that can be better studied.)
- Are there data stores that are never referenced?
- Is the inflow of data adequate to perform the process?
- Is there excessive storage of data in a data store (more than the necessary details)?
- Is the inflow of data into a process too much for the output that is produced?
- Are aliases introduced in the system description? Are they accounted for in the data dictionary? (If not, inconsistencies may result in describing and understanding the system.)
- Is each process independent of other processes and dependent only on data it receives as input?

23. Interview Questionnaires

The following questions were used to guide the information gathering during the consultations with the MoPTT executives. Some interviewees added to the questionnaire lengthy and valuable comments and descriptions. The questionnaires are also available in Arabic (not shown here).

23.1 The MoPTT Executives (General Questions)

1. What are the major goals of your organisation?

For each goal, please list measurable and/or quantifiable objectives that are necessary to achieve each goal.

2. What assumptions must you make about things in the external environment (external to your department and not under your control) in order to achieve your goals (e.g. 'it is assumed that an appropriate level of funding will be available to add the services described in this year's Business Plan.')?
3. What are the most important factors ('critical success factors') that are under your control and that are absolutely necessary to achieve your goals (i.e. what things absolutely must happen in order to achieve your goals)?
4. What are the major problems (internal or external) that are limiting your organisation's ability to meet its goals?
5. What do you think is the solution to each of the problems listed in question 4?
6. What are your organisation's priorities during the next 12 months?
7. What are your organisation's priorities over the next 5 years?

The following questions were used to guide the information gathering during the consultations with the operational executives:

23.2 Operational Executive (Interview Questions)

1. Please consider the 12 functions that have been identified (Information Technology, Network Development, Network Management, Marketing, Customer Service, Training, Buildings & Land Management, Motor Vehicles Management, Human Resources Management, Materials Management, Financial Management, Strategic Planning) to decide which of these functions is a primary responsibility of your organisation? And which of these functions is a secondary responsibility of your organisation?
2. Which services provided by the MoPTT (e.g. data services, telegraph, microwave, wireless/mobile, satellite, etc.) does your organisation support? Please describe the role of your organisation in supporting each service.
3. What are the major goals of your organisation? For each goal, please list measurable and/or quantifiable objectives that are necessary to achieve each goal.
4. What assumptions must you make about things in the external environment (external to your department and not under your control) in order to achieve your goal (e.g. 'it is assumed that an appropriate level of funding will be available to add the services described in this year's Business Plan.')?
5. For each of the goals listed in question 3, please list one or more functions from question 1 that are most important for achieving your goals.
6. What are the most important factors ('critical success factors') that are under your control and that are absolutely necessary to achieve your goals (i.e. what things that must happen in order to achieve your goals)?
7. For each of the critical success factors, which are listed in question 6, please list one or more of the functions that would be most affected by each factor.
8. What other groups or departments in the MoPTT does your organisation interact with, and for what purpose?

9. What are the major problems (internal or external) that are limiting your organisation's ability to meet its goals?
10. What do you think is the solution to each of the problems listed in question 9?
11. What are your organisation's priorities during the next 12 months?
12. What are your organisation's priorities over the next 5 years?
13. What are some examples of the most important information that your organisation needs to make decisions and operate successfully?
14. Is the information provided in question 13 readily available? If not, why not?
15. What problems arise from the lack of the information provided in question 14? Please quantify the consequences if possible (e.g. lack of accurate information about available phone numbers results in an estimated X% under-utilisation of available network capacity).
16. What are the major weaknesses of the current information systems used by your organisation?
17. Does your organisation have regularly scheduled meetings with the IT Department?

23.3 Strategic Planning Executive

The objectives of this interview are to elicit goals and objectives for the MoPTT plans for the next 5-year planning period, and the performance levels required from processing to achieve these goals.

1. What is your plan for the MoPTT for the next 5 years? Your vision?
2. What are your goals and objectives for the MoPTT for the next 5 years? Has the board of directors developed a different set? If so, what is the reason? How do those you present differ from those of the board?

3. How are you achieving these goals?
4. How does the current system fit into your plans? How do you rate its effectiveness? What is the reason for the levels of effectiveness you describe?
5. Can you be more specific about the levels of performance needed in your department's processing? Do you have specific standards? Do any standards currently exist? Who do you feel has the best insight into current department processing? Do you know whether the current status exists as a result of any particular person or persons?
6. What difficulties do you foresee in meeting future growth and operating expectations under the current systems? Do you have suggestions for handling the anticipated difficulties you outline? What is your feeling about the cost and benefits of implementing these suggestions? Have you developed a cost projection in your thinking?

23.4 IS director

The objectives of this interview are to determine the goals and objectives for the MoPTT, as well as to assess current problems in the use of the existing systems. In addition, it will assess executive's requirements to deliver the same or better service during the expected growth period.

1-6. Same questions as for the previous executive.

