Management of open information technology and systems (ITS) architectures in the Australian federal government: development of a perspectival model for information systems management

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MANAGEMENT OF OPEN INFORMATION TECHNOLOGY AND SYSTEMS (ITS) ARCHITECTURES IN THE AUSTRALIAN FEDERAL GOVERNMENT

Development of a Perspectival Model for Information Systems Management.

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APPENDIX A

CASE ORGANISATION

SURVEY INSTRUMENT

ITS MANAGEMENT QUESTIONS

INDIVIDUAL RESPONDENT PROFILE

Organisational title (and position in overall structure)

Job description and responsibilities

Number of staff reporting

RESEARCH QUESTIONS

ITS Management

STAFF - ITS Department Structure

What is the strueture of your ITS Department ?

Please draw, or provide a drawing of this department indicating your position.

STRATEGY - Business Focus

Where should the ITS managers time be spent now, given the implementation of the Open Systems architecture.

1 2 3 4 5

foeuscd on internal I.T. issues — focused on business issues

WHY ?

Where should the ITS managers time be spent in 3 years time given the implementation of the Open Systems architecture.

1 2 3 4 5

focused on internal I.T. issues — focused on business issues

WHY ?

How is ITS perceived/ or should be perceived as a result of the decision to implement these Open Systems attributes i.e. Strategic, Turnaround, Factory, Support. (Now and in 3yrs)

STRATEGIC - The information system is aimed directly at improving a corporation's competitive position in the marketplace. The company is critically dependent on the smooth functioning of the system as it provides the backbone of the services offered, This is true in many large organisations where new services have been built around the continual availability of the computer and its associated processing capability. Because of its strategic impact, the planning for the information service must be closely integrated with planning for the new corporate aetivity.

TURNAROUND - This is a transition period where the information system is well on its way to becoming strategic. Its operational value is not as high as a strategic system because the business can function, perhaps in a limited way, if the system becomes unavailable for a short period. Thus, if a computer , associated communications facilities, or a terminal is down, the transactions can be held over without affecting critical activities. Because, however, the information technology is embedded in the management control of the organisational unit, this is obviously an undesirable situation. Adequate planning is thus necessary, at the top level, in defining the level of service that is to be provided.

FACTORY - As its name implies, this approach to I.S. management represents the paperwork or volume processing of the typical data processing shop. Here the emphasis is on providing low-cost service. The back-room operation of some banks fall in this quadrant. The operational value of a typieal system is very high, but it is perceived to have little strategic impaet on the competitive situation other than if processing costs get out of hand and the profitability of the institution is affected as it struggles to provide competitive serviees. Not all paperwork systems lack strategic impact, especially in thc airline industry and thc banking industry. Aspects of a conventional system can be of considerable value to a firm, particularly if the data can be mined for marketing information.

SUPPORT - A good example of a support function is an end-user system or an executive workstation. The support tool is provided to a functional arca, but it is of relatively low strategic impact. Because of its visibility, however, its operational value may be higher than implied.

STAFF - ITS Positions

How would you grade each of the following ITS positions in terms of importance to the successful implementation of Open Systems (now and 3yrs)

1 ----------> 5
(low importance -------> high importance) ?

Why would you grade each position at that level of importance ?

How would you rank each position (in order or priority) in terms of their importance to the success of your Open Systems implementation. (now and 3yrs)

Why would you rank each position in this way ?

RANK		FACTOR
Now	3yrs	
		Operations
		Applications, system architecture/system delivery
		Data Management
		Systems Administration
		Communications
		Technical Architecture
		Quality Assurance
		Vendor Relations
		EUC
		Help Desk
		Outsourcing
		Research & Development
		Insourcing
		ITS Training
		Client Support
		Client Management
		Department Management
		Other

REASON:

GRADING REASONS NOW:

GRADING REASONS 3YRS:

RANKING REASONS NOW:

RANKING REASONS IN 3 YRS:

SKILLS - Skill Mix

How would you grade each of the following skills in terms of importance to the successful implementation of Open Systems (now and 3yrs)

1 ----------> 5
(low importance -------> high importance) ?

Why would you grade each skill at that level of importance ?

How would you rank each skill (in order or priority) in terms of their importance to the success of your Open Systems implementation. (now and 3yrs)

Why would you rank each skill in this way ?

RANK		FACTOR	Now 3yrs
Now	3yrs		
		OS Standards	
		UNIX	
		4GL Languages	
		Data Communications	
		System Monitoring Tools	
		Object Oriented	
		Client/server	
		EDI	
		OS Solutions	
		ITS Management	
		ITS Technical	
		Communications (People)	
		Analysis/Problem Solving	
		Inquiring Mind	
		Supplier Interface	
		Multi-vendor Knowledge	
		Vendor Management	
		LANS	
		Client Management	
		Project Management	
		People Management	

Desktop Tool Set (GUIs)
BPR
Data Management
Code Re-use
Data Modelling
Security
Relational Databases
Architecture
Business
Job Process
Training
Applications
System Administration
Strategic Thinking
Position Specific
Network Management
CASE
Other

REASON:

GRADING REASONS NOW:

GRADING REASONS 3YRS:

RANKING REASONS NOW:

RANKING REASONS IN 3 YRS:

SUPERORDINATE GOALS - Priority Concerns

How would you grade each of the following management issues in terms of importance to the successful implementation of Open Systems (now and in 3 years)

1 ----------> 5
(low importance -------> high importance) ?

Why would you grade each issue at that level of importance ?

How would you rank each issue (in order of priority) in terms of their importance to the success of your Open Systems implementation ?

Why would you rank each priority concern in this way ?

RANK	FACTOR
Now 3yrs	
	Internal organisation of the I.T. function
	Identifying opportunities for the use of I.T
	Integrating diversified technologies
	Organisational impacts of information systems
	Relations between ITS and user departments
	Cost justification of spending on ITS projects
	User involvement
	Aligning ITS with business strategy
	Development and management of end-user computing
	Technological constraints
	ITS staff resources
	User awareness and education
	ITS project management and implementation
	Information systems maintenance
	Coping with new information technologies
	Location of the ITS function in the organisational structure
	ITS security
	Data management and control
	Information systems long range plan
	Top management support for ITS
	Budget constraints of ITS
	More effective information systems/technology development
	Other

GRADING REASONS NOW:

GRADING REASONS IN 3 YRS:

RANKING REASONS NOW:

RANKING REASONS IN 3 YRS:

SKILLS - Education and Training Needs

How would you grade each of the following training areas in terms of importance to the successful implementation of Open Systems (now and in 3 years).
1 ---------->5
(low importance -----> high importance)

Why would you grade each training area at that level of importance ?

How would you rank each training area (in order of priority) in terms of importance to the success of your Open Systems implementation.

Why would you rank each training area in this way ?

RANK	FACTOR
Now 3yrs	
	OS Standards
	UNIX
	4GL Languages
	Data Communications
	System Monitoring Tools
	Object Oriented
	Client/server
	EDI
	OS Solutions
	ITS Management
	ITS Technical
	Communications (People)
	Analysis/Problem Solving
	Inquiring Mind
	Supplier Interface
	Multi-vendor Knowledge
	Vendor Management
	LANS
	Client Management
	Project Management
	People Management
	BPR
	Data Management
	Code Re-use
	Data Modelling
	Security
	Relational Databases
	Architecture
	Business
	Job Process
	Training
	Applications
	System Administration
	Strategic Thinking
	Position Specific
	Network Management
	CASE
	Other

GRADING REASONS NOW:

GRADING REASONS IN 3 YRS:

RANKING REASONS NOW:

RANKING REASONS IN 3 YRS:

Now 3yrs

STYLE - Leadership Requirements

How would you grade each of the following ITS management leadership issues in terms of importance to the successful implementation of Open Systems (now and in 3 years).

1 ---------->5
(low importance -------> high importance) ?

Why would you grade each issue at that level of importance ?

How would you rank each issue (in order of priority) in terms of their importance to the success of your Open Systems implementation.

Why would you rank each leadership issue in this way ?

RANK Now 3yrs	FACTOR	GRADING
	Interpersonal	
	Figurehead	Symbolic duties
	Leader	Set directions, motivate staff
	Liaison	Co-ordinate with others
	Informational	
	Monitor	Follow the environment
	Disseminator	Communicate within the organisation
	Spokesperson	Communicate outside the organisation
	Decision making	
	Entrepreneur	Look for opportunities
	Disturbance handler	Fire fighting
	Resource allocator	Provide resources
	Negotiator	Resolve conflicts
	Learning about the business	
	Establishing the ITS department's credibility	
	Increasing the technological maturity of the organisation	
	Creating an ITS vision and selling it	
	Implementing a systems architecture to support the company vision for the future.	
	Other	

GRADING REASONS NOW:

GRADING REASONS IN 3YRS:

RANKING REASONS NOW:

RANKING REASONS IN 3YRS:

Appendix A – Survey Instrument

RESEARCH QUESTIONS

SYSTEMS Open Systems

What is your definition of Open Systems ?

Why have you defined Open Systems in this way ?

Do you feel that the definition of Open Systems will change in any way in the next three years ?

Is your organisation implementing an Open Systems architecture now/or in the future?

What percentage of your ITS budget will be devoted to your Open Systems architecture ?

What do you believe to be the most important aspeets of implementing Open Systems ?

Please indicate which types of technology you are implementing in order to achieve an Open Systems architecture ?

Operating Systems

MS-DOS
MVS, VM, or VSE
OS/2
UNIX
VMS
Other

Graphical User Interfaces

DECwindows
Macintosh
Microsoft Windows
Presentation Manager
Motif
Open Look
Internally developed
Other

Networking

LAN Manager
OSI
SNA
TCP/IP
X.25
Token Ring
Ethernet
Other

Databases (relational)

DB2
Sybase
Oracle
Ingres
Informix
Other

Frameworks

Common Applications Environment (X/OPEN)
GOSIP
POSIX (IEEE)
SAA (IBM)
Other

Why have you selected these types of technology ?

How would you grade each of these types of technology in terms of importance to the successful implementation of an Open Systems architecture within your organisation (now and in 3yrs).

1 ---------- 5
(low importance -------> high importance) ?

RANK **TECHNOLOGY**
Now 3yrs

Operating Systems

MS-DOS
MVS, VM, or VSE
OS/2
UNIX
VMS
Other

Graphical User Interfaces

DECwindows
Macintosh
Microsoft Windows
Presentation Manager
Motif
Open Look
Internally developed
Other

Networking

LAN Manager
OSI
SNA
TCP/IP
X.25
Token Ring
Ethernet
Other

Databases (relational)

DB2
Sybase
Oracle
Ingres
Informix
Other

Frameworks

Common Applications Environment (X/OPEN)
GOSIP
POSIX (IEEE)
SAA (IBM)
Other

Why would you grade each type of technology at that level of importance ?

How would you rank each type of technology (in order of priority) in terms of its importance to the success of your Open Systems implementation.

Why would you rank each type of technology in this way ?

GRADING REASONS NOW:

GRADING REASONS IN 3YRS:

RANKING REASONS NOW:

RANKING REASONS IN 3YRS:

STRATEGY & STRUCTURE – Open Systems Objectives

Please indicate what objectives your organisation is trying to achieve through the implementation of Open Systems ?

The following terms are defined as:

Portability - means the ability to take systems developed from one computer and use them with very little change on another computer (possibly supplied by a different vendor.

Scaleability - means the ability to use the same application software on a wide range of machines i.c micros ------> mainframes

Interoperability - means the ability of applications and service functions (such as database systems to interact with each other, thereby jointly providing the total computing service.

How would you grade each of the following Business and New Technology objectives in terms of importance to the successful implementation of Open Systems (now and in 3 years).

1 ----------->5
(low importance -------> high importance) ?

Why would you grade each issue at that level of importance ?

How would you rank each issue (in order of priority) in terms of their importance to the success of your Open Systems implementation.

Why would you rank each leadership issue in this way ?

RANK	OBJECTIVE
Now 3yrs	
	Business Objectives
	Automating operations
	More efficient communications with customers/clients
	Expansion into overseas markets
	Improving the quality of business decisions
	Produet quality improvement or control
	Increasing the autonomy of user departments
	Improving research/development capabilities
	Increasing the speed of business decisions
	Minimising information technology costs
	Reducing business costs
	Reducing the "time-to-market" for new products/services
	Streamlining relationships with suppliers
	Supporting basic functions
	Other

New Technology Objectives

Moving applications off mainframes to smaller systems
Reducing size and/or number of mainframes
Database redesign
Data interchange between applications
Interoperability between applications
Network management
Multivendor network management
Electronie data interchange (EDI) with customers
Electronic data interechange (EDI with suppliers
New operating systems
Systems based on information technology standards
Real time computing
Fault toleranee
Distributed databases
Computer aided software engineering (CASE)
Objeet oriented programming
Client-server applications
On-line transaction processing
Image proeessing
Loeal area network(s)
Wide area network(s)
Networks of dissimilar systems
Coherent ITS architeeture
End user systems development
Other

REASONS FOR GRADINGS NOW

REASONS FOR GRADINGS IN 3 YRS:

REASONS FOR RANKINGS NOW:

REASONS FOR RANKINGS IN 3 YRS:

Have you achieved any of these objectives (or varying degrees) at this point in timc ?

If yes, please indicate the objective and how, and to what degree you feel it has been fulfilled ? 1= LOW 5 = HIGH

Business Objectives
Y/N

ACHIEVED/LEVEL
1 - 5

Automating operations
More efficient communications with customers/clients
Expansion into overseas markets
Improving the quality of business decisions
Product quality improvement or control
Increasing the autonomy of user departments
Improving research/development capabilities
Increasing the speed of business decisions
Minimising information technology costs
Reducing business costs
Reducing the "time-to-market" for new products/services
Streamlining relationships with suppliers
Supporting basic functions
Other

New Technology Objectives

Moving applications off mainframes to smaller systems
Reducing size and/or number of mainframes
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Distributed databases
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Object oriented programming
Client-server applications
On-line transaction processing
Image processing
Local area network(s)
Wide area network(s)
Networks of dissimilar systems
Coherent ITS architecture
End user systems development
Other

GENERAL MANAGEMENT QUESTIONS

INDIVIDUAL RESPONDENT PROFILE

Organisational title (and position in overall structure)

Job description and responsibilities

Number of staff reporting

RESEARCH QUESTIONS

I.S. MANAGEMENT

An Information System is defined as the implementation of technology to manage information within the business as an aid to business processes and decision making.

An information systems architecture is defined as the Information Systems vision or blueprint for the total approach to information technology and its uses within the organisation.

ITS/ IS refers to the department which manages the implementation of information systems.

STRATEGY Business Focus

Where should the ITS managers time be spent now, given the implementation of the Information Systems architecture.

1 2 3 4 5

focused on internal I.T. issues — focused on business issues

WHY ?

Where should the ITS managers time be spent in 3 years time given the implementation of the Information Systems architecture.

1 2 3 4 5

focused on internal I.T. issues — foeused on business issues

WHY ?

How is ITS department perceived/ or should be perceived i.e. Strategic, Turnaround, Factory, Support. (Now and in 3yrs)

STRATEGIC - The information system is aimed directly at improving a corporation's competitive position in the marketplace. The company is critically dependent on the smooth functioning of the system as it provides the backbone of the services offered, This is true in many large organisations where new services have been built around the continual availability of the computer and its associated processing capability. Because of its strategic impact, the planning for the information service must be closely integrated with planning for the new corporate activity.

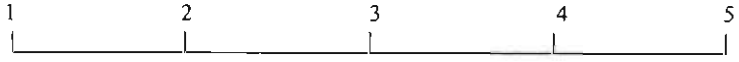
TURNAROUND - This is a transition period where the information system is well on its way to becoming strategic. Its operational value is not as high as a strategic system because the business can function, perhaps in a limited way, if the system becomes unavailable for a short period. Thus, if a computer , associated communications facilities, or a terminal is down, the transactions can be held over without affecting critieal activities. Because, however, the information technology is embedded in the management control of the organisational unit, this is obviously an undesirable situation. Adequate planning is thus necessary, at the top level, in defining the level of service that is to be provided.

FACTORY - As its name implies, this approach to I.S. management represents the paperwork or volume processing of the typical data processing shop. Here the emphasis is on providing low-cost service. The back-room operation of some banks fall in this quadrant. The operational value of a typical system is very high, but it is perceived to have little strategic impact on the competitive situation other than if processing costs get out of hand and the profitability of the institution is affected as it struggles to provide competitive services. Not all paperwork systems lack strategic impact, especially in the airline industry and the banking industry. Aspects of a conventional system can be of considerable value to a firm, particularly if the data can be mined for marketing information.

SUPPORT - A good example of a support function is an end-user system or an executive workstation. The support tool is provided to a functional area, but it is of relatively low strategic impact. Because of its visibility, however, its operational value may be higher than implied.

SKILLS - Skill Mix

How would you grade each of the following skills in terms of importance to the successful implementation of Information Systems (now and 3yrs)



low importance high importance

Why would you grade each skill at that level of importance ?

How would you rank each skill (in order or priority) in terms of their importance to the success of your Information Systems implementation. (now and 3yrs)

Why would you rank each skill in this way ?

RANK	FACTOR
Now 3yrs	
	OS Standards
	UNIX
	4GL Languages
	Data Communications
	System Monitoring Tools
	Object Oriented
	Client/server
	EDI
	OS Solutions
	ITS Management
	ITS Technical
	Communications (People)
	Analysis/Problem Solving
	Inquiring Mind
	Supplier Interface
	Multi-vendor Knowledge
	Vendor Management
	LANS
	Clicnt Management
	Project Management
	People Management
	Desktop Tool Set (GUIs)
	BPR
	Data Management
	Code Re-use
	Data Modelling
	Security
	Relational Databases
	Architecture
	Business
	Job Process
	Training
	Applications
	System Administration
	Strategic Thinking
	Position Specific
	Network Management
	CASE
	Other

REASON:

GADING REASONS NOW:

GRADING REASONS 3YRS:

RANKING REASONS NOW:

RANKING REASONS IN 3 YRS:

SUPERORDINATE GOALS - Priority Concerns

How would you grade each of the following management issues in terms of importance to the successful implementation of Information Systems (now and in 3 years)

1 ----------> 5
(low importance -------> high importance) ?

Why would you grade each issue at that level of importance ?

How would you rank each issue (in order of priority) in terms of their importance to the success of your Information Systems implementation ?

Why would you rank each priority concern in this way ?