7. What details and information that you receive about your department processing and are most vital? What are they used for? How often do you receive them? Is this adequate?
8. What excess or unnecessary information are you receiving that you do not find helpful? Do you know why you receive it? Would you rather not receive it?
9. Have you identified information that you do not currently receive but that you feel is so useful it should be produced by any new or modified systems that emerge from this

investigation? If preparation of this information is costly, do you still think it should be prepared? How will you evaluate its cost-effectiveness?

10. What bottlenecks or problems do you have with needed information? Where do they occur? Why? What suggestions do you think will improve this?
11. Who do you suggest we talk to in order to find out about how these systems function?
12. Do you feel that your staff is adequate to meet the increased demand? Do you have specific suggestions or questions that we should be aware of when discussing these matters with your staff?
13. Describe the manner in which your department interact with the order departments. Do you or the staff feel this is an efficient method? Should it be improved? What alternatives have been considered?
14. Specifically, would up-to-date information on the status of the current system be useful? Would it help to cut costs?
15. What decision-making processes could best be supported by an automated system? What support would be most useful?

23.5 Network Executive

The objectives of these interviews are first, to determine this executive's goals and objectives for the department and his assistants' knowledge of them, and second, to determine executive's problems with the current system and what he needs to deliver the same or better service during the planned growth.

1. What is your vision for the MoPTT for the next 5 years?
2. What are your goals for your department for the next 5 years?
- 3-9. Same questions as for the previous executive.

10. How do you keep track of the current system processing? What records or specifications do you have currently? What files and filing procedures do you currently use?
11. How are you made aware of an order?
12. What roles do your assistants have in this area? Do they have specific responsibilities? Please describe them.
13. What tasks in your department are most time-consuming, repetitious, and tedious? Which tasks are liked the most? The least?
14. Please describe or trace the steps in the current system processing, so that we see the role your department plays in the processing.
15. How do you determine whether an incoming order can be filled? Please relate this to order timing and plant capacity.
16. Which decisions about handling orders are the most complex to formulate? Which are the least complex decisions to make?
17. What decision-making processes are highest in volume and very routine? (This is used to test whether computer assistance is useful for a task area.)
18. You indicated that order loss is one of your concerns. How often do orders get lost? How do you find out about it? How much time passes before the customer complains? Why do orders get lost? How is the loss resolved? What costs arise from losing an order? From resolving the loss?
19. What are typical daily and weekly volumes? What are low and high levels? Do you make any specific adjustments in processing when the volume reaches a high level for a period time? Please describe any adjustments you make.

23.6 Customer Services Executive

The objectives of this interview are first, to determine the goals and objectives for this executive's department and to learn what he needs to deliver the same or better service during this growth period; second, to obtain a description of all processing activities and procedures involved in this department; third, to obtain a description of stored data and their uses, and relations between the data and the files; fourth, to obtain a statement about the size and characteristics of reports, files, frequency of access, retention and security information, including techniques used to ensure accuracy, integrity, and validity; fifth, to differentiate each function within the system and delineate the (1) triggers, (2) restrictions, (3) output data elements, (4) input data elements, (5) processing steps, and (6) volume of transactions and frequency of activities; and sixth, to positively approach the possibility of an automated system.

1. What is your plan for your department for the next 5 years? Your vision? Your goals and objectives for the department?
2. How are you achieving your goals?
3. How do the current system fit into your plans? What problems do these systems cause? Why? How could these systems be improved?
4. What information do you currently receive that is most important and useful? Least useful? How often does this information arrive? Is that satisfactory? Please explain.
5. Have you identified information that you do not currently receive but that you feel is so useful that it should be produced by any new or modified systems that emerge from this investigation? If preparation of this information is costly, do you still think it should be prepared? How will you evaluate the system's cost-effectiveness?
6. What bottlenecks or problems do you have with obtaining or preparing necessary information? What are your suggestions for improvement?

7. Describe current security procedures data. How do you rate their effectiveness? Why is such security necessary?
8. We want to understand each function in processing the current system. Therefore, we ask that you describe the functions in detail. What forms do you use? Where do they come from? How are they completed? By whom? Where do the clerks get this necessary information?
9. With which other persons, departments, and functions do your department interact? What works well about these interactions? What needs attention to improve efficiency?
10. How often does an order get lost? How long does it take before the customer complains about the missing order? How do you think that this loss occurs? How is it resolved? Do you have suggestions for avoiding this in the future?
11. Do you feel your department is being held responsible for problems that are occurring elsewhere? Please explain. How can this be resolved?
12. What are the present ways for dealing with overdue accounts? Whom do you alert that an account is delinquent and how?
13. What roles do your assistants have in this department? Please explain their responsibilities.
14. Are there particularly tedious tasks in your department? Which are the most time-consuming and repetitious? Do staff members avoid these tasks if possible? Do you have suggestions for improving this situation?
15. Describe the process of checking customer credit when orders are received. Is the process consistently applied? How are customer orders handled when the credit check produces a poor credit rating?
16. Is there a discount policy? A penalty for late payment? Please explain.