RANK	FACTOR
Now 3yrs	
	Internal organisation of the I.T. function
	Identifying opportunities for the use of I.T
	Integrating diversified technologies
	Organisational impacts of information systems
	Relations between ITS and user departments
	Cost justification of spending on ITS projects
	User involvement
	Aligning ITS with business strategy
	Development and management of end-user computing
	Technological constraints
	ITS staff resources
	User awareness and education
	ITS project management and implementation
	Information systems maintenance
	Coping with new information technologies
	Location of the ITS function in the organisational structure
	ITS security
	Data management and control
	Information systems long range plan
	Top management support for ITS
	Budget constraints of ITS
	More effective information systems/technology development
	Other

GRADING REASONS NOW:

GRADING REASONS IN 3 YRS:

RANKING REASONS NOW:

RANKING REASONS IN 3YRS

SKILLS - Education and Training Needs

How would you gradc each of the following training areas in terms of importance to the successful implementation of Open Systems (now and in 3 years).

1 ----——----------->5
(low importance -----> high importance)

Why would you grade each training area at that level of importance ?

How would you rank each training area (in order of priority) in terms of importance to the success of your Open Systems implementation.

Why would you rank each training area in this way ?

RANK	FACTOR
Now 3yrs	
	OS Standards
	UNIX
	4GL Languages
	Data Communications
	System Monitoring Tools
	Object Oriented
	Client/server
	EDI
	OS Solutions
	ITS Management
	ITS Technical
	Communications (People)
	Analysis/Problem Solving
	Inquiring Mind
	Supplier Interface
	Multi-vendor Knowledge
	Vendor Management
	LANS
	Client Management
	Project Management
	People Management
	Desktop Tool Set (GUIs)
	BPR
	Data Management
	Code Re-use
	Data Modelling

Security
Relational Databases
Architecture
Business
Job Process
Training
Applications
System Administration
Strategic Thinking
Position Specific
Network Management
CASE
Other

REASON:

GRADING REASONS NOW:

GRADING REASONS 3YRS:

RANKING REASONS NOW:

RANKING REASONS IN 3 YRS:

STYLE - Leadership Requirements

How would you grade each of the following ITS management leadership issues in terms of importance to the successful implementation of Information Systems (now and in 3 years).

1 ---------->5
(low importance -------> high importance) ?

Why would you grade each issue at that level of importance ?

How would you rank each issue (in order of priority) in terms of their importance to the success of your Information Systems implementation.

Why would you rank each leadership issue in this way ?

RANK		FACTOR
Now	3yrs	
		Interpersonal
		Figurehead — Symbolic duties
		Leader — Set directions, motivate staff
		Liaison — Co-ordinate with others
		Informational
		Monitor — Follow the environment
		Disseminator — Communicate within the organisation
		Spokesperson — Communicate outside the organisation
		Decision making
		Entrepreneur — Look for opportunities
		Disturbance handler — Fire fighting
		Resource allocator — Provide resources
		Negotiator — Resolve conflicts
		Learning about the business
		Establishing the ITS department's credibility
		Increasing the technological maturity of the organisation
		Creating an ITS vision and selling it
		Implementing a systems architecture to support the company vision for the future.
		Other

GRADING REASONS NOW:

GRADING REASONS IN 3YRS:

RANKING REASONS NOW:

RANKING REASONS IN 3YRS:

RESEARCH QUESTIONS

STRATEGY - Open Systems Business Objectives

How would you grade each of these business objectives in terms of importance to the successful implementation of an Information Systems architecture within your organisation (now and in 3yrs).

1 ----------> 5
(low importance -------> high importance) ?

Why would you grade each objective at that level of importance ?

How would you rank each objective (in order of priority) in terms of its importance to the success of your Open Systems implementation.

Why would you rank each objective in this way ?

RANK **OBJECTIVE**

Now **3yrs**

Business Objectives

Automating operations
More efficient communications with customers/clients
Expansion into overseas markets
Improving the quality of business decisions
Product quality improvement or control
Increasing the autonomy of user departments
Improving research/development capabilities
Increasing the speed of business decisions
Minimising information technology costs
Reducing business costs
Reducing the "time-to-market" for new products/services
Streamlining relationships with suppliers
Supporting basic functions
Other

REASONS FOR GRADINGS NOW:

REASONS FOR GRADINGS IN 3 YRS:

REASONS FOR RANKINGS NOW:

REASONS FOR RANKINGS IN 3 YRS:

Why are you attempting to achieve these objectives ?

Have you achieved any of these objectives (or varying degrees) at this point in time ?

If yes, please indicate the objective and how, and to what degree you feel it has been fulfilled ?

1= LOW 5 = HIGH

Business Objectives	**ACHIEVED LEVEL 1-5**
Y/N	
Automating operations	
More efficient communications with customers/clients	
Expansion into overseas markets	
Improving the quality of business decisions	
Product quality improvement or control	
Increasing the autonomy of user departments	
Improving research/development capabilities	
Increasing the speed of business decisions	
Minimising information technology costs	
Reducing business costs	
Reducing the "time-to-market" for new products/services	
Streamlining relationships with suppliers	
Supporting basic functions	
Other	

APPENDIX B

CASE ORGANISATION

CONTEXTUAL BACKGROUND INFORMATION

B.1 Case Organisation 1

This section describes the first case organisation, summarising it under the sub-sections of organisational background and ITS department structure. A full account of individual subjective case account details for this organisation are located in appendix D section D1.

B.1.1 Organisational Background

This organisation's business activity is in the transportation industry. It is ranked 16 in the MIS Spring, 1996 Top 100 ITS Users List. At the time of this study it was the 10th largest organisation of its kind in the world and was being prepared for privatisation. The ITS staff numbered approximately 650 out of an organisation of 28,000 staff. The organisation was predominately hierarchical and distributed (in 8 State offices) in structure generating revenues of 6 billion dollars per year. The ITS budget at the time of this project was 120 million dollars over a two-year period. This level of investment was provided in order to realise the complete redevelopment of the core ITS platform to one of a more "open" nature. It was stated that this would ensure that a number of diverse technologies (IBM/MVS, IBM/TPF, Stratus, networked PCs, NCR 3600, UNIX and Unisys) would come together in a national and international network. These technologies would also be utilised to rationalise duplicate systems which the organisation had inherited through mergers and acquisitions over the years. In 1993 the organisation had lost $377 million dollars so effective and efficient use of ITS was firmly on their agenda.

As this data was being collected the CIO, the Director of Information Services and the General Manager Special Project Services positions on the organisation chart were combined to become the Executive Manager ITS (see figure B.1). This was done to

ensure that all ITS resources were focussed on the internal business of the organisation rather than on other project work outside of the organisation.

The Executive Manager (ITS) was a recent external appointment who had former experience with privatisation of a similar business in another country. He saw the transforming role of ITS in such circumstances but also the mandatory nature of ITS in order to run such a business. The key areas of cost reduction and personalisation of customer service were of primary concern to him and he saw the need to measure ITS benefits and performance while making sure ITS was aligned to corporate policy e.g. impacts on provision of products to customers caused by ITS.

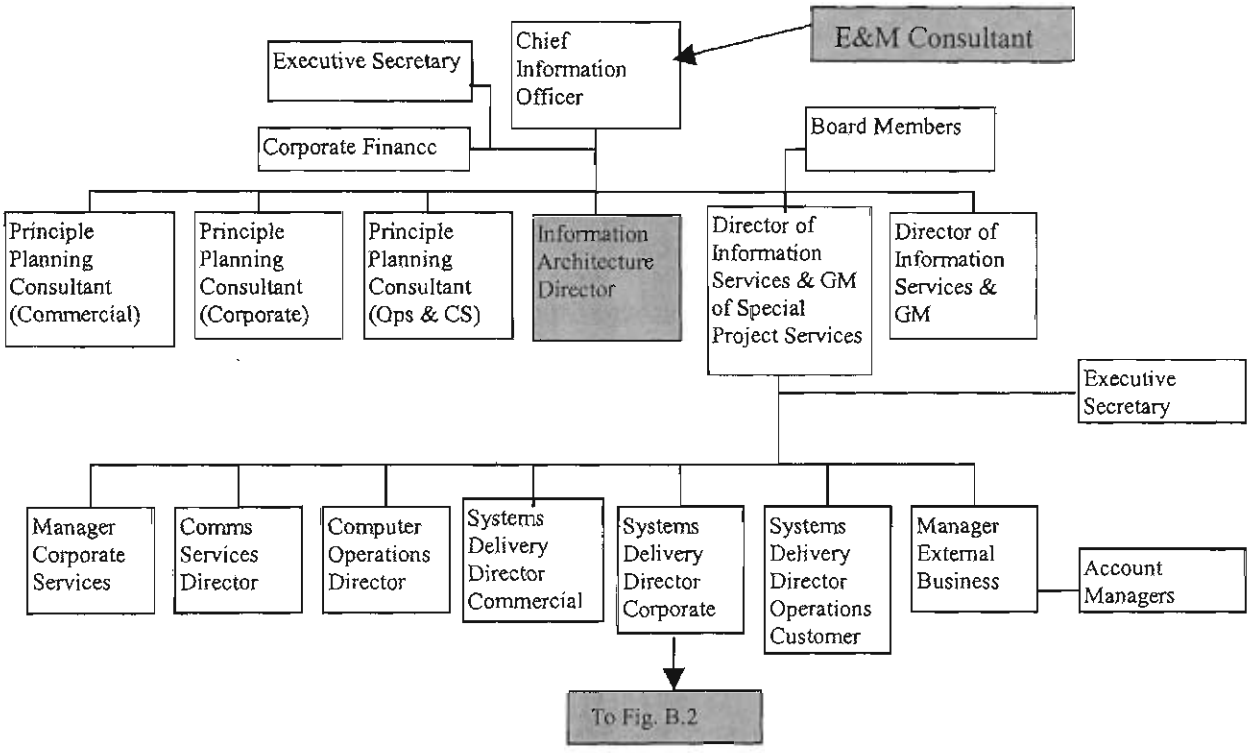
In a 1995 magazine article the Executive Manager ITS referred to this project as "a brain and heart transplant on a $6 billion patient". This project was seen as rectifying problems such as too many systems (duplication from inheritance) but was also seen as "not an activity for the faint hearted". Rationalisation of systems while boosting the bottom line and containing expenses, was a challenge for this organisation at the time of this study. The Executive Manager ITS expressed that "information technology can enable a lot of very fundamental changes in the way that the business operates" and that ITS is "absolutely vital" to this particular business operation. He also stated that a smaller proportion of expenditure on hardware and communications was happening every year. This was because the greater cost of operation was being produced by people and physical infrastructure in the creation of ITS platforms.

The executive manager ITS was also charged with managing the organisation's technical ITS subsidiary (a separate independent ITS consulting company). so essentially the two ITS areas would be under the one executive's control. This was done to ensure that the technical subsidiary's main area of focus would become the organisation and its ITS requirements.

B.1.2 ITS Department Structure

The following figure B.1 details the ITS department structure at the time of this study which is a role based hierarchy (Handy 1995). Principle planning consultants were given the responsibility for various areas of the business.

Figure B.1 - ITS Department Organisational Chart



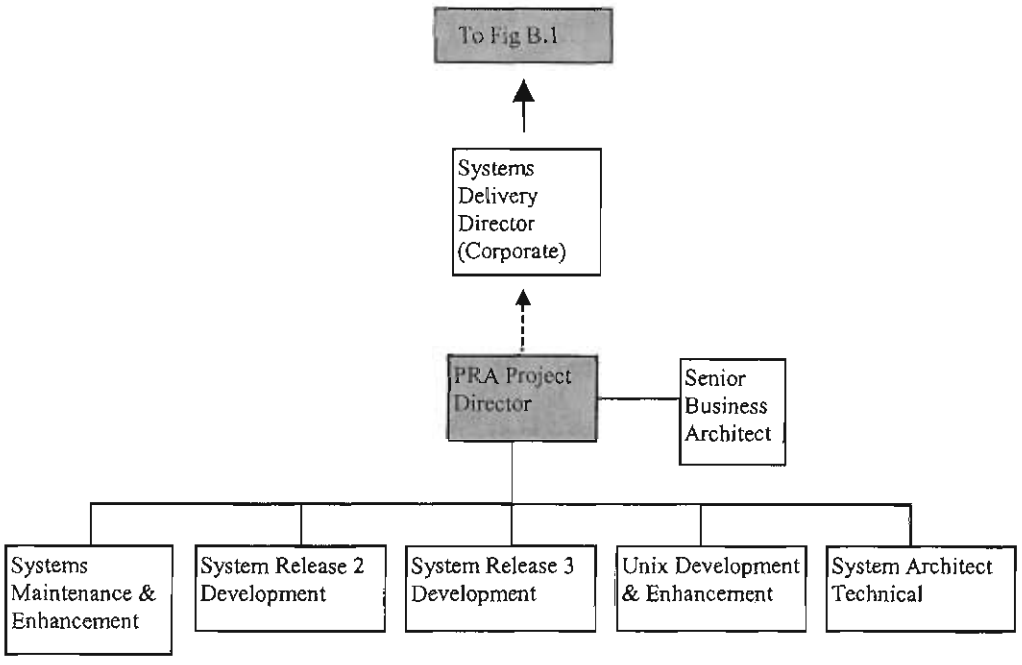
Respondents were asked to describe their roles within the organisation and the following section outlines *key players and their job descriptions.*

Respondent 1 - Office of the Chief Information Officer (CIO) E & M Consultant – this position reports directly to the CIO box on the ITS Organisation Chart (see Figure B.1). This position assists the Engineering and Maintenance Department (E & M) with their strategic ITS planning and ensured the integration of E & M with the rest of the corporate ITS architecture. This position performs the role of consultant to the organisation with no direct staff reports.

Respondent 2 - Information Architecture Director (refer to ITS Department Organisation Chart – figure B.1) - this position worked with the CIO and the organisational management at large, to develop and update principles, standards and guidelines for the use of ITS. It also provided effective architectural solutions to business and ITS issues. This position had 5 staff reporting to it.

Respondent 3 - Project Director - Passenger Revenue Accounting (see figure B.2) - this position entailed the delivery of a multi-release, multi-year project across 3 different technical platforms. It reported to the Systems Delivery Director (Corporate) and it had 40 staff reporting to it.

Figure B.2 Project Director – Revenue Accounting



B.2 Case Organisation 2

This section of appendix B describes the second case organisation summarising the organisational background and ITS department structure. A full account of individual subjective case account details for this organisation are located in appendix D section D.2.

B.2.1 Organisational Background

This organisation's business activity is in the transportation industry. At the time of this research project the organisation was corporatising with a view to long-term privatisation. The ITS staff numbered approximately 4 full time and 6 part time out of an organisation of 600 staff located predominately in Sydney with offices Australia wide. The organisation was mostly hierarchical and distributed (8 State offices) in structure (moving to a matrix like structure). The ITS budget at the time of this project was 1.4% of the overall organisational revenue, in order to facilitate the redevelopment of the core ITS platform to one of a more "open" nature and an orientation towards a more "user pays" approach for ITS services.

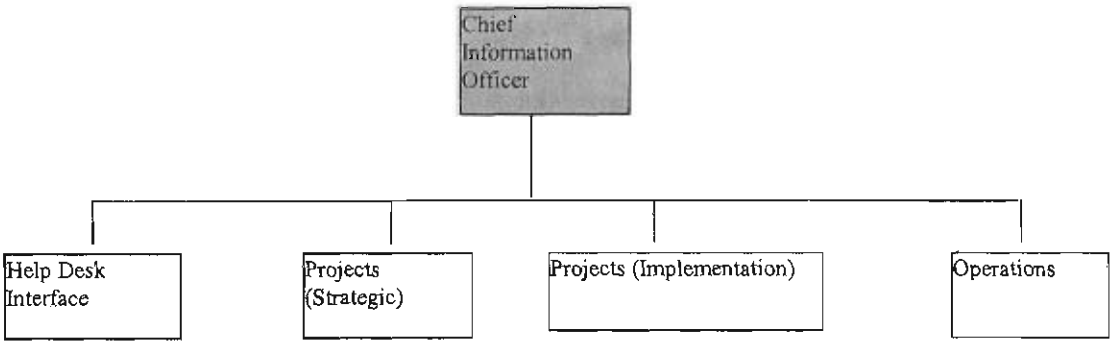
The Executive CIO of the ITS function referred to these strategies as being highly successful due to the ITS budget reduction (1.4% of revenue instead of the usual 1.9 – 2.4%) which necessitated the end user taking more responsibility for the cost and use of ITS. This open systems architecture development approach was also seen as educating the users of ITS, to pay for the services as well as bringing them along with the move to more integrated open systems architecture systems. Rationalisation of systems, while boosting the bottom line and containing expenses, was a challenge for this organisation at the time of this study. There was, however, some dissatisfaction from users not used to paying for ITS services. The executive CIO stated that "These are new applications of technology and so the users are still learning, therefore open systems architecture will

become more successful over time". He also stated that "because of the current shift from proprietary systems to open systems architecture there was a need to make the systems pay as well deriving the strategic requirements for what comes next in the open systems architecture". He saw this as being more appropriate for the positive progression of the open systems architecture and integrated systems within this organisation.

B.2.2 ITS Department Structure

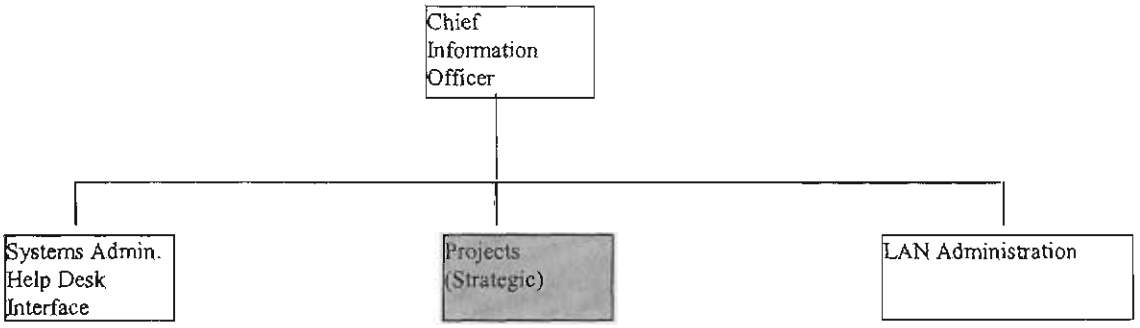
The following figure B.3 details the ITS department structure at the time of the study, as described by the Chief Information Officer, which is a role based hierarchy (Handy 1995).

Figure B.3 - Structure of the ITS Department (according to the Executive CIO)



This respondent sees the structure of the ITS department differently to the executive CEO (see figure B.4)

Figure B.4 - Structure of the ITS Department (according to the Manager ITS Projects)



The helpdesk function is connected to other ITS staff (see figure B.4) in order to use their expertise and pass on expertise to them. This respondent also sees that projects (implementation) and operations are rolled into the LAN administration function.

Respondents within this organisation commented that privatisation of the organisation and the additional productivity requirements would place pressure on the open systems architecture strategy over the coming years.

The Executive CIO stated that the characteristics of the open systems architecture within the organisation encompassed: project based staff management and reporting; ITS service offerings within the business and the ITS plan as part of the corporate plan. ITS expenditure was seen as being relatively low, however, there was a possibility of more of an ITS overhead cost due to a larger travel budget to service all national ITS locations (8 in all).

Respondents were asked to outline their roles within the organisation. The following section highlights *key players and their job descriptions*.

Respondent 1 - Executive CIO – At the time of this study this was a corporate ITS position responsible for the management of computer hardware, software and communications requirements (voice & data). It has 4 full time and 6 part time positions reporting to it across Australia. These positions supply and maintain over 400 terminals (including workstations to over 600 staff).

Respondent 2 - Manager of ITS Projects – This position is one of technical support to the Executive CIO. The role encompasses the preparation of budgets and ITS plans (strategy) to support the business and align it with the open systems architecture platform. There are no staff reporting to this position.

B.3 Case Organisation 3

This section of appendix B describes the third case organisation summarising the organisational background and ITS department structure.

A full account of individual subjective case account details for this organisation is located in appendix D section D.3.

B.3.1 Organisational Background

This organisation which is part of a larger services organisation has a seven year history of business activity is in the ITS services industry. It was formed by amalgamating branches of 3 former government departments. At the time of the study this organisation was ranked 47 in the MIS Spring, 1996 Top 100 ITS Users. The organisation's business mission is to provide not only itself but "also the rest of the Commonwealth with cost-effective common information technology services on a competitive basis". Objectives included: strong commercialisation (productivity improvements and lower costs); increased service offerings (meeting customer requirements); total quality management and customer satisfaction focus and committed management and support teams (taken from corporate documents). Business unit managers were responsible for the development and administration of ITS under the broad direction of the corporate ITS committee.

At the time of this research project the organisation was corporatising with a view to long term privatisation and outsourcing. It was seen as becoming a successful

commercial ITS consulting operation. The ITS staff numbered approximately 100 full time, servicing 40 government agencies mostly in Canberra with offices Australia wide. The organisation was mostly hierarchical in structure generating revenue of 24.5 million dollars per year. The ITS budget at the time of this project was expressed as provision of service for 40 cents per computing unit with estimated computing costs of 24 million dollars per annum. This organisation was recognised by the Nolan Norton Institute as having a very high standard of mainframe bureau operating efficiency (corporate documents). It must be stressed that most of the ITS development and operation going on in this organisation was on behalf of other government agencies. This organisation has a "history of innovation and leadership in federal government information technology" it is also a - "government commercial business" with an "impressive customer base" (quotes taken from corporate documents). This organisation has a Total Quality Management (TQM) and strategic alliance orientation.

At the time of this study the organisational ITS included: hardware (Amdahl, IBM RISC/6000, HP 900-G40), operating systems (UNIX, MVS), data communications (IBM SNA, TCP/IP, X.25, IPX) and DBMS (DB2, Informix, INGRES). Open systems architecture efforts have included: development of COSINet, a corporate open systems compliant office network; adopting GOSIP to interconnect the organisations various computer systems via an X.25 WAN (in 1992); migrating from a proprietary IBM SNA network by utilising TCP/IP and other standard protocols; porting NOMAD (the organisation's human resource system) to a UNIX platform; and setting up a large-scale UNIX bureau service for accrual accounting systems (in 1993).

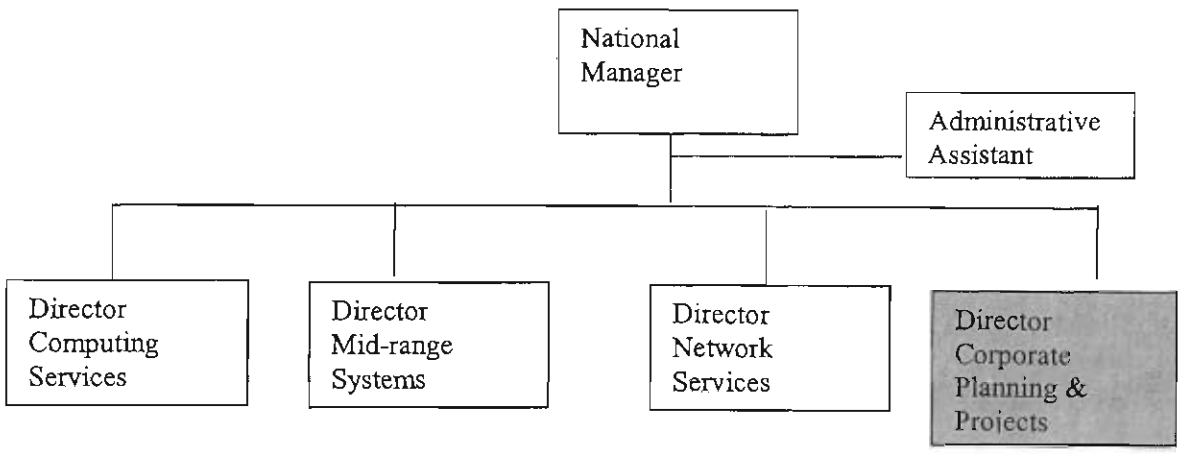
Highlights of the organisation's achievements include: development and management of an integrated nation-wide voice and data communications network; taking the lead in the development of a value-added network for Commonwealth agencies; identifying UNIX as a strategic operating system; developing a corporate open systems compliant office network. ITS services offered at the time of this study included: mainframe services; data communications; customer support; database services; office systems; voice communications; systems design; program development; project management; ITS strategic planning; capacity management; and ITS security and access monitoring (from corporate documents).

This organisation also viewed itself as being successful in the area of strategic alliances and was also running an enterprise computing centre for a client who was a computer vendor. This centre was designed to assist the computer vendor's clients to migrate to more open architectures by allowing them to "systematically develop and test their information strategies as well as pick and test the software solutions that best meet their business needs" (corporate documentation). This computing centre was an innovative approach that involved vendors in this area and required a major investment of 25 million dollars most of which was provided by the major vendor partner in the operation. This organisation has computing services, mid range systems, network services and corporate planning and project areas (see figure B.5).

B.3.2 ITS Department/Organisational Structure

The following figure B.5 details the ITS department structure at the time of this study which was a role based hierarchy (Handy 1995). Directorial roles were established for key business practice areas. The ITS department offers a mainframe processing bureau, midrange facilities management and a national voice/data network to all Australian capital cities. It co-ordinates email services for its own staff and provides electronic commerce facilities and personnel and financial services for itself and other government agencies.

Figure B.5 - ITS Department/Organisational Chart



The Director of Computing Services is responsible for mainframe software, database and software installation, system capacity and facilities and business services. The Director of Mid Range Services is responsible for marketing strategy, customer service and integrated systems and services. The Director of Network Services is responsible for communications and workgroup support.

At the time of this project this organisation was undergoing radical change and it was thought that the Director of Corporate Planning and Projects would be the best person to respond to this survey.

Single Respondent

Single Respondent - Director of Corporate Planning and Projects - this position was responsible for the key EDI project (Electronic Trading Gateway), TQM/TQS and the major NOMAD/UNIX project (Human Resources Application).

B.4 Case Organisation 4

This section of appendix B describes the fourth case organisation summarising the organisational background and ITS department structure. A full account of individual subjective case accounts for this organisation is located in appendix D section D.4.

B.4.1 Organisational Background

Operating in the public administration sector this organisation' s business mission is to "collect revenue properly payable, so as to fund services and support for the people of Australia" (taken from corporate documents). It is ranked 11 in MIS Spring, 1996 Top 100 ITS Users List. Highlights of the organisation's ITS achievements include the support of 17,700 organisational staff, completing 80 million transactions per year utilising 18,500 screens.

The ITS staff numbered approximately 1,178 full time servicing its central operations in Canberra (see Figure B.6) and its branch offices Australia wide (see diagram B.7). The organisation was mostly hierarchical in structure generating revenue of 74 billion dollars p.a. The ITS budget at the time of this project was 119 million dollars p.a.

This organisation has two Amdahl mainframes using IBM systems software and 17,000 diskless PCs that all have access to the mainframes. Operating systems include MVS,

Primos and Unix while DBMS include DB2 and ADABAS. Each of these PCs is connected via a LAN, operates under WINDOWS and uses a standard software platform for word-processing, spreadsheet, database and email. There are also 4000 standalone or portable PCs in addition. This organisation is the third largest user of computers in the federal government.

At the time of this research project the organisation was implementing a program of modernisation over a ten year period (1989/99) with a vision of a single integrated electronic information system to be accessible by fully-trained multi-skilled staff from anywhere in the country. This modernisation project "broke with tradition in calling for a total system concept, with new products such as mainframes, terminals, network elements and software all contributing to an over-riding set of core functions and capacities" (taken from a research report on this company). Modernisation was to cost 1.2 – 1.5 billion over the ten year period which was comparable to the current operation budget which stands at 1.19 billion, of which 0.6 billion is spent on salaries. A new IT strategic plan was also being developed within the framework of modernisation to "provide guidance about how it will advance its computing infrastructure and what applications would be needed to support the business" (newspaper report).

End user computing control is also a large part of the ITS management effort as an organisation that collects a large amount of government revenue and is so large and distributed, is more prone to security issues such as virus attacks.

Historically this organisation was not seen as an innovative enterprise, but the modernisation program was seen as a way of using enabling agreements between, staff, unions, management, government and other interested parties, as well as participative project management approaches and systems development frameworks, to overhaul the purpose, goals and objectives of this organisation by making them relevant to the current social, business and client expectations (taken from a research report on this company).

The following figures B.6 and B.7 detail the organisational structure at the time of this study (taken from organisational documents) which is a national and branch office role based hierarchy (Handy 1995). Roles were established at both a national and branch office level for key business practice areas.

Figure B.6 - National Office Organisational Chart

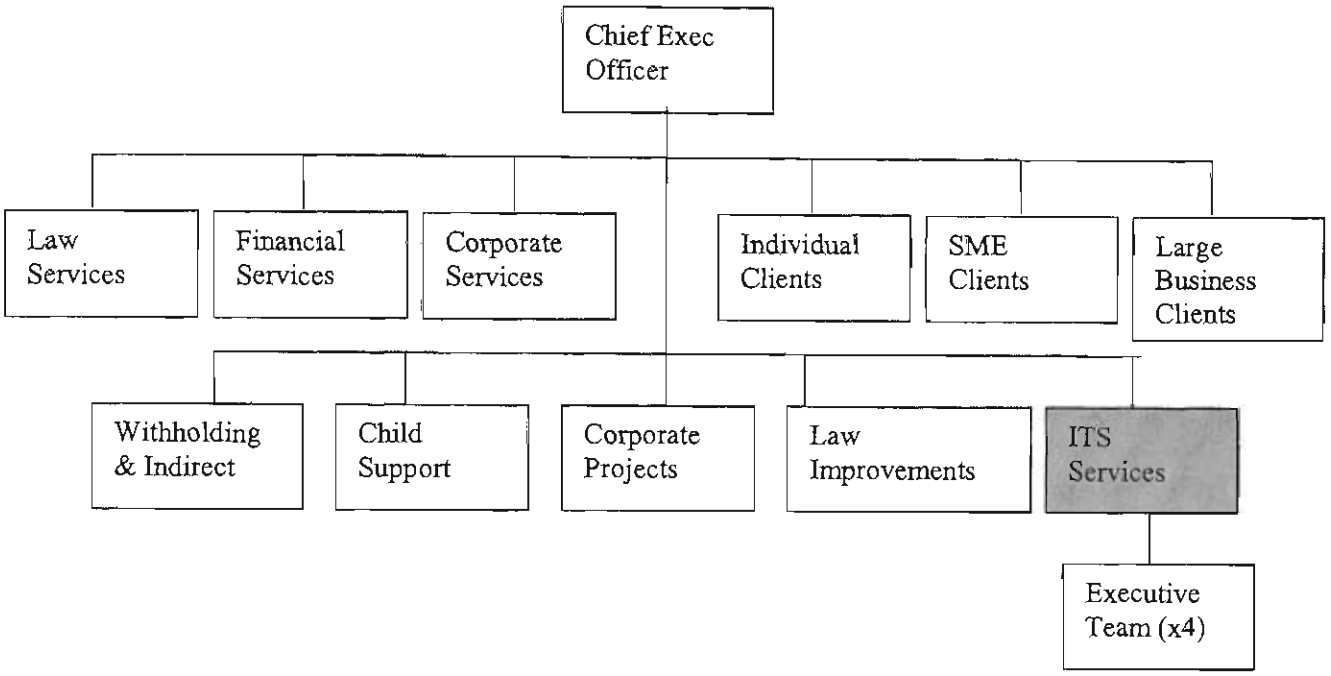
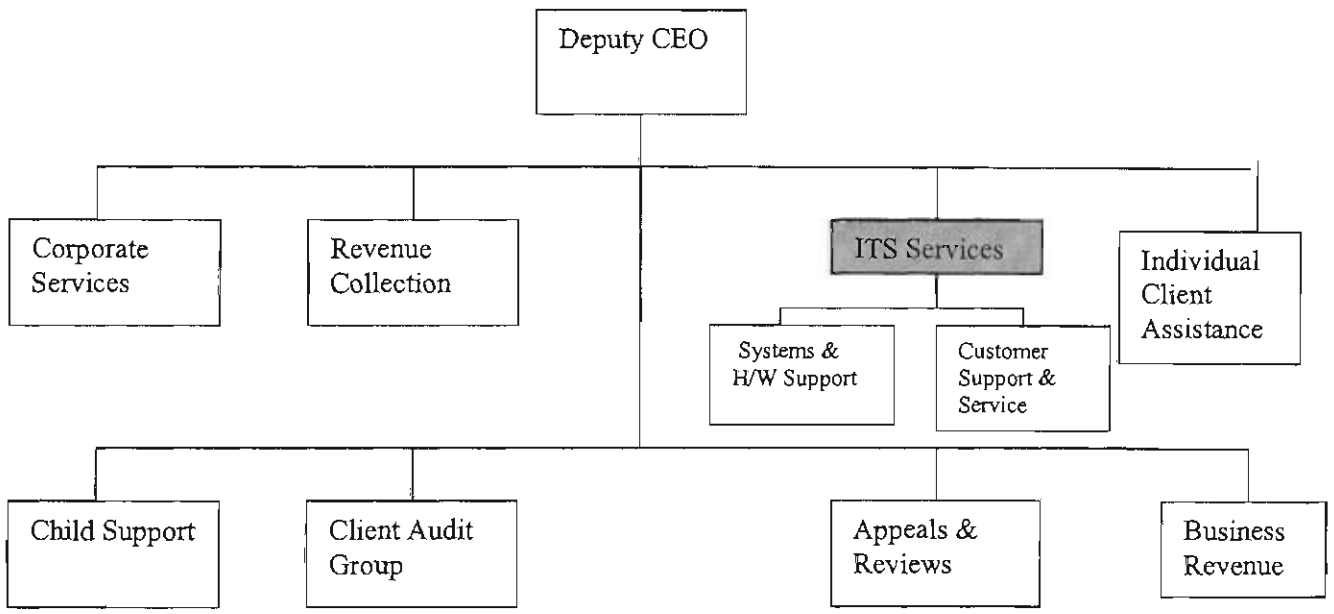


Figure B.7- Branch Office Organisational Chart

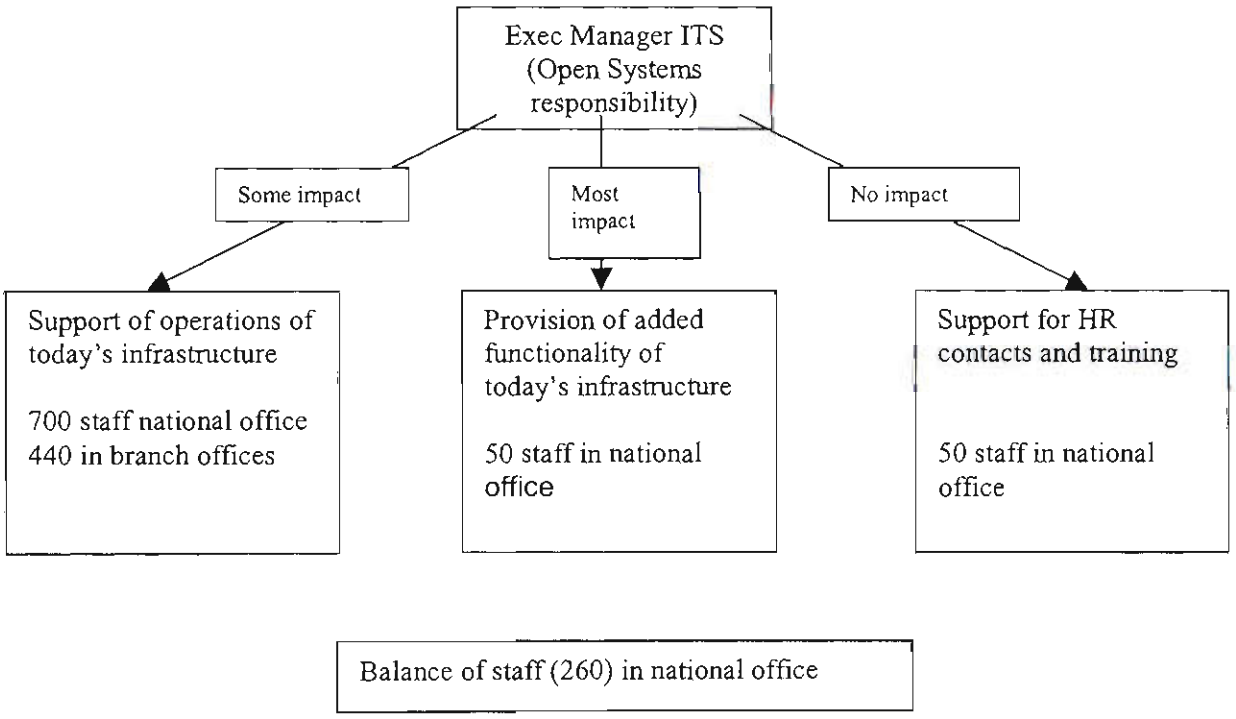


B.4.2 ITS Department Structure

The following figure B.8 details the ITS department structure at the time of the study, as described by the Executive Manager ITS, which is a role based hierarchy (Handy 1995).