24. General Questions

- What should be the appropriate structure for the telecommunication sector in Saudi Arabia?
- Should basic telecommunications remain operated by only one operator (i.e., retaining the monopoly, irrespective of the legal status of the operator)?
- Should any, all or part of the Saudi telecommunication sector be open to competition?
- Is it necessary to enter into a partnership with another operator?
- Has a common vision been developed and communicated within the MoPTT?
- Who are the key decision makers and stakeholders in the MoPTT?
- Are there defined criteria for the successful accomplishment of goals? Are these criteria measurable?
- What is the corporate information technology strategy of the MoPTT?
- Is there an established procedure for performing business/mission needs analysis to determine how new customer needs can best be met?
- Are the roles and responsibilities of each of the MoPTT units and departments involved in the system evolution effort well defined?
- How will efforts be co-ordinated across the MoPTT units and departments, and with external customers?
- Does the MoPTT provide suitable infrastructure support to assist projects in contracting, quality assurance, and other key activities that may be beyond the scope of an individual project to perform?

25. Questionnaire for IT Staff

Application & Data Assessment Questionnaire	
IT Division Input	
System ID: _____	
Interviewee Name: _____	Title: _____

Organisation: _____	
Location: _____	
Interviewers: _____	

Other Attendees:	

Interview Date: _____	Time: _____

Questions	Response
1. Do you have proper documentation of the system?	<input type="checkbox"/> User Manual <input type="checkbox"/> System Specification <input type="checkbox"/> Maintenance Manual <input type="checkbox"/> Training Manual <input type="checkbox"/> Others
2. Is the documentation available and up-to-date?	<input type="checkbox"/> Needs Update <input type="checkbox"/> Needs Re-write <input type="checkbox"/> None Available
3. How many outstanding Change System Request (CSR) do you have?	
4. What is the major obstacles that you are facing today to help improve system maintenance?	
5. Would recommend converting the existing system, or redesign a new one?	Useable as is _____ Useable with Modification _____ Useable Temporarily _____ Need Replacement _____
6. What language you input the data in?	Arabic _____ English _____ Bilingual _____
7. Do you use any type of data manipulation software?	Natural _____ Others _____
8. What hardware does the system reside on?	IBM Main Frame _____ WANG _____ Telex _____ PC _____
9. Who are the primary users of the system?	
10. What are the databases or the input data used by the system? Please provide a short description of each input file used.	
11. What DBMS is used for the system?	IMS (DB/DC) _____ DB2 _____ CLIST _____ Other _____
12. Please provide the following information	<input type="checkbox"/> Storage Device type where the data resides <input type="checkbox"/> Size of data (in Gigabytes) <input type="checkbox"/> Frequency usage of the system, in total, read and modify usage
13. What type of backup / recovery procedures you provide for the users?	<input type="checkbox"/> Mainframe Backup <input type="checkbox"/> PC Backup <input type="checkbox"/> Others
Remarks	Please feel free to add any other comments

26. Questionnaire for Users

Application & Data Assessment Questionnaire	
User Input	
System ID: _____	
Interviewee Name: _____	Title: _____

Organisation: _____	
Location: _____	
Interviewers: _____	

Other Attendees:	

Interview Date: _____	Time: _____

Questions	Response
1. What are the functions of the system(s) you are using?	
2. How satisfied are you with the current system? Please indicate any function areas that you are not satisfied with.	
3. What improvements would you suggest to the current system?	
4. Does the existing data provide you with the information needs you require? If not, what additional information do you need?	
5. Would you recommend converting the existing system, or redesign a new one?	Useable as is _____ Useable with Modification _____ Useable Temporarily _____ Need Replacement _____
6. What language you input the data in?	Arabic _____ English _____ Bilingual _____
7. Do you use any data access tools?	Natural _____ Others _____
8. What hardware does the system reside on?	IBM Main Frame _____ WANG _____ Telex _____ PC _____

Questions	Response
9. How would you rate your system?, based on the following parameters.	<input type="checkbox"/> Ease of Use: excellent good average below average poor <input type="checkbox"/> Accessibility: excellent good average below average poor <input type="checkbox"/> Appropriateness: excellent good average below average poor <input type="checkbox"/> Availability: excellent good average below average poor <input type="checkbox"/> Functionality: excellent good average below average poor <input type="checkbox"/> Reliability: excellent good average below average poor <input type="checkbox"/> Maintainability: excellent good average below average poor <input type="checkbox"/> Response Time: excellent good average below average poor
10. Do you use any manual system, forms, or produce reports that will compliment your system? If yes, could you please provide sample(s).	Manual Forms _____ PC generated Forms _____ Others _____
11. Who shares your data? What type of sharing is it?	Please list the departments that share your data.
12. What would be the most urgent short- term that would make your system serve you better?	<input type="checkbox"/> Training section _____ <input type="checkbox"/> Documentation _____ <input type="checkbox"/> On-site Analyst _____ <input type="checkbox"/> Others _____
Remarks	Please feel free to add any other comments