Figure B.8 - ITS Organisational Chart

This is an organisation in transition and is represented in the following way:



Respondents were asked to outline their roles within the organisation the following

Respondent 1- Executive Manager Corporate Projects – responsible for one-off and ongoing special projects at high levels within the organisation.

Respondent 2 - Executive Manager ITS - responsible (to the date that this survey was administered) for applications, communications, hardware and infrastructure management. Currently the responsibility for applications is being moved to the business lines and is managing hardware, voice and data communications and infrastructure services (mainframes, LANS and telecommunications). This position manages the user support function in terms of infrastructure and applications, as well as the training of staff in ITS use. There is 1,200 staff in the group (spread over 3 areas of impact) with 7 staff directly reporting to this position.

Respondent 3 - SES Specialist in ITS - responsible for keeping up to date with current and future developments (and relevance to the organisation) within the ITS field. He chairs and Open Systems Steering Sub-Committee on information exchange and is currently writing a report on the progress of the implementation of the open systems architecture and its GOSIP compliance within this organisation. He sees that it is his role to keep in touch with the systems delivery project so that it occurs within the stipulated architecture and also to make sure that the architecture changes as the organisation requires it to. This is to ensure that there is a stability of architecturally controlled change.

Respondent 4 - Project Manager - who is emerging from an evolving organisational structure of a Melbourne user base orientation to a Canberra ITS based orientation. This respondent looks after everything to do with her project in both locations with a total of 5 ITS staff reporting in Canberra with 3 left in Melbourne (to be phased out). Her project responsibility is for implementing a new gateway capability which provides

connection between the organisation and the outside world (to initially connect third party intermediaries (agents)). Additional functionality will be eventually provided to include email and internal access to online databases including decision support information.

B.5 Case Organisation 5

This section of appendix B describes the fifth case organisation summarising the organisational background and ITS department structure. A full account of individual subjective case responses for this organisation are located in appendix D section D.5.

B.5.1 Organisational Background

This organisation was among the 5 largest Commonwealth spending agencies (more than $50 million spent on software and hardware per year) and it also has a history of business activity is in the community services industry. It was rated 10 in the MIS Spring, 1996 Top 100 ITS Users List. The organisation's business mission is to "get people into jobs and reduce unemployment by: increasing job opportunities for the long term unemployed; managing employment and training programs for employment outcomes; and targeting client assistance to those most in need" (taken from corporate documents). The ITS staff numbered approximately 450 full time servicing 16,000 staff in a central national office (Canberra), 19 area offices and employment services offices Australia wide. The organisation was mostly hierarchical in structure with an annual budget to provide key services of 13.6 billion dollars per annum. The ITS budget at the time of this project was 102 million dollars per annum. The organisation was "one of those agencies that had taken devolution to extraordinary lengths. Each area had developed its own systems" (journal article). The organisation was also given a one-off sum of $1.87 billion dollars in 1994 for a 4 year development of an integrated

employment system (IES) which consisted of touch screen systems and displays for job searchers in the government employment program. In 1995 it was busy implementing a $20 million client server student entitlement processing system (STEPS), as well as a $45 million mainframe upgrade to a HDS GX8824 and a $300,000 usability lab.

Facilities under its control include: two mainframe computers (HDS and Fujitsu); operating systems which include MSP & MVS; DBMS which include AIM/DB, IDMS, Adabas & DB2; a large national communications network; and the support and maintenance of over 16,000 devices (8,000 x PCs, 8,000 x terminals, printers etc). The (ITS) Division also: assists other divisions (within the organisation) in identifying areas in which ITS can be applied; undertakes systems development, implementation and maintenance; provides planning and administrative support for the Department's ITS activities. It was also obvious that the organisation has developed a mainframe culture to systems development over the years.

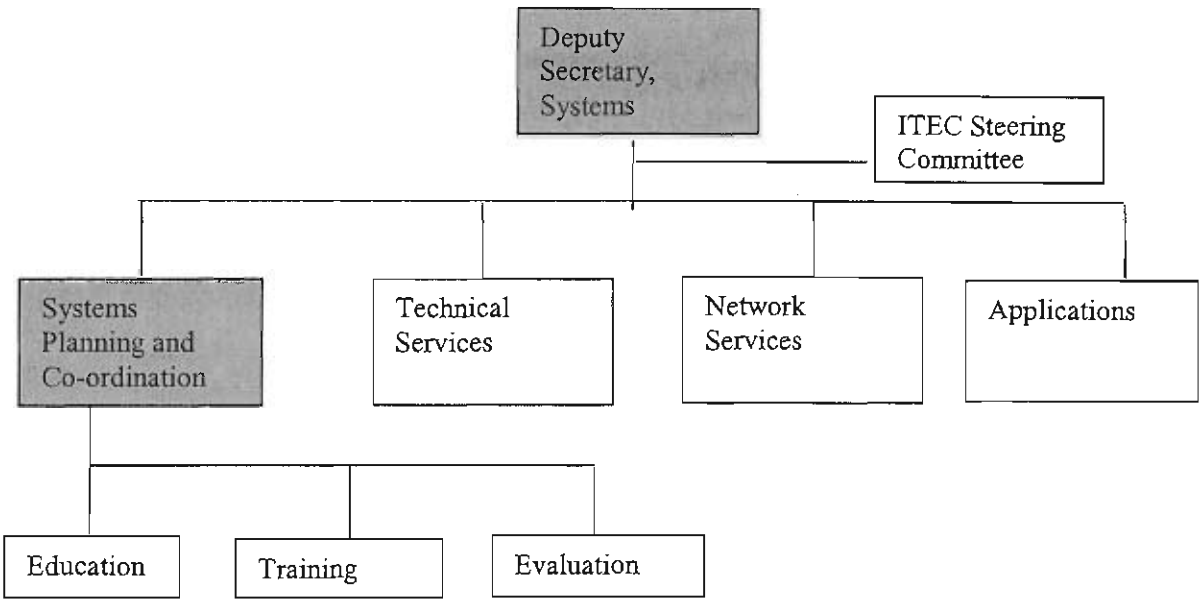
At the time of this study this organisation had brought all of its ITS staff under one command in order to effect the best and most effective systems management outcome for the organisation. There was also a desire to build a cohesive group of client/server projects to overcome the number of different ITS platforms within the organisation. "Lack of standards was the most galling issue". It was also part of the Deputy Secretary's brief to put the brakes on spending (journal article). The need for consistency in the user interface promised to be a headache. Decisions such as standardising on MVS and DB2 for mainframe developments and Oracle for distributed processing as well as Texus Instruments IEF for applications development, were testimony to this approach. The organisation also used Microsoft WINDOWS NT server

and associated applications, as a standard PC platform. The ITS division consists of four branches steered by a Information Technology Committee (ITEC). As the deputy secretary of the systems group confirms "The business stakeholders in the organisation appreciate the discipline and the more businesslike process for investing in ITS solutions" (journal article).

B.5.2 ITS Department/Organisational Structure

The following figure B.9 details the ITS department structure at the time of this study which is a role based hierarchy (Handy 1995). Divisional roles were established for key business practice areas.

Figure B.9 - ITS Department/Organisational Chart



The Systems Planning and Co-ordination Branch was responsible for ITS strategic planning and administrative support of the Department's ITS infrastructure. The Technical Services Branch was responsible for the ongoing operation of the Department's centralised computing facilities and technical support of database, operating systems and mainframe communications software. The Network Services Branch was responsible for managing the redevelopment and operation of the ITS infrastructure outside the computer centre. This includes the co-ordination of out-posted staff in the National Office and Division and Area Offices. The Applications Branch was responsible for the technical development and ongoing technical support of ITS applications (taken from corporate documents).

Respondents to this study were asked to outline their organisational title, responsibilities and the number of staff reporting to them.

Respondent 1 – Division Manager (non-ITS position). This position assists Area Managers in delivery of systems by monitoring them, giving systems support and change management assistance as well as operations support. Staff reporting to this position included 4 Branch heads, 3 business units and 19 area managers (in the day-to-day operational sense)

Respondent 2 - Deputy Secretary Systems - this position is responsible for all of the ITS requirements for the organisation and has 4 Section Heads reporting to it.

Respondent 3 – Section Head – Planning and Co-ordination - this position is responsible for ITS planning of the ITS Division and departments. It is also involved in most projects with an ITS component. It manages public document keys and the Department's corporate ITS plan as well as ITS training requirements for 450 staff. 3 sub-section heads report to this person (Education, Training and Evaluation).

B.6 Case Organisation 6

This section of appendix B describes the sixth case organisation summarising the organisational background and ITS department structure. A full account of individual subjective case accounts for this organisation are located in appendix D section D.6.

B.6.1 Organisational Background

This organisation has a history of business activity in public administration. The organisation was ranked 108th in a listing of the leading Australian and New Zealand users of ITS (journal article).

The organisation's business mission is to "assist and encourage informed decision making, research and discussion within governments and the community, by providing a high quality, objective and responsive national statistics service. We will actively co-ordinate statistical activities across government agencies and promote the use of statistical standards. " (taken from corporate documents).

The ITS staff numbered approximately 170 full time servicing 3,534 staff in a central national office (Canberra – 1,652), state (6 – difference) and territory (1 – 42) offices Australia wide. The organisation was mostly hierarchical in structure with an annual budget in terms of total expenditure of $212.8 million dollars against total appropriations of $222.2 million (1992-93). Estimates of revenue for the period of this study are around $18 million. The ITS budget at the time of this project was not disclosed. The ITS group, support and maintain over 3,300 desktop computers most

of which have access to data files through Lotus Notes which it also uses for its enterprise-wide information systems which include electronic mail, data sharing and workflow organisation. The ITS architecture includes: hardware (15 SUN servers, 1 Fujitzu mainframe); operating systems (MSP, UNIX and Solaris) and DBMS (Adabas and Oracle). The organisation has also established a web site to make information available to the general community using InterNotes publisher to assist with the task. There are 100,000 hits on their website per annum (1996). The computer services area also: assists other parts of the organisation with implementation and maintenance; provides planning and administrative support for the organisation's ITS activities. It focussed this through the three key business activities of technical applications (systems development and maintenance, technical support and technical research (R&D).

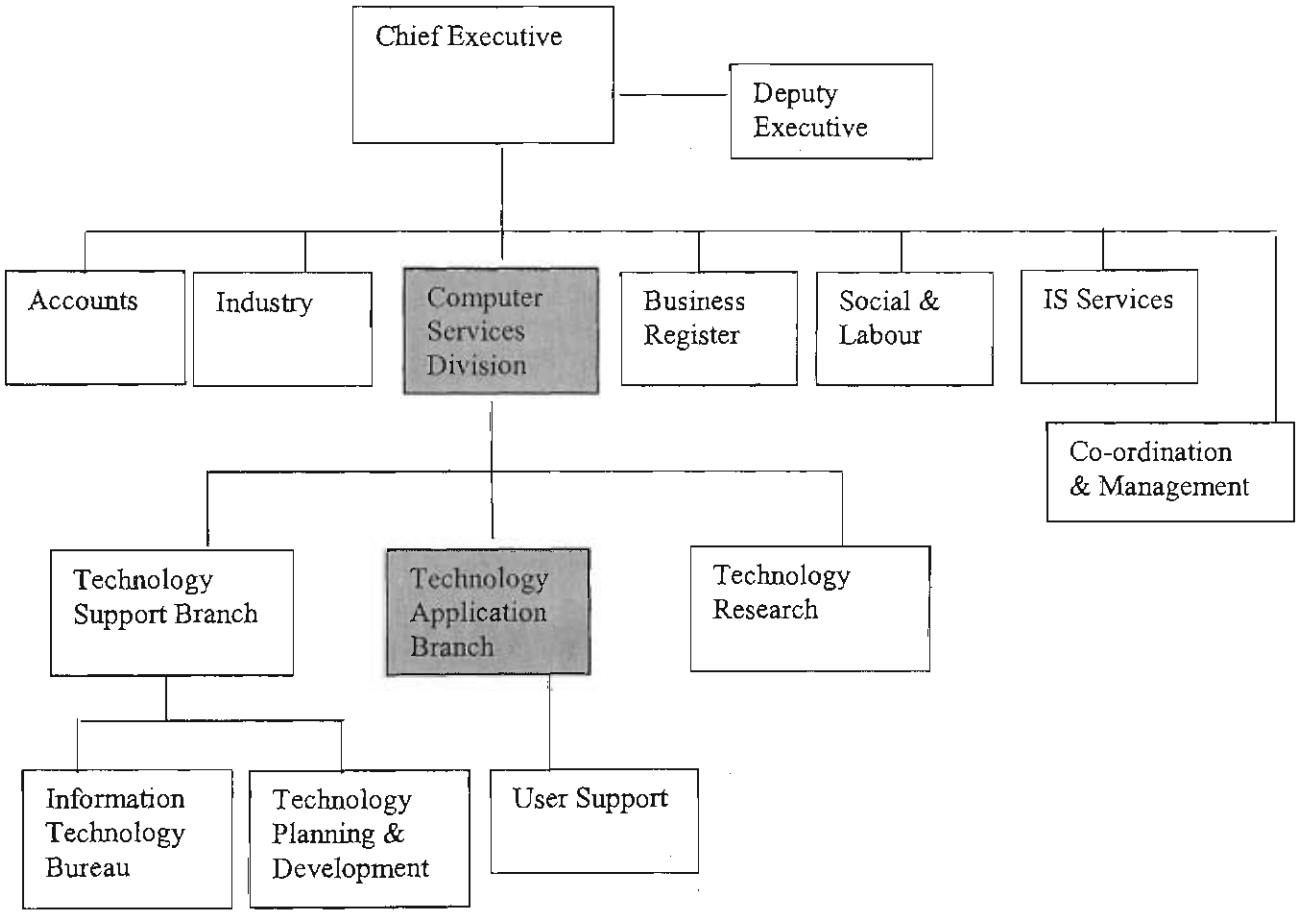
At the time of this study this organisation had brought all of its ITS staff under one command in order to effect the best and most effective systems management outcome for the organisation. The Computer Services division consists of three branches which are Technology Support, Technology Applications and Technology Research. These branches report to the Computer Services CIO. The Bureau is attempting to break the time worn image of the stodgy public service organisation by both making its research easily accessible on the Internet and by making it affordable and relevant to a broad audience (journal article).

Two major projects are underway. These are the 1996 population and housing census/systems (PC based) and the redevelopment of the business register (Fujitsu object oriented ODB2).

B.6.2 ITS Department/Organisational Structure

The following figure B.10 details the ITS department structure at the time of this study which is a role based hierarchy (Handy 1995). Divisional roles were established for key business practice areas.

Figure B.10 - ITS Department/Organisational Chart



The Information Technology Bureau have responsibility for "installation and operation" of the organisation's central computing equipment, installation and operation of mid-range equipment, installation and support of small scale technology (including micro-computers), installation and operation of communication networks,

development and support of systems software and program products, support of databases, and management of storage media. Facilities under its control include: a Fujitsu mainframe computer in the central office; linked to state and territory offices by a large national communications network; and increased trend for distributed processing through the connection of all computers to each other and to the central computing installation (CCI) through a Banyan Vines network. In addition, this organisation has 11 Fujitsu S series UNIX mid-range computers which are all accessible right across the network running Oracle database management systems which support personnel, library, management information systems and some statistical systems. All computer acquisitions were in line with the Department of Administrative Services guidelines and the organisational technology strategic plan. This organisation also explicitly states its involvement with the Federal Government Information Exchange Steering Committee in the development of GOSIP, Open Systems Guidelines and other standards.

Technology Planning and Development is responsible for the provision of advice on, and support of ITS planning and for research and investigation into new technology development and use. Planning activities relate to large and small scale computing, voice and data telecommunications and related technologies.

User Support acquires, develops and supports computerised systems for statistical and management applications and software. It also provides support to users of the organisation's information technology facilities such as consultancy and technology training.

Respondents to the study were asked to outline their roles within the organisation and the following section highlights *key players and their job descriptions.*

Respondent 1 – Computer Services Division (Chief Executive) – responsible for the entire division (approx 270 staff).

Respondent 2 - Director of Technology Applications – responsible for user support activities with 15 staff reporting.

APPENDIX C

CASE ORGANISATION

RESPONDENT SUBJECTIVE CHARACTERISTICS

TABLES

Table C.1 - STRATEGY Subjective Characteristics - Business Focus of ITS Applications - NOW & FUTURE (N=15)

Organisation	1				2			3		4				5			6		
Respondent	1	2	3	S/T	1	2	S/T	1	S/T	1	2	3	4	S/T	1	2	3	S/T	1	2	S/T	TOTAL
NOW																						
Strategic	1	1	1	3	1		1	1	1		1	1	1	3	1	1		2	1	1	2	12
Turnaround				0	1	1	2		0	1	1	1		3	1			1	1		1	7
Factory	1			1	1	1	2		0	1	1	1		3	1			1			0	7
Support				0	1		1		0		1	1	1	3	1	1	1	3	1		1	8
FUTURE																						
Strategic	1	1	1	3	1	1	2	1	1		1	1	1	3	1	1		2	1	1	2	13
Turnaround				0			0		0	1	1	1		3			1	1			0	4
Factory				0	1		1		0		1			1				0			0	2
Support				0			0		0		1		1	2		1		1		1	1	4

Table C.2 - STRATEGY Subjective Characteristics - ITS Business Objectives - NOW & FUTURE (N = 15)

Organisation	1				2			3		4				5			6		
Respondent	1	2	3	S/T	1	2	S/T	1	S/T	1	2	3	4	S/T	1	2	3	S/T	1	2	S/T	TOTAL
Business Objectives NOW																						
Automating Operations			1	1	1		1		0	1		1		2				0			0	4
More effic't comms cust/clients		1		1			0	1	1	1			1	2	1	1		2			0	6
Expansion overseas markets				0			0		0					0				0			0	0
Improve quality of bus decisions	1		1	2			0		0	1		1		2	1			1			0	5
Prod qual control or improve				0			0		0	1				1			1	1		1	1	3
Increase user dept autonomy				0	1		1	1	1			1		1				0			0	3
Improving R&D capabilities				0			0	1	1					0				0			0	1
Increase bus decision speed	1		1	2	1		1		0	1				1	1	1	1	3			0	7
Minimising IT costs	1	1	1	3	1		1	1	1		1	1	1	3				0		1	1	9
Reducing business costs	1	1	1	3	1		1		0	1	1	1	1	4	1	1		2	1	1	2	12
Reduce prod/service lead time		1		1			0	1	1	1		1		2			1	1		1	1	6
Streamline supplier relationships				0			0	1	1					0				0			0	1
Supporting basic functions			1	1		1	1		0					0				0			0	2
Expansion into third party work	1			1			0		0					0				0			0	1
Compliance with law				0			0		0	1				1				0			0	1
Business Objectives 3YRS																						
Automating Operations			1	1	1	1	2		0	1		1		2			1	1			0	6
More effic't comms cust/clients		1		1	1	1	2	1	1	1				1	1	1		2	1		1	8
Expansion overseas markets				0			0		0					0				0			0	0
Improve quality of bus decisions	1		1	2	1	1	2		0	1		1		2	1		1	2			0	8
Prod qual control or improve				0			0		0	1				1				0		1	1	2
Increase user dept autonomy				0	1		1	1	1			1	1	2				0			0	4
Improving R&D capabilities				0			0	1	1					0				0			0	1
Increase bus decision speed	1		1	2	1		1		0	1				1	1	1		2			0	6
Minimising IT costs	1	1	1	3	1		1	1	1		1	1		2				0	1	1	2	9
Reducing business costs	1	1	1	3	1	1	2		0	1	1	1		3	1	1	1	3		1	1	12
Reduce prod/service lead time		1		1			0	1	1	1		1		2				0		1	1	5
Streamline supplier relationships				0			0	1	1					0				0			0	1
Supporting basic functions			1	1			0		0					0				0			0	1
Expansion into third party work	1			1			0		0					0				0			0	1
Compliance with law				0			0		0					0				0			0	0

Table C.3 - STRUCTURE Subjective Characteristics - ITS Department Structure NOW & FUTURE (N = 12)

Organisation	1				2			3		4					5				6			
Respondent	1	2	3	S/T	1	2	S/T	1	S/T	1	2	3	4	S/T	1	2	3	S/T	1	2	S/T	TOTAL
NOW																						
Hierarchical/role		1	1	2	1	1	2		0		1	1	1	3		1	1	2	1	1	2	11
Matrix/task				0			0	1	1		1	1	1	3				0			0	4
Person/professonal				0			0		0					0				0			0	0
Web/power				0			0		0					0				0			0	0
FUTURE																						
Hierarchical/role			1	1	1	1	2		0		1	1	1	3		1	1	2	1	1	2	10
Matrix/task				0			0	1	1		1	1	1	3				0			0	4
Person/professonal				0			0		0					0				0			0	0
Web/power				0			0		0					0				0			0	0

Table C.4 -STRUCTURE Subjective Characteristics - ITS Technical Objectives - NOW & FUTURE (N = 12)

Organisation	1				2			3		4					5				6			
Respondent	1	2	3	S/T	1	2	S/T	1	S/T	1	2	3	4	S/T	1	2	3	S/T	1	2	S/T	TOTAL
New Technology Objectives NOW																						
Move appl'ns M/Fs to smaller				0			0		0					0		1		1			0	1
Reduce size/no mainframes				0			0		0					0				0			0	0
Database redesign			1	1			0		0					0		1	1	2			0	3
Data interchange appl'ns		1	1	2	1	1	2	1	1		1	1	1	3			1	1		1	1	10
Interoperability applns		1	1	2	1		1	1	1		1	1	1	3		1		1	1	1	2	10
Network management		1		1	1		1	1	1			1		1			1	1			0	5
Multivendor network m'ment				0			0	1	1			1		1				0			0	2
EDI with customers		1	1	2			0	1	1		1	1		2				0	1	1	2	7
EDI with suppliers		1	1	2			0	1	1					0				0	1		1	4
New operating systems				0	1		1	1	1		1	1		2				0			0	4
Systems - IT standards				0	1		1	1	1			1	1	2		1		1		1	1	6
Realtime computing				0			0		0				1	1				0			0	1
Fault tolerance				0	1		1	1	1			1		1				0			0	3
Distributed databases				0			0		0					0				0			0	0
CASE				0	1		1	1	1					0		1	1	2	1		1	5
Object oriented programming				0			0		0				1	1				0	1		1	2
Client-server applications		1		1	1		1	1	1			1	1	2		1	1	2		1	1	8
On-line transaction processing			1	1			0		0			1	1	2		1	1	2			0	5
Image processing			1	1			0	1	1				1	1				0		1	1	4
LANs				0	1	1	2	1	1			1	1	2		1	1	2			0	7
WANs				0			0		0			1	1	2		1	1	2			0	4
Networks of dissimilar systems				0	1		1	1	1			1	1	2				0			0	4
Coherent IT architecture		1	1	2			0	1	1			1	1	2			1	1		1	1	7
EUC development				0			0		0			1	1	2				0	1		1	3
New Technology Objectives 3YRS																						
Move appl'ns M/Fs to smaller				0			0	1	1					0		1		1			0	2
Reduce size/no mainframes				0			0	1	1					0			1	1			0	2
Database redesign			1	1			0	1	1					0		1		1		1	1	4
Data interchange appl'ns		1	1	2	1		1	1	1		1	1	1	3				0			0	7
Interoperability applns		1	1	2	1	1	2	1	1		1	1	1	3		1		1	1		1	10
Network management		1		1	1		1	1	1					0				0			0	3
Multivendor network m'ment				0			0	1	1			1		1				0			0	2
EDI with customers		1		1	1	1	2	1	1			1	1	2			1	1	1		1	5
EDI with suppliers		1	1	2	1	1	2	1	1					0			1	1	1		1	7
New operating systems				0	1		1	1	1		1			1			1	1			0	4
Systems - IT standards				0	1		1	1	1				1	1		1		1			0	4
Realtime computing				0			0	1	1				1	1				0			0	2
Fault tolerance				0	1		1	1	1					0				0			0	2
Distributed databases				0	1		1	1	1		1			1				0			0	3
CASE				0	1		1	1	1					0		1		1	1		1	4
Object oriented programming				0			0	1	1				1	1			1	1	1	1	2	5
Client-server applications		1		1	1	1	2	1	1				1	1		1		1			0	6
On-line transaction processing			1	1			0	1	1				1	1		1		1			0	4
Image processing			1	1	1		1	1	1				1	1			1	1			0	5
LANs				0	1		1	1	1				1	1		1		1			0	4
WANs				0			0	1	1				1	1		1		1			0	3
Networks of dissimilar systems				0	1		1	1	1				1	1				0			0	3
Coherent IT architecture		1	1	1			0	1	1			1	1	2				0			0	5
EUC development				0			0	1	1				1	1				0	1		1	3
EU OA applications				0			0	1	1					0				0			0	1

Table C.5 - STAFF Subjective Characteristics - ITS Department Positions - NOW (N =13)

Organisation	1				2			3		4				5				6		
Respondent	1	2	3	S/T	1	2	S/T	1	S/T	1	2	3	4	S/T	1	2	3	S/T	1	2	S/T	TOTAL
Positions Impacted by Move to OSA																						
Operations		1		1	1	1	2	1	1		1	1		2				0			0	
Aps/syst arch/deliv		1	1	2			0	1	1	1	1	1	1	4			1	1			0	
Data Management				0			0	1	1			1	1	2				0			0	
Systems Admin				0			0	1	1			1	1	2				0			0	
Communications		1		1		1	1	1	1					0		1	1	2			0	
Technical Arch				0			0	1	1			1	1	2				0	1	1	2	
Quality Assurance				0			0		0					0				0			0	
Vendor relations				0	1	1	2		0					0				0	1		1	
EUC				0	1		1		0					0				0			0	
Help desk				0			0	1	1					0				0			0	
Outsourcing				0			0		0					0				0			0	
R & D				0			0		0					0				0	1		1	
Insourcing				0			0		0					0				0			0	
IT Training				0			0		0		1			1				0			0	
Client Support				0			0	1	1					0			1	1			0	
Client Management				0			0	1	1					0				0			0	
Department M'ment				0			0		0					0				0			0	

Table C.6 - STAFF Subjective Characteristics - ITS Department Positions - FUTURE (N =13)

Organisation	1				2			3		4				5				6		
Respondent	1	2	3	S/T	1	2	S/T	1	S/T	1	2	3	4	S/T	1	2	3	S/T	1	2	S/T	TOTAL
Positions Impacted by Move to OSA																						
Operations		1		1	1	1	2	1	1		1			1				0			0	5
Aps/syst arch/deliv		1	1	2			0	1	1	1	1			2		1	1	2	1	1	2	9
Data Management				0			0	1	1			1		1				0			0	2
Systems Admin				0			0	1	1					0				0			0	1
Communications				0		1	1	1	1					0		1	1	1			0	3
Technical Arch				0			0	1	1					0				0	1	1	2	3
Quality Assurance				0			0		0					0				0			0	0
Vendor relations				0	1		1		0					0				0			0	1
EUC				0		1	1		0					0				0			0	1
Help Desk				0	1		1		0					0				0			0	1
Outsourcing				0			0		0		1			1				0			0	1
R & D				0			0		0					0				0	1		1	1
Insourcing				0			0		0					0				0			0	0
IT Training				0			0		0		1			1				0		1	1	2
Client Support				0	1		1	1	1					0			1	1		1	1	4
Client Management				0	1		1	1	1					0				0		1	1	3
Department M'ment				0			0		0					0				0			0	0

Table C.7 - STYLE Subjective Characteristics - ITS Leadership Requirements - NOW & FUTURE - (N = 15)

Organisation	1				2			3		4				5			6		TOTAL
Respondent	1	2	3	S/T	1	2	S/T	1	S/T	1	2	3	4	S/T	1	2	3	S/T	1	2	S/T	
Leadership Qualities NOW																						
Interpersonal	1	1	1	3			0	1	1	1	1		1	3	1		1	2	1		1	10
Informational	1	1	1	3		1	1	1	1			1	1	2				0			0	7
Decision making	1	1	1	3		1	1	1	1			1	1	2				0			0	7
Learn about the business	1		1	2			0	1	1	1		1	1	3	1			1		1	1	8
Est IT depts credibility		1	1	2	1		1	1	1			1	1	2	1	1		2			0	8
Increase org's tech maturity			1	1	1		1	1	1	1		1	1	3	1		1	2	1		1	9
Creat IT vision & sell it	1	1		2			0	1	1		1	1	1	3	1		1	2	1	1	2	10
Implement visionary arch	1		1	2	1		1	1	1	1	1	1	1	4	1	1	1	3	1		1	12
Leadership Qualities FUTURE																						
Interpersonal	1	1	1	3		1	1	1	1	1	1		1	3	1			1	1		1	10
Informational	1	1	1	3		1	1	1	1				1	1			1	1			0	7
Decision making	1	1	1	3		1	1	1	1			1	1	2			1	1			0	8
Learn about the business	1	1	1	3			0	1	1	1			1	2	1			1		1	1	8
Est IT depts credibility		1	1	2	1		1	1	1				1	1	1	1		2			0	7
Increase org's tech maturity				0	1		1	1	1	1			1	2	1	1		2	1		1	7
Creat IT vision & sell it	1	1	1	3	1		1	1	1		1		1	2	1			1	1	1	2	10
Implement visionary arch				0	1		1	1	1	1	1	1	1	4	1	1		2	1		1	9

Table C.8 - SKILLS Subjective Characteristics - ITS Skill Sets NOW (N = 15)

Organisation	1				2			3		4				5			6		
Respondent	1	2	3	S/T	1	2	S/T	1	S/T	1	2	3	4	S/T	1	2	3	S/T	1	2	S/T	TOTAL
OS Standards		1		1		1	1	1	1				1	1		1	1	2	1		1	7
UNIX		1		1	1	1	2		0				1	1				0		1	1	5
Oracle				0	1		1		0					0				0			0	1
4 G Languages				0			0		0					0				0		1	1	1
Data Comms			1	1	1		1		0				1	1		1		1	1		1	5
Sys Monitoring Tools				0			0		0					0				0			0	0
Object Oriented				0			0	1	1					0				0			0	1
Client/server				0			0		0					0				0	1		1	1
EDI				0			0		0				1	1				0			0	1
OS Solutions	1			1	1		1	1	1		1			1			1	1		1	1	6
IT Managerial Skills		1	1	2			0		0	1				1				0	1	1	2	5
IT Technical Skills	1	1	1	3	1		1	1	1	1	1		1	3			1	1	1	1	2	11
Communication skills			1	1			0	1	1	1			1	2				0	1	1	2	6
An'lyt/problem solving			1	1	1		1		0	1		1	1	3				0	1	1	2	7
Inquiring Mind			1	1			0		0	1		1	1	3				0		1	1	5
Supplier interface				0	1		1		0					0				0			0	1
Multivendor skills	1			1	1		1	1	1		1		1	2		1	1	2			0	7
Vendor Management				0	1		1		0				1	1				0			0	2
LANs				0		1	1		0					0				0			0	1
Client Management				0			0	1	1	1				1				0	1	1	2	4
Project Management			1	1			0	1	1					0				0		1	1	3
People Skills				0			0	1	1	1				1				0	1		1	3
Desktop tool set (GUI)				0			0		0					0				0			0	0
BPR				0			0		0			1	1	2				0			0	2
Data Management				0			0	1	1	1				1				0			0	2
Re-use skills				0			0		0					0				0			0	0
Data Modelling			1	1			0		0	1				1				0			0	2
Security				0			0		0					0				0			0	0
Relational Databases				0	1		1	1	1	1				1				0			0	3
Architectural Skills	1	1		2	1		1	1	1	1				1	1			1	1		1	7
Business Skills	1			1			0	1	1	1				1	1		1	2	1	1	2	7
Job Process Skills				0			0	1	1					0				0			0	1
Training Skills				0			0	1	1					0	1		1	2			0	3
Applications Skills	1			1			0	1	1					0	1			1	1		1	4
Systems Administration				0			0		0					0				0			0	0
Strategic Thinking				0			0	1	1					0				0		1	1	2
Position Specific Skills				0			0		0					0				0			0	0
Network Management				0	1		1		0					0				0	1		1	2
CASE				0			0	1	1					0				0			0	1

Table C.9 - SKILLS Subjective Characteristics - ITS Skill Sets FUTURE (N = 15)

Organisation	1				2			3		4				5			6		
Respondent	1	2	3	S/T	1	2	S/T	1	S/T	1	2	3	4	S/T	1	2	3	S/T	1	2	S/T	TOTAL
OS Standards				0		1	1	1	1			1	1	2		1	1	2	1		1	7
UNIX				0	1		1		0				1	1				0		1	1	3
Oracle				0	1		1		0					0				0			0	1
4 G Languages				0			0		0					0				0		1	1	1
Data Comms			1	1	1		1		0				1	1		1		1	1		1	5
Syst Monitoring Tools				0			0		0					0				0			0	0
Object Oriented				0			0	1	1					0				0			0	1
Client/server				0			0		0					0				0	1		1	1
EDI				0			0		0				1	1				0			0	1
OS Solutions	1	1		2	1		1	1	1					0	1		1	2		1	1	7
IT Managerial Skills		1	1	2			0	1	1	1				1				0	1	1	2	6
IT Technical Skills	1	1	1	3	1		1	1	1	1	1	1	1	4	1		1	2	1	1	2	13
Communication skills			1	1		1	1	1	1	1			1	2				0	1	1	2	7
An'lyt/problem solving			1	1	1		1		0	1			1	2				0	1	1	2	6
Inquiring Mind			1	1			0		0	1			1	2				0		1	1	4
Supplier Interface				0	1		1		0					0				0			0	1
Multivendor skills	1	1		2	1		1	1	1		1	1	1	3			1	1			0	8
Vendor Management				0	1		1		0				1	1				0			0	2
LANs				0			0		0					0				0			0	0
Client Management				0		1	1	1	1	1				1				0	1	1	2	5
Project Management			1	1		1	1	1	1					0				0		1	1	4
People Skills				0		1	1	1	1	1				1				0	1		1	4
Desktop tool set				0			0		0					0				0			0	0
BPR				0			0		0				1	1				0			0	1
Data Management				0		1	1	1	1	1				1				0			0	3
Re-use skills				0			0		0					0				0			0	0
Data Modelling			1	1			0		0	1				1				0			0	2
Security				0			0		0					0				0			0	0
Relational Databases				0	1	1	2	1	1	1				1				0			0	4
Architectural Skills	1	1		2	1		1	1	1	1				1	1			1	1		1	7
Business Skills	1			1		1	1	1	1	1				1	1		1	2	1	1	2	8
Job Process Skills				0			0	1	1					0				0			0	1
Training Skills				0			0	1	1					0		1	1	2			0	3
Applications Skills	1			1			0	1	1					0				0	1		1	3
Systems Administration				0			0		0					0				0			0	0
Strategic Thinking				0			0	1	1					0	1			1		1	1	3
Position Specific Skills				0			0		0					0				0			0	0
Network Management				0	1		1	1	1					0				0	1		1	3
CASE				0			0	1	1					0				0			0	1

Table C.10 - SKILLS Subjective Characteristics - Education & Training Needs - NOW (N= 15)

Organisation	1				2		3		4					5			6			
Respondent	1	2	3	S/T	1	2 S/T	1	S/T	1	2	3	4	S/T	1	2	3 S/T	1	2 S/T		TOTAL
OS Standards		1	1	2		0	1	1	1	1		1	3		1	1	1		1	8
UNIX		1		1		0		0				1	1			0		1	1	3
Oracle				0		0		0					0			0			0	0
4 G Languages				0		0		0					0			0		1	1	1
Data Comms		1		1		0		0			1	1	2		1	2	1		1	6
System Monitoring Tools				0		0		0					0			0			0	0
Object Oriented				0		0	1	1					0			0			0	1
Client/server				0		0		0					0			0	1		1	1
EDI				0		0		0				1	1			0			0	1
OS Solutions	1	1	1	3		0	1	1		1	1		2	1		1		1	1	8
IT Managerial Skills			1	1		0	1	1					0			0	1	1	2	4
IT Technical Skills		1	1	2	1	1	1	1	1			1	2	1		1 2	1	1	2	10
Communication skills			1	1		0	1	1				1	1			0	1	1	2	5
Analytical/problem solving			1	1		0		0				1	1			0	1	1	2	4
Inquiring Mind			1	1		0		0				1	1			0		1	1	3
Supplier Interface				0		0		0					0			0			0	0
Multivendor skills				0	1	1	1	1	1	1	1	1	4		1	1			0	7
Vendor Management				0		0		0				1	1			0			0	1
LANs				0		0		0			1		1			0			0	1
Client Management	1			1		0	1	1					0			0	1	1	2	4
Project Management	1			1		0	1	1	1				1			0		1	1	4
People Skills				0		0	1	1					0			0	1		1	2
Desktop tool set (GUI)				0		0		0					0			0			0	0
BPR				0		0		0				1	1			0			0	1
Data Management				0		0	1	1	1				1			0			0	2
Re-use skills				0		0		0					0			0			0	0
Data Modelling			1	1		0		0	1				1		1	1			0	3
Security				0		0		0					0			0			0	0
Relational Databases				0		0	1	1			1		1		1	1			0	3
Architectural Skills			1	1		0	1	1			1		1			0	1		1	4
Business Skills	1			1	1	1	1	1	1		1		2	1		1	1	1	2	8
Job Process Skills				0		0	1	1	1				1			0			0	2
Training Skills				0	1	1	1	1	1				1			0			0	3
Applications Skills	1			1	1	1	1	1			1		1			0	1		1	5
Systems Administration				0		0		0					0			0			0	0
Strategic Thinking				0		0	1	1					0			0		1	1	2
Position Specific Skills				0		0	1	1	1				1		1	1			0	3
Network Management				0		0		0					0		1	1	1		1	2
CASE				0		0	1	1					0			0			0	1
Office Automation				0		0		0					0			0			0	0

Table C.11 - SKILLS Subjective Characteristics - Education & Training Needs FUTURE (N= 15)

Organisation	1				2			3			4				5				6			
Respondent	1	2	3	S/T	1	2	S/T	1	S/T		1	2	3	4 S/T	1	2	3	S/T	1	2	S/T	TOTAL
OS Standards		1	1	2			0	1	1		1	1		1 3		1		1	1		1	8
UNIX		1		1			0		0					1 1				0		1	1	3
Oracle				0			0		0					0				0			0	0
4 G Languages				0			0		0					0				0		1	1	1
Data Comms				0			0		0				1	1 2		1	1	2	1		1	5
System Monitoring Tools				0			0		0					0				0			0	0
Object Oriented				0			0	1	1					0				0			0	1
Client/server				0			0		0					0			1	1	1		1	2
EDI				0			0		0				1	1				0			0	1
OS Solutions	1	1	1	3			0	1	1		1	1		2				0		1	1	7
IT Managerial Skills		1	1	2		1	1	1	1					0				0	1	1	2	6
IT Technical Skills			1	1	1		1	1	1		1			1 2	1		1	2	1	1	2	9
Communication skills			1	1			0	1	1					1 1				0	1	1	2	5
Analytical/problem solving			1	1			0		0					1 1				0	1	1	2	4
Inquiring Mind			1	1			0		0					1 1				0		1	1	3
Supplier Interface				0			0		0					0				0			0	0
Multivendor skills				0	1		1	1	1		1	1	1	4		1		1			0	7
Vendor Management				0			0		0					1 1				0			0	1
LANs				0			0		0				1	1				0			0	1
Client Management	1			1			0	1	1					0				0	1	1	2	4
Project Management	1			1			0	1	1		1			1				0		1	1	4
People Skills				0			0	1	1					0				0	1		1	2
Desktop tool set				0			0		0					0				0			0	0
BPR				0			0		0				1	1				0			0	1
Data Management				0			0	1	1		1			1				0			0	2
Re-use skills				0			0		0					0				0			0	0
Data Modelling				0			0		0		1			1			1	1			0	2
Security				0			0		0					0				0			0	0
Relational Databases				0			0	1	1				1	1			1	1			0	3
Architectural Skills			1	1			0	1	1				1	1				0	1		1	4
Business Skills	1			1		1	1	1	1		1		1	2	1		1	2	1	1	2	9
Job Process Skills				0			0	1	1		1			1				0			0	2
Training Skills			1	1		1	1	1	1		1			1				0			0	4
Applications Skills	1			1	1		1	1	1				1	1				0	1		1	5
Systems Administration				0			0		0					0				0			0	0
Strategic Thinking				0			0	1	1					0				0		1	1	2
Position Specific Skills				0			0		0		1			1			1	1			0	2
Network Management				0			0	1	1					0			1	1	1		1	3
CASE				0			0	1	1					0				0			0	1
Office Automation				0			0		0					0				0			0	0

Table C.12 - SUPERORDINATE GOALS Subjective Characteristics - ITS Priority Concerns - NOW (N =15)

Organisation	1				2			3			4				5				6			
Respondent	1	2	3	S/T	1	2	S/T	1	S/T		1	2	3	4 S/T	1	2	3	S/T	1	2	S/T	TOTAL
Internal org of IT function				0			0		0				1	1 2			1	1			0	3
ID opportunities for IT use				0	1		1		0					1 1				0			0	2
Integrating diverse tech		1	1	2			0		0		1	1	1	1 3		1	1	2	1	1	2	9
Org impacts of IS			1	1			0	1	1					1 1		1	1	2			0	5
Relations between IT/users			1	1			0		0					1 1		1		1			0	3
Cost just of IT projects	1		1	2	1		1		0					1 1		1		1			0	5
User involvement	1			1			0		0		1	1	1	1 4	1			1			0	6
Aligning IT with bus strat	1		1	2	1	1	2		0		1			1 2	1	1	1	3	1		1	10
Dev & m'ment of EUC				0			0	1	1					1 1			1	1	1		1	4
Technological constraints	1	1	1	3			0	1	1			1		1 2				0			0	6
IT staff resources		1		1			0		0					1 1				0		1	1	3
User awareness and edu				0			0	1	1				1	1 2	1			1			0	4
IT project m'ment & implm'tat	1		1	2		1	1		0					1 1		1		1			0	5
IS maintenance				0			0		0					1 1			1	1			0	2
Coping with new IT	1	1	1	3			0		0		1			1 2		1	1	2		1	1	8
Loc of IT funct in org'n			1	1		1	1	1	1					1 1		1	1	2			0	6
IT security				0	1		1	1	1					1 1			1	1	1	1	2	6
Data m'ment and control		1		1	1		1	1	1		1			1 2			1	1	1	1	2	8
IS long range plan			1	1	1		1		0					1 1				0			0	3
Top m'ment support for IT			1	1	1	1	2		0				1	1 2				0			0	5
Budget constraints of IT	1		1	2			0		0				1	1 2				0			0	4
More effective IS/IT dev			1	1			0		0		1			1 2	1	1		2			0	5
Outsourcing				0	1		1	1	1					1 1				0			0	3
Control and Backup				0			0		0					1 1				0			0	1
Strength of OS Standards				0			0		0					1 1				0			0	1
Supplier Relationships				0			0		0					1 1				0			0	1
Management of IT Function				0			0	1	1					1 1			1	1			0	3
Legacy to Client Server				0			0		0					1 1				0			0	1

Table C.13 - SUPERORDINATE GOALS - ITS Priority Concerns - FUTURE (N = 15)

Organisation	1				2			3			4				5				6			
Respondent	1	2	3	S/T	1	2	S/T	1	S/T		1	2	3	4	S/T	1	2	3	S/T	2	3	S/T	TOTAL
Internal org of IT function				0			0		0				1	1	2				0			0	2
ID opportunities for IT use	1			1	1		1		0					1	1	1			1			0	4
Integrating diverse tech			1	1			0		0			1	1	1	3	1			1	1		1	6
Org impacts of IS	1		1	2			0		0					1	1				0			0	3
Relations between IT/users			1	1			0		0					1	1			1	1			0	3
Cost just of IT projects			1	1	1		1		0					1	1				0			0	3
User involvement	1			1			0		0		1	1	1	1	4			1	1			0	6
Aligning IT with bus strat	1		1	2	1	1	2		0		1			1	2		1	1	2	1		1	9
Dev & m'ment of EUC				0			0		0					1	1				0	1	1	2	3
Technological constraints			1	1			0		0			1		1	2				0			0	3
IT staff resources		1		1			0		0					1	1				0		1	1	3
User awareness and edu	1			1			0		0				1	1	2				0			0	3
IT project m'ment & implm'tat			1	1		1	1		0					1	1		1		1			0	4
IS maintenance				0			0		0					1	1				0			0	1
Coping with new IT	1	1	1	3			0		0		1			1	2		1		1			0	6
Loc of IT funct in org'n			1	1		1	1		0					1	1				0			0	3
IT security				0	1		1		0					1	1				0	1	1	2	4
Data m'ment and control	1	1		2	1		1		0		1			1	2		1		1	1	1	2	8
IS long range plan			1	1	1		1		0					1	1	1			1			0	4
Top m'ment support for IT			1	1	1	1	2		0				1	1	2				0			0	5
Budget constraints of IT			1	1			0		0				1	1	2			1	1			0	4
More effective IS/IT dev			1	1			0		0		1			1	2				0			0	3
Outsourcing				0	1		1	1	1					1	1				0			0	3
Control and Backup				0			0		0					1	1				0			0	1
Strength of OS Standards				0			0		0					1	1				0			0	1
Supplier Relationships				0			0		0					1	1				0			0	1
Management of IT Function				0			0		0					1	1				0			0	1
Legacy to Client Server				0			0	1	1					1	1				0			0	2

Table C.14 - SYSTEMS Subjective Characteristics - Open Systems Profiles - NOW (N = 7)

Organisation	1				2		3	4				5			6		
Respondent	1	2	3	S/T	1	2 S/T	1 S/T	1	2	3	4 S/T	1	2	3 S/T	1	2 S/T	TOTAL
OPERATING SYSTEMS																	
MS-DOS		1		1	1	1	0		1	1	2		1	1	1	1	6
MVS,VM OR VSE			1	1		0	0		1	1	2		1	1	1	1	5
OS/2				0		0	0		1		1			0	1	1	2
UNIX		1	1	2	1	1	0		1	1	2			0	1	1	6
VMS				0		0	0				0			0		0	0
Other				0		0	0				0			0	1	1	1
Terradata			1	1		0	0				0			0		0	1
CTOS				0		0	0				0			0		0	0
NT				0		0	0				0			0		0	0
ALTRIX (UNIX)				0		0	0				0			0		0	0
OSF2 --> 1170 (UNIX)				0		0	0				0			0		0	0
PRIMOS				0		0	0		1		1			0		0	1
GUIS																	
DECWindows				0		0	0				0			0		0	0
Macintosh				0		0	0		1		1			0		0	1
Microsoft Windows		1		1	1	1	0		1	1	2		1	1	1	1	6
Presentation Manager				0		0	0				0			0		0	0
Motif		1		1		0	0			1	1			0		0	2
Open Look				0		0	0				0			0		0	0
Internally Developed				0		0	0		1		1			0		0	1
Other				0	1	1	0				0			0		0	1
X/WINDOWS				0		0	0				0			0		0	0
COSE				0		0	0				0			0		0	0
NETWORKING																	
LAN Manager			1	1	1	1	0		1	1	2		1	1		0	5
OSI				0		0	0		1	1	2		1	1	1	1	4
SNA				0		0	0		1	1	2		1	1	1	1	4
TCP/IP		1		1	1	1	0		1	1	2			0	1	1	5
X.25		1		1		0	0		1	1	2			0	1	1	4
Token Ring				0		0	0				0		1	1	1	1	2
Ethernet		1	1	2	1	1	0		1	1	2			0	1	1	6
Other				0		0	0				0			0	1	1	1
LU6.2 Apple				0		0	0				0			0		0	0
IPX				0		0	0				0			0		0	0
DATABASES (REL)																	
DB2		1	1	2		0	0		1	1	2		1	1		0	5
Sybase				0		0	0				0			0		0	0
Oracle				0	1	1	0		1		1			0	1	1	3
Ingres		1	1	2	1	1	0		1		1			0		0	4
Informix				0	1	1	0		1		1			0		0	2
Other				0		0	0				0			0		0	0
Terradata			1	1		0	0				0			0		0	1
DBQ				0		0	0				0			0		0	0
SQLBASE (GUPTA)				0		0	0				0			0		0	0
ADABAS				0		0	0		1		1		1	1		1	3
AIM				0		0	0		1		1			0			1
IDMS				0		0	0		1		1			0			1
SAS				0		0	0				0			0	1	1	1
FRAMEWORKS																	
Applic Environ (X/OPEN)		1		1		0	0				0			0		0	1
GOSIP				0	1	1	0		1	1	2		1	1	1	1	5
POSIX (IEEE)		1		1		0	0		1		1			0		0	2
SAA (IBM)				0		0	0		1		1		1	1		0	2
Other				0		0	0				0			0		0	0
AGGOS				0		0	0			1	0			0		0	1

Table C.15 - SYSTEMS Subjective Characteristics - Open Systems Profiles - FUTURE (N = 7)

Organisation	1				2		3	4				5			6		
Respondent	1	2	3	S/T	1	2 S/T	1 S/T	1	2	3	4 S/T	1	2	3 S/T	1	2 S/T	TOTAL
OPERATING SYSTEMS																	
MS-DOS		1	1	2	1	1	0	1			1	1		1	1	1	6
MVS,VM OR VSE				0		0	0	1			1	1		1	1	1	3
OS/2				0		0	0	1			1			0	1	1	2
UNIX		1	1	2	1	1	0	1			1			0	1	1	5
VMS				0		0	0				0			0		0	0
Other				0		0	0				0			0		0	0
Terradata			1	1		0	0				0			0		0	1
NT				0		0	0			1	1			0	1	1	2
CTOS				0		0	0				0			0		0	0
ALTRIX (UNIX)				0		0	0				0			0		0	0
OSF2 ---> 1170 (UNIX)				0		0	0				0			0		0	0
CHICAGO				0		0	0	1			1			0		0	1
GUIS																	
DECWindows				0		0	0				0			0		0	0
Macintosh				0		0	0				0			0		0	0
Microsoft Windows		1		1	1	1	0	1			1	1		1	1	1	5
Presentation Manager				0		0	0	1			1			0		0	1
Motif		1		1		0	0				0			0		0	1
Open Look				0		0	0				0			0		0	0
Internally Developed				0		0	0	1			1			0		0	1
Other				0		0	0				0			0		0	0
X/WINDOWS				0		0	0				0			0		0	0
Oracle user interface				0	1	1	0				0			0		0	1
COSE				0			0				0			0		0	0
NETWORKING																	
LAN Manager				0	1	1	0	1			1	1		1		0	3
OSI				0		0	0	1			1	1		1	1	1	3
SNA				0		0	0	1			1	1		1	1	1	3
TCP/IP		1		1	1	1	0	1			1			0	1	1	4
X.25		1		1		0	0				0			0	1	1	2
Token Ring				0		0	0				0	1		1	1	1	2
Ethernet		1		1	1	1	0	1			1			0	1	1	4
Other				0		0	0				0			0		0	0
LU6.2 Apple				0		0	0				0			0		0	0
IPX				0		0	0				0			0		0	0
DATABASES (REL)																	
DB2		1	1	2		0	0	1			1	1		1		0	4
Sybase				0		0	0				0			0		0	0
Oracle				0	1	1	0	1			1			0	1	1	3
Ingres		1	1	2	1	1	0	1			1			0		0	4
Informix				0	1	1	0	1			1			0		0	2
Other				0		0	0				0			0		0	0
Terradata			1	1		0	0				0			0		0	1
SQLBASE (GUPTA)				0		0	0				0			0		0	0
ADABAS				0		0	0	1			0			0	1	1	1
SAS				0		0	0				0			0	1	1	1
FRAMEWORKS																	
Applic Environ (X/OPEN)		1		1		0	0				0			0		0	1
GOSIP				0	1	1	0	1			1	1		1	1	1	4
POSIX (IEEE)		1		1		0	0				0			0		0	1
SAA (IBM)				0		0	0				0	1		1		0	1
Other				0		0	0				0			0		0	0

APPENDIX D

CASE ORGANISATION

INDIVIDUAL SUBJECTIVE ACCOUNTS

To be read in conjunction with
APPENDICES B & C

D.1 Case Organisation 1

This section of appendix D describes individual subjective case accounts for Organisation 1.

D.1.1 STRATEGY Subjective Responses

Respondents were asked to discuss their thoughts on the *ITS Manager's role* both within the ITS department and also within the organisation in general.

Respondent 1 feels that the ITS manager should be focussed on internal to ITS issues (2 on the 1-5 scale) while business managers should be focussed on business issues (5 on the 1-5 scale). This answer was justified due to the fact that business issues have been previously addressed in the ITS architecture redevelopment project. The current systems development life cycle phase of this project is to solve technical issues in delivery of this ITS architecture. The ITS Manager should be focussed on the business in the future (4.5 on the 1-5 scale).

This answer was justified due to the fact that the systems development life cycle will move back into business issues nearing the end of the 4 year development cycle. The delivery of this total system has been structured in small sub-systems. These systems are open systems architecture enabled.

Respondent 2 stated that it should be noted that some systems will never be any more than proprietary in nature e.g. the reservations system. The ITS manager's time should

be focussed between ITS issues and business issues (3 on the 1-5 scale). Time is currently being spent by the ITS manager in the merging of two ITS architectures (Unisys and TFP/IBM). Appropriate reservation systems, ITS architecture and communications systems must be identified and implemented in the immediate future. This process is very resource intensive. This respondent also thought that the ITS manager should be more focussed on the business (3.5 on the 1-5 scale) as the technical architectural issues become settled. More systems within the open systems architecture will be developed and implemented as a result of this trend.

Respondent 3 highlighted that the ITS manager should be focussed between internal to ITS issues and external to ITS issues (3 on the 1-5 scale). The ITS manager should also have a management and business perspective but must also be able to provide a technical solution with integrity. The ITS management role is to ensure satisfaction of business needs by the delivery of appropriate technical solutions, therefore, effort and focus should span both areas. This respondent also feels that the ITS manager should continue to support business solutions and the easier technical management of open systems architecture technologies. This position should provide better organisational flexibility and responsiveness to business solutions.

Respondents were asked to *position ITS applications* on the McFarlan & McKenny (1983) strategic grid.

Respondent 1 stated that ITS is perceived as a strategic function within the organisation as the technology is used to fulfill a strategic need in the business and systems development process. Some systems within the architecture are also factory in nature as

they provide low cost data processing functions. Open systems architectures have been used for these E & M applications due to: graphics requirements of illustrated text; user requirements for use by novice non ITS technical users; system responsiveness and modular delivery requirements.

Respondent 2 stated that the reservation system is the core business application and ITS is perceived as a strategic function. It was also thought that the corporate database will have more of an "open" direction. ITS should still be perceived as strategic in its orientation.

Respondent 3 feels that ITS is perceived as a strategic function. While a system provides automated support to the Revenue Accounting factory-like application this application also provides a major component of the strategic corporate database. There is an implementation of a large percentage of strategic systems organisation wide, giving the company a realisation of benefits through objectives such as better service to business, currency of data and responsiveness to change. It is highlighted that this perception of strategic systems is due to the nature of the application rather than the technology which is selected as the best ITS solution. The amount of expenditure on packages, in-house development and technology availability should be around 25% of the total architecture.

Respondents were asked to assess the *open systems architecture business objectives* within their organisation.

Respondent 1 feels that improving the quality of business decisions, reducing business costs, expansion into third party work, minimising ITS costs and increasing the speed of

business decisions, were important factors for the present. Improving the quality of business, reducing business costs, increasing the speed of business decisions, expansion into third party work and minimising ITS costs were important factors for the future. This respondent then stated that the reasons why these open systems architecture objectives had been set were to provide the: ability for data entry at the workface in a user friendly way; ability for provision of illustrated manuals at the workstation and ability for provision of powerful planning tools on intelligent workstations.

Respondent 2 stated that reducing business costs, minimising ITS costs, more efficient communications with customers/clients and reducing the "time-to-market" for new products and services were important issues for now. In 3 years time he felt that reducing business costs, reducing the "time-to-market" for new products and services, more efficient communications with customers/clients and minimising ITS costs would become more important.

Respondent 3 stated that both now and in the future automating operations, improving the quality of business decisions, increasing the speed of business, supporting basic functions, minimising information technology costs, and reducing business costs were important.

Respondents were then asked to assess the *level of achievement of open systems architecture business objectives* within their organisations.

Respondent 1 stated that minimising ITS costs, improving the quality of business decisions, reducing business costs and expansion into third party work had all been achieved to a satisfactory level.

Respondent 2 feels that automating operations, more efficient communications with customers/clients, improving the quality of business decisions and increasing the speed of business decisions had all been achieved to a satisfactory level. Minimising ITS costs, reducing business costs and supporting basic functions require more work.

Respondent 3 stated that this organisation has around 50% of the new open systems architecture platform implemented. Automating operations, improving the quality of business decisions, increasing the speed of business decisions and supporting basic functions had all come about as the result of these strategies.

D.1.2 STRUCTURE Subjective Responses

Respondents within this case discussed the *ITS department structure.*

Respondents 1 & 3 did not feel qualified to answer this question.

Respondent 2 outlined that ITS is currently undergoing a change in structure with the new open systems architecture development activity. This respondent feels that this question would be more appropriately answered after this development activity is

complete. The ITS department structure in 3 years is unknown due to restructure in progress at the moment.

Respondents were then asked to describe the *open systems architecture technical objectives* for their organisation.

Respondent 1 felt that he was not suitably qualified to comment on open systems architecture technical objectives.

Respondent 2 stated that data interchange between applications, network management, interoperability between applications, EDI with suppliers, client-server applications, EDI with customers and a coherent ITS architecture were very important. In the future he felt that data interchange between applications, EDI with customers, network management, interoperability between applications, client-server applications, EDI with suppliers and a coherent ITS architecture would be very important. This organisation is attempting to achieve these objectives in order to allow the ITS department to provide cost effective and timely systems to support the business through vendor independence, portability and interoperability. It is also expected that ITS costs will become less through more efficient application development, easier systems and network management and reduced training, due to a less complex ITS environment. Business objectives have been highlighted in this way to allow for cost minimisation as it is the current key objective. The relative importance of time-to-market should increase due to increasing emphasis on responsiveness to customer needs. The technology objectives have been highlighted in this way as the organisation is attempting to minimise data

duplication and make it easier to manage the network. EDI with customers is likely to increase with more emphasis on customer focus.

Respondent 3 felt that both now and in the future database redesign, coherent ITS architecture, data interchange between applications, interoperability between applications, on-line transaction processing and EDI (with image processing) would be very important.

Respondents were then asked to describe the *level of achievement of open systems architecture technical objectives for their organisation.*

Respondent 1 felt that he was not suitably qualified to comment.

Respondent 2 felt that moving applications off mainframe computers to smaller systems, interoperability between applications, multi-vendor network management, CASE and client-server applications had all been partly achieved. Reducing size and/or the number of mainframes on the network, EDI with customers, EDI with suppliers, systems based on ITS standards, image processing, WANs, a coherent ITS architecture and end user systems development had all been moderately achieved. Data interchange between applications, new operating systems, real-time computing fault tolerance, and LAN implementation had all been nearly achieved whilst OLTP had been completed.

Respondent 3 stated that moving applications off mainframes to smaller systems, database redesign, data interchange between applications and interoperability between

applications had been achieved to a reasonable level with more work to be done. Other objectives had not been achieved.

D.1.3 SYSTEMS Subjective Responses

Respondents were asked to give a definition of an open systems architecture.

Respondent 1 felt that he was not suitably qualified to define an open systems architecture.

Respondent 2 defined an open systems architecture as disparate systems linked through a common communications architecture. Open systems architectures also require that interfaces (e.g.API's, Protocols) conform to formal, vendor neutral, generally available industry standards. Open systems architecture was defined in this way as this definition is from the Gartner Group. It demonstrates the need for interoperability and portability of hardware and applications. It was stated that this definition would not change over the next 3 years. This organisation's long-term direction is towards open systems architecture. The percentage of the ITS budget devoted to open systems architecture is dependent on individual projects in any one year but 25% is a reasonable assumption. The most important aspects of open systems architecture is achieving real portability of applications and interoperability of applications and hardware. This is difficult especially in light of agreement on standards e.g. many different flavours of UNIX.

Respondent 3 defined open systems architecture as being data centred, functionally decomposed and architecturally constructed solutions where high levels of modularity

are maintained. There is a focus on simplification of functional systems interaction. This respondent stated that open systems architecture would not change in any way in the next three years. He felt that individuals and companies would only change the way that they understand open systems architecture. This organisation was implementing open systems architecture at the time of the survey, but the respondent was not aware of the proportion of the ITS budget allocated to this task. The most important aspects of implementing open systems architecture are systems flexibility, maintainability and change responsiveness due to the need to meet these objectives to determine suitable business functional and data storage requirements.

The state of the ITS architecture and infrastructure at the time of the interviews was outlined at length and the following information technology was identified from *all respondents* as core to the move to an open systems architecture.

Operating systems included MS-DOS (assuming migration to Chicago) and UNIX. *GUIs* included Microsoft Windows and Motif. *Networking* technologies are TCP/IP, X.25 and Ethernet. *Databases (relational)* were DB2 and Ingres (may migrate to Oracle) whilst *open systems architecture frameworks* that were used were Common Applications Environment (X/OPEN) and POSIX (IEEE).

These types of technology were chosen as part of the open systems architecture approach due to their fit with the environment. They also met the current business needs, were of reasonable cost with vendor support and they worked towards a long term open systems architecture. The vendors who developed and supported them also looked like being in business in the long term.

Respondent 3 highlighted the importance of MVS, UNIX and Teradata operating systems both now and in the future while de-emphasising database programs such as DB2, Ingres and Teradata for the success of the open systems architecture in this organisation.

D.1.4 STAFF Subjective Responses

Respondents within this case discussed *ITS department positions* that were important in the move to an open systems architecture.

Respondent 1 did not feel qualified to answer this question.

Respondent 2 states that with the introduction of UNIX and other open systems architecture technology we will see new skills being developed by systems development staff in areas that are using this new technology. Most areas within the organisation have been affected to one degree or another. Data communications staff need skills to incorporate open systems architecture technology and the protocols in use, and they also require an understanding of software complexity. There is now also a requirement for new staff groups in the operations area of the ITS department to handle UNIX connections between host machines. Communications technologies will be more stable with more knowledge available for ITS staff as time goes on. Operations and systems delivery areas will require more staff with open systems architecture technical knowledge.

Respondent 3 stated that the ITS department will evolve into a purely maintenance and enhancement area.

D.1.5 STYLE Subjective Responses

Respondents were asked their opinion of what qualities a good ITS manager should have for a successful open systems architecture implementation.

Respondent 1 states that interpersonal skills (as a leader with the ability to set directions and motivate staff) are very important. The ability to create an ITS vision and sell it, the ability to implement a systems architecture to support the company while creating a vision for the future, as well as informational skills (communicate ITS vision within the organisation) and interpersonal skills (staff liaison skills) also rank very highly. All of the skills discussed as well as informational skills (ability to monitor the environment), business knowledge skills, decision making skills (ability to provide resources and negotiation skills to resolve conflict) are rated as the most important skills to have now. In the future this respondent sees that interpersonal skills (the ability to set directions and motivate staff), creating an ITS vision and selling it, and informational skills (ability to communicate an ITS vision within the organisation) are very important. Interpersonal skills (staff liaison skills), business knowledge skills and decision-making skills (ability to provide resources and negotiation skills to resolve conflicts) are also critical skills to have.

Respondent 2 thinks that establishing the ITS department's credibility by creating an ITS vision and selling it and interpersonal skills (especially the ability to set directions

and motivate staff and staff liaison skills) are very important. These skills as well as informational skills (ability to communicate ITS vision outside and within the organisation) and decision-making skills (ability to provide resources and look for opportunities within the organisation) are important issues both now and in the future. Key issues will probably stay unchanged over time. If the ITS strategic place is to be assured in an organisation and if the ITS function wants to be able to effectively implement an open systems architecture, ITS credibility, vision and people/leadership skills will be critical.

Respondent 3 feels that implementing a systems architecture to support the company vision for the future, informational skills, decision making, establishing the ITS department's credibility, increasing the technological maturity of the organisation and interpersonal skills are all critical to managing the open systems architecture now. As the architecture becomes a reality and the vision is realised, systems development focus should move from managing and selling change to a steady state. Informational, interpersonal and learning skills are all important for the future of the organisation as is implementing a systems architecture to support the vision for the future. Creating an ITS vision and selling it, making decisions and establishing the ITS department's credibility as well as increasing the technological maturity of the organisation are also of future importance. As the architecture is implemented and the vision is realised, the systems development focus should move from managing and selling change to a steady state of existence.

D.1.6 SKILLS Subjective Responses

Respondents within this case discussed the *ITS skill sets* required for a successful move to an open systems architecture.

Respondent 1 feels that there is not enough knowledge in ITS techniques of system development in open systems architecture environments. He feels that most open systems architecture technology is being implemented in a proprietary manner, for example, the use of one major vendor's offerings and solutions. As ITS experience develops in the use of open systems architecture technologies, users are overexposed to the systems development process. ITS users then demand too many changes because of the ITS department's inexperience with the open systems architecture. The users feel that ITS is not initially providing them with the system that they specified. Management has an appreciation of this situation, but ITS functional analysts need to have the skill to utilise open systems architecture technologies adequately in order to provide business analysts with comprehensive models of the business. This situation creates productivity problems in the systems development life cycle. Training should be focussed, therefore, in providing the skills to the systems developers to effectively use open systems architecture technologies and systems.

Respondent 2 states that the major ITS skill sets that will be required as result of open systems architecture are open systems architecture knowledge (technical skills) and systems management skills in UNIX. The ITS manager's job will be more complex in the short term, however, in the medium term there must be a change in attitude to include a greater focus on open systems architecture solutions. There will be a need to

have technical skills to manage a more complex environment which includes both open systems architecture and legacy systems.

Respondent 3 highlights that the major position created/impacted by the move to open systems architecture is that of the system architect. This is due to the need for a cohesive systems plan for systems integration. This position defines open systems architecture concepts for projects and the organisation at large, therefore, this position validates the implementation (reality) and acceptable compromises and boundaries of the open systems architecture. The definition of this position supports a rise in the visibility and importance of technical people from a management perspective. All other positions within the project team need to have an understanding of the systems architect role and adherence to guidelines set by that position. This position will be used to approach and manage systems development projects. The systems architect will move from project to project and will have high level strategic and low level technical input. There will also be a need for individuals who are capable of implementing systems development approaches that require system integration and cohesion. This respondent feels that the following are important for the successful implementation of open systems architecture: strong generalist technical skills; analytical skills; management presence; an inquiring mind and good communication.

These skill sets will generalise ITS backgrounds and ensure that the systems architect has the ability to operate at a senior level but also has knowledge of the technical platform and how it provides a solution. This position must have strong communications and presentation skills.

Respondents within this case discussed *ITS education/training needs* for a successful move to an open systems architecture.

Respondent 1 did not answer.

Respondent 2 states that the major ITS training required as a result of open systems architecture is of a technical nature with a view to understanding software issues, especially those to do with data communications. Higher levels of open systems architecture technical training are required. There is an emphasis on data communications and systems management skills in the UNIX environment. This respondent expects to see training in open systems architecture take effect with more system acceptance and higher skill levels in open systems architecture environments.

Respondent 3 feels that architectural design, communication and management skills are essential training areas for successful open systems architecture. The systems architect must have general management training but also know the role of architecture and the architect within the organisation. Skills of the architect include: data modelling; functional modelling; documentation and communication; co-ordination and control; validation; adherence to guidelines; general management; presentation; project management; specific technical training as required and a self learning capability.

D.1.7 SUPERORDINATE GOALS Subjective Responses

Respondents were asked to give their impressions of *ITS priority concerns* for their organisations in the successful move to an open systems architecture.

Respondent 1 feels that cost justification of spending on ITS projects, user involvement, ITS project management and implementation, budget constraints of ITS, technological constraints and coping with new ITS are the most important issues which should be concerning managers now (top six ranked factors). In the future he sees user involvement, identifying opportunities for the use of ITS and organisational impacts of information systems as most important.

Respondent 2 states that technological ITS staff resources, integrating diversified technologies, coping with new information technology and data management and control are important factors now while in 3 years time, ITS staff resources, data management and control and coping with new information technology are areas of focus. This respondent feels that ITS is still at a stage of development where you can have true open systems architecture. He expects this issue to be of less concern in the future, but distributed data management and rapidly changing technologies will still be high on the agenda in 3 years time. Having sufficient human resources trained in open systems architecture technology is and probably will be an issue in the future.

Respondent 3 states the following to be important priority concerns: ITS project management and implementation; more effective information systems/technology development; coping with new information technologies; information systems long

range plans; organisational impacts of information systems; technological aligning ITS with business strategy; integrating diversified technologies; user cost justification of spending on ITS; relations between ITS and user departments; location of the ITS function in the organisational structure and top management support for budget constraints of ITS. This respondent feels that these factors will become less relevant over the long term.

D.2 Case Organisation 2

This section of appendix D describes individual subjective case accounts for Organisation 2.

D.2.1 STRATEGY Subjective Responses

Respondents were asked to discuss their thoughts on the *ITS Manager's role* both within the ITS department and also within the organisation in general.

Respondent 1 feels that the ITS manager should be focussed on internal to ITS issues and business issues (3 on the 1-5 scale). This answer was justified as the management of ITS within this organisation is viewed as an operational project with a strategic orientation and as a result the business needs should be matched with the ITS requirements based on user demand. This manager sees no need for a large centralised ITS function within the organisation as the ITS function should be contract management oriented i.e. be able to deal with multiple vendors and the intellectual property from open systems architecture solutions derived in-house.

Respondent 2 stated that the ITS manager should be focussed on business issues (5 on the 1-5 scale) and the project manager should be focussed mainly on the business with some technical orientation (4 on the 1-5 scale). This answer was justified as this respondent argued that technical expertise can be bought by the organisation if required but that there is also an element of solving business problems using technical solutions. This respondent stated that this would stay the same in the long term as technical expertise becomes even cheaper to purchase.

Respondents were asked to *position ITS applications* on the McFarlan & McKenny (1983) strategic grid.

Respondent 1 stated that ITS is perceived as a Support/Factory function as users are currently unhappy about paying for the new open systems architecture. They are still learning how to use the technology and they are not used to paying for ITS as they see it as currently only fulfilling basic functions. In the future ITS will be perceived as Factory/Strategic in nature as this organisation will consult to other similar organisations regarding their open systems architecture solutions, therefore, seeing the opportunity for a new market from the investment in these systems. Client/server solutions, however, can only go so far in providing ITS infrastructure and levels of control for this organisation. The organisation will need to match its business processes with ITS in order to operate effectively.

Respondent 2 feels that ITS is perceived as a Factory function by some senior management as there is still much to be done. Most users feel that ITS is in Turnaround mode as they can get by without the technology for short periods of time (although this may also be used as an excuse for not using the technology).

This respondent feels that this may change in the future by becoming more strategic although there is not a lot of evidence of competitive advantage for this organisation as there is currently a lack of systems integration. A movement to a Strategic perception will happen eventually due to an increase in the organisation's bottom line and organisational effectiveness through the implementation of an open systems architecture.

Respondents were then asked to assess the *open systems architecture business objectives* within their organisation.

Respondent 1 stated that increasing the speed of business decisions, reducing business costs, increasing the autonomy of user departments (all ranked 1) and minimising ITS

costs and automating operations (both ranked 2) were important now. The picture changes in 3 years time as increasing the speed of business decisions, reducing business costs, increasing the autonomy of user departments (all ranked 1), minimising ITS costs, automating operations (ranked 2), improving the quality of business decisions and more efficient communications with customers and clients become more important.

Respondent 2 felt that supporting basic functions was important now while improving the quality of business decisions (ranked 1), more efficient communications with customers and clients (ranked 2), reducing business costs (ranked 3) and automating operations (ranked 4) were important in 3 years time. There is a requirement to improve business decisions by making information readily available. Automating operations at passenger terminals is a necessity given the industry direction in this area.

Respondents were then asked to assess the *level of achievement of open systems architecture business objectives* within their organisations.

Respondent 1 stated that increasing the speed of business decisions, reducing business costs, increasing the autonomy of user departments, automating operations and minimising ITS costs were all rated highly.

Respondent 2 offered no comment as it was thought to be more appropriate that the Executive CIO evaluate these objectives (see Respondent 1).

D.2.2 STRUCTURE Subjective Responses

Both respondents described their ITS department structure as a project matrix.

Respondents were asked to describe the *open systems architecture technical objectives* for their organisation.

Respondent 1 felt that data interchange between applications, interoperability between applications, new operating systems, systems based on ITS standards and fault tolerance were all of critical importance now. Computer aided software engineering, client-server applications, local area networks, networks of dissimilar systems and network management were thought to be less critical but still very important. In 3 years time this respondent felt that all of these issues would be of importance in meeting open systems architecture technical objectives with the addition of electronic data interchange (EDI) with customers, electronic data interchange (EDI) with suppliers, distributed databases and image processing as other important factors.

Respondent 2 stated that local area networks and data interchange between applications were important factors now with interoperability between applications, electronic data interchange (EDI) with customers, electronic data interchange (EDI) with suppliers and client-server applications becoming much more important in 3 years time.

Interoperability between applications is critical in terms of the look and feel of applications and the ability to automatically update from one application to another.

Respondents were then asked to describe the level of achievement of *open systems architecture technical objectives for their organisation.*

Respondent 1 felt that data interchange between applications and local area networks had been somewhat achieved although there was some way to go (ranked 3). He stated that fault tolerance, computer aided software engineering and networks of dissimilar systems had been nearly achieved (ranked 4) and that interoperability between applications based on a UNIX interface NOT vertical systems integration, new operating systems, client server applications and network management had been fully achieved (ranked 5).

Respondent 2 offered no comment as it was thought to be more appropriate that the Executive CIO evaluate these objectives (see *Respondent 1*).

D.2.3 SYSTEMS Subjective Responses

Respondents were asked to give their *definitions of an open systems architecture.*

Respondent 1 defined open systems architecture as meaning the replacement of old technology with new. There needs to be flexibility and disaster/ recovery features in built so that the organisation can move part or all of their applications as the need arises. With an open systems architecture you can also split the system across other hardware and software and still have it run (especially in case of emergency). There needs to be standard product connectivity of hardware and software across the open systems architecture. Open systems architecture have been defined in this way due to the

continuous operation of the technology compared to an MVS based architecture i.e. more able to put terminal and software connections into the environment without interruption. All of the ITS budget of this organisation is devoted to open systems architecture with most of the funding concentrated on vendors and users.

Respondent 2 felt that an open systems architecture is an environment where you can easily connect systems with a limitation on the amount of development effort. There is also a need to connect systems of a disparate nature. Open systems architectures have been defined in this way due to the rationalisation of the ITS architecture within the organisation and the spread of business units across the country. These two organisational directions have created an important need to be able to supply and access information electronically from anywhere in Australia. Industry may eventually change this definition as the direction may become more standardised or conversely more fragmented. Supplier driven open systems architecture direction will not, however, revert to the closed situation that preceded it. The most important aspect of implementing open systems architecture is the effective use of standards in the environment.

The state of the ITS architecture and infrastructure at the time of the interviews was outlined at length and the following information technology was identified by *all respondents* as core to the move to an open systems architecture.

Respondent 1 described the ITS architecture and infrastructure as being: *operating systems* including MS-DOS and UNIX (most important); *GUIs* including Microsoft Windows and Oracle User Interface; *networking* technologies that encompass LAN

Manager, TCP/IP and Ethernet which are described as all being important; *databases (relational)* which were predominately Oracle and Ingres with some Informix CAD requirements whilst *OITSA frameworks* that were used were GOSIP compliant.

Respondent 2 did not offer any comment on ITS architecture and infrastructure as it was thought to be more appropriate that the Executive CIO draw up this list (see Respondent 1).

D.2.4 STAFF Subjective Responses

Respondents within this case discussed *the positions/impacted* by the move to an open systems architecture as it was felt that both these issues were closely related.

Respondent 1 stated that users now have ITS application knowledge and vendor agreements which make vendors supply more support for an open systems architecture. The downside to all of this is that ITS operations within the organisation have less of a supporting role. There is also a lesser requirement for an ITS department "middle person" as the organisation no longer relies on in house ITS expertise to solve its problems. The ITS function's new role is to manage the relationship between vendors and ITS users. The users may become more familiar with the business as a result of this. Ultimately the business application responsibility should be with the users as they should own their applications.

Respondent 2 felt that the position of the Manager of ITS projects was created as a result of the increase in administration and workloads in the move to an open systems architecture. The LAN Administration position has been created due to the impact of the new operating system (UNIX) and the requirement of LAN functionality in a client server environment. Open systems architecture can be low maintenance as there is not a need for more ITS staff, but ITS staff with different skill sets. With the move to a

standards-based system building approach there is a need to appreciate that it can be difficult for suppliers to apply your standards to supply required solutions. The ITS department structure in the future will also depend on how the organisation restructures. The ITS department structure will change when service level agreements are implemented between the ITS department and the users. There will be a need to balance centralised ITS control with End User Computing (EUC) requirements. EUC requirements are not working effectively due to the end user expectations of the ITS role in the organisation. End users do not want to have to perform traditional ITS roles and there is some confusion about this, especially in relation to extra work-loads as a result of this shift. There are two approaches to this problem that may be used. More staff may be hired for the ITS department or there can be training and hiring of more end users with management and systems commitment.

D.2.5 STYLE Subjective Responses

Respondents were asked what *qualities an ITS manager should have* for successful implementation of an open systems architecture.

Respondent 1 stated that the ability to implement a systems architecture to support the company, the ITS vision for the future, the ability to increase the technological maturity of the organisation and establishing the ITS department's credibility were important factors both now and in the future (ranked 1). He also felt that interpersonal, informational and decision making skills are just good management skills needed by all managers.

Respondent 2 stated that informational (ranked 1) and decision making skills (ranked 2) were most important now and that Interpersonal (ranked 1), informational and decision

making skills (ranked 3) were all-important in 3 years time. Informational skills are more important now as there is a need to let staff know where ITS is in terms of development issues and how it will help them achieve their and the organisation's aims and objectives. Decision-making skills are also important as there is a need to look for opportunities to improve the organisation with ITS in an ongoing way. In the future interpersonal skills will become more important but this depends on the structure of the ITS department and how the open systems architecture settles into the organisation.

D.2.6 SKILLS Subjective Responses

Respondents within this case discussed both the *ITS skill sets required and the ITS education/training needs* for a successful move to an open systems architecture as it was felt that both these issues were closely related.

Respondent 1 feels that ITS staff must have skills in: the supplier interface; telecommunications; ISDN/DOS; SYITEC; NRC/AT&T and PC's which are mostly of a technical nature. Skills are also required in multi vendor knowledge, diagnosis and problem solving environments; ORACLE and database management; network management and tools e.g. NRC as well as UNIX management. ITS staff also need to have contract negotiation skills so that they can negotiate the maximum performance of the open systems architecture with suppliers as a result of staff reduction and the uniqueness of the open systems architecture solution. If this approach is successful then the organisation pays for the open systems architecture but has little to manage in terms of technical issues.

This respondent feels that ITS staff should train in the more technical aspects of open systems architecture so that they can monitor other technical staff and vendors and that

the organisation and business staff should train in ITS applications issues as they are closest to the business issues.

Respondent 2 stated that the LAN Administrator must have both LAN and UNIX skill sets. All other skills listed are applicable regardless of the technology being implemented. Major skills that become more important in the future include: customer relations; project management; standards and policy administration and dealing with business units and users. The ITS department will need to have more of an appreciation of business and commerce in general and the end users will need to have a greater appreciation and understanding of ITS. A major area of training for the future will be: ITS management (postgraduate education – business skills); keeping up to date with research in the area and a general increase in ITS and business education at all levels in the organisation.

D.2.7 SUPERORDINATE GOALS Subjective Responses

Respondents were asked what were the main ITS *priority concerns* to be addressed in the successful move to an open systems architecture.

Respondent 1 felt that the most important issues (ranked 1) for ITS both now and in 3 years time were identifying opportunities for the use of ITS, the IS long range plan, outsourcing risks (means less staff overhead and less maintenance costs) and top management support for ITS. The next most important issues (ranked 2) were aligning ITS with business strategy and cost justification of spending on ITS projects. Issues ranked 3 included data management and control, ITS project charging and implementation (transfer of project management to users for ownership) and ITS

security (who owns what). This respondent also felt that budget constraints of ITS become less important as the open systems architecture business needs are met and that coping with new information technology (especially training requirements) is critical both now and in the future. It was also stated that for more effective IS/ITS development vendors should supply packaged solutions of hardware and software to support organisational systems development. It is interesting to note that the respondent could not decide between the importance of these issues. Ratings were not given by this respondent for any factors.

A small ITS department depends on user/supplier involvement. This respondent states that there is no change to this situation over time. Organisational impacts (change in structure and environment) do, however, need to be taken into account as there are more of these over time.

Respondent 2 felt that aligning ITS with business strategy (ranked 1) and top management support for ITS (ranked 2) were important issues now and that location of the ITS function in the organisational structure (ranked 1) and ITS project management and implementation (transfer of project management to users for ownership - ranked 2) were most important in 3 years time. This respondent did not rate any of the issues in these tables). This respondent also felt that there should be an alignment of ITS with the business strategy as it is hard to get management support without this. Without top management support ITS cannot succeed as business processes (the way things are done) need to be changed as well as the technology. Only management involvement can achieve this goal. The ITS department must be located within the organisational structure at a corporate service level in order to be effective. Effective ITS project

management reinforces all of the above issues. This respondent does not perceive that this situation will change in the future.

D.3 Case Organisation 3

This section of appendix D describes individual subjective case accounts for Organisation 3.

D.3.1 STRATEGY Subjective Responses

Respondents were asked to discuss their thoughts on the *ITS Manager's role* both within the ITS department and also within the organisation in general.

This *respondent* feels that the ITS manager should be currently focussed on high level business issues (3 on the 1-5 scale). The example cited by this respondent is that of EDI seen as business issue rather than a technical one. This respondent feels that EDI currently focuses on ineffective business practices rather than continuous improvement practices. There should be better communications between government agencies regarding business client satisfaction and business interaction in order to improve work practices. From an organisational perspective this means the replacement of paper-based communications.

Respondents were asked to *position ITS applications* on the McFarlan & McKenny (1983) strategic grid.

This *respondent* feels that ITS applications are perceived as being strategic, however, he is worried about the lack of management of ITS overall. Over the years department

operations have been built around ITS but some people may say that ITS have not produced the required productivity benefits even though multi-skilling has resulted.

Staff outside of the ITS function (at a higher level) are more aware of ITS and what it can do as they continually question the value of ITS to the organisation. This organisation will be charging out the use of its ITS facilities to its users and this will influence the various cost structures within the organisation. This is a direct consequence of the ability to purchase ITS technologies and applications away from the in-house ITS group. EUC has redirected ITS administrators' work away from administration so there has been a drop in these managers' productivity. EUC development has distracted from the "real" ITS work (infrastructure development and analysis and design skills). As a backdrop to this the push towards "openness" is seen as a good thing as it has pushed management to question their cost structures and delivery of ITS to the organisation and other government agencies, however, it is seen that this may lead to an overall increase in the applications backlog. In the future ITS will be of a strategic nature, however, the current marketing of ITS to non-ITS personnel highlights the vulnerability of belief in the value of ITS and, therefore, the push of EUC from the last 5-10 years will continue.

Respondents were then asked to describe the open systems architecture *business objectives* within their organisation.

This *respondent* stated that more efficient communications with customers and clients (opportunities to make use of technology between these groups of people with inter-organisational openness providing the benefit), increasing the autonomy of user

departments (good or bad only time will tell), improving research and development capabilities (using the Internet) and minimising ITS costs (will come down in importance) are all very important, however this will happen through a more co-ordinated approach. All of these imperatives will rest with ITS rather than EUC while management would like to believe that associated control mechanisms will make this an expensive option. The size of the ITS group might shrink while the size of EUC will expand and be hidden (as it is less easy to track) were all very important. Reducing the time to market for new products and services (SA & D methodologies will assist here) and streamlining relationships with suppliers were also important.

D.3.2 STRUCTURE Subjective Responses

ITS *department structure* is discussed in section D.3.6.

Respondents were then asked to describe the *open systems architecture technical objectives* for their organisation.

This *respondent* sees that moving applications off mainframes to smaller systems (not necessarily open systems architecture - driven by needs), reducing size and/or number of mainframes (not necessarily open systems architecture - driven by needs), database redesign (allows you to use more modern database), data interchange between applications and interoperability between applications (depends upon standards for data and information) are all very important.

He also sees network management (a headache as well), multi-vendor network management (essential part of the environment), electronic data interchange (EDI) with customers (more use is made of EDI in the future - new operating system will cause concern and confusion about what to use), electronic data interchange (EDI) with suppliers, new operating systems (concern with proliferation), systems based on information technology standards (important - things like TCP/IP), real time computing, fault tolerance (24 hours a day) and distributed databases will also play a critical role in the establishment of an open systems architecture.

This *respondent* also listed computer aided software engineering (CASE), object oriented programming (future), client/server applications, on-line transaction processing (image processing to play a greater role), local area network(s), wide area network(s) (not necessary as open systems architecture make extensive use of these), networks of dissimilar systems (future replacement standards will downplay this), a coherent ITS architecture and end user systems development (impacted by connectivity) as being very important.

He also felt that most of these things would also be critical in the future.

D.3.3 SYSTEMS Subjective Responses

Respondents were asked to give their *definitions of an open systems architecture.*

This *respondent* saw an open systems architecture as a move to a client/server approach. The ability to communicate between different software and hardware environments should be relatively easy. Hardware should use standard applications and operating

systems as a range of platforms is not necessarily a function of an open systems architecture. This respondent has defined an open systems architecture in this way due to his background and expertise in EDI and other technologies. Communications between federal government agencies and the outside world is becoming standards based. The most important aspects of implementing the open systems architecture are liaison and communication between all parties involved and adherence to standards (the problem is which one)! This respondent sees the technology used to implement an open systems architecture as irrelevant. He sees that there are islands of applications in his organisation and other government agencies rather than any coherent technology platform. Information control means physical control of technology as all else is transient and applied according to the needs of the moment. He sees that the open systems architecture frameworks are most important (i.e X/OPEN, GOSIP, POSIX, SAA etc) as these are the basic standards for information and data.

D.3.4 STAFF Subjective Responses

Respondents within this case discussed the *positions/impacted* by the move to an open systems architecture.

This *respondent* feels that these types of positions need to be created due to the higher expectations of clients. Client management (e.g. marketing) and support skills (e.g. help desk - 1 contact point) are very important. There also need to be some client management skills imparted to technical support staff as they are an important interface with clients.

Respondents within this case discussed the *ITS skill sets* required for a successful move to an open systems architecture.

This respondent outlined that management and development of client skills are necessary along with focused expectation management as a result of the implementation of an open systems architecture. A more corporate view of ITS and the resulting skills over multiple technical functions is required, as well as the supervision of technical breadth in each technical function (e.g. use of CASE and OO tools). This may necessitate a change in the way systems analysis and design occurs (as well as SA&D perspectives). Knowledge of the business and its processes, therefore, becomes very important.

D.3.5 STYLE Subjective Responses

Respondents were asked to identify the *qualities an ITS manager should have* in the move to an open systems architecture.

This *respondent* felt that the ITS leader should set directions and motivate staff by coaching rather than telling. As a result of this process liaison and co-ordination with others within the ITS function, the organisation and across Federal government agencies will be very important. The ability to monitor (follow the environment), disseminate and communicate with the organisation as well as be a spokesperson to those outside the organisation should become more sales and marketing oriented and occur in a top-down fashion or at least be delegated. The longer-term role of the ITS services of this organisation should be entrepreneurial (looking for opportunities) and should not be fire

fighting (handling disturbances). The role of the resource allocator is also important to ensure corporate decisions are made within strict planning and budgeting constraints. All staff should be coached as to the validity of these skills as well. Learning about the business should be linked to the overall decision-making process. ITS department's credibility should be established by telling and doing and this should be communicated to all staff (coaching and leadership). There should be guidance to ITS users so that the technological maturity of the organisation is increased through this process. A business vision should be created (rather than an ITS vision) and a there should be a systems architectural vision to support the company vision for the future.

D.3.6 SKILLS Subjective Responses

Respondents within this case discussed the *ITS department structure and skill sets* required to move to an open systems architecture.

This *respondent* stated that more managerial skills are now needed to manage a hybrid ITS structure. There are changes in emphasis from mainframe development and the resultant structure to automated operations (open systems architecture has made people more aware of cost structure, therefore they try to improve this). There needs to be more support for the new technologies as these technologies are seen as being innovative. Communications technologies skills are also required due to complex problems and uncertainties in this area. The logic of the open systems architecture interconnectivity argument has hidden the technical difficulties inherent in achieving interconnectivity. The availability of current database technology also means that new database management skills are required. Management skills are also needed on how to organised

mainframe and open systems architecture staff e.g. separate (open systems architecture and mid-range) or integrated by function (hybrid approach).

This *respondent* sees that there will be more of the same requirements in the future but the ITS planning role should become more of a business function (rather than an ITS function) due to the required technical staff interaction with users, therefore, managers need to be aware of ITS technical planning skill availability.

Respondents within this case discussed *the ITS education/training needs for a successful move to an open systems architecture.*

This *respondent* stated that education and training strategy has become more pro-active in this organisation as is evidenced by the dedication of another 7-8% on top of the administration budget for training provision. Some of the training providers, however, are not making an impact e.g. how technical staff can appreciate a business perspective and how they can also keep up with technical change.

D.3.7 SUPERORDINATE GOALS Subjective Responses

Respondents were asked to identify important *priority concerns* that need to be addressed in the move to an open systems architecture.

The following factors are rated, by this *respondent,* as important both now and in the future. Organisational impacts of information systems (as people don't fully realise what can be done with ITS), development and management of EUC (as there are a variety of

packages and therefore a lack of interconnectivity, therefore there needs to be some definition and control of hardware and software standards), technological constraints and control (these are required from an ITS perspective to enforce interconnectivity within and between applications especially as the organisation rolls out more applications) and so security also plays a large role here. User awareness and education (what ITS can and cannot do), location of the ITS function within the organisation structure (which at the moment is decentralised and therefore difficult to manage - will or should, the structure become more centralised over time) and data management and control are also seen as important. Out-sourcing will become more of an issue as this organisation will play an important role right across the Australian federal government in areas such as cost evaluation and management of the ITS function (getting rid of technical problems).

A major future problem is seen as the decision process to be taken on the migration path from the old legacy to new client server architecture. This is not always clear and this respondent feels that this should be an incremental process.

D.4 Case Organisation 4

This section of appendix D describes individual subjective case accounts for Organisation 4.

D.4.1 STRATEGY Subjective Responses

Respondents were asked to discuss their thoughts on the *ITS Manager's role* both within the ITS department and also within the organisation in general.

Respondent 1 feels that due to the 10 year modernisation program that the current business focus would vary for different ITS managers depending on how they aligned themselves with corporate goals (rated 3 balanced between ITS related and business related issues on the 1-5 scale). In the future this respondent feels that ITS management should be more aligned with corporate goals (rated 4 on the scale) but that there would also be a need to solve technical delivery problems.

Respondent 2 feels that the ITS manager should spend his/her time focussed more on the business both now and in the future (rated 4). The manager should delegate technical responsibility and take more of a leadership role.

Respondent 3 feels that the ITS manager should be more business focused as it is business which drives technology usage although he did stress that ITS management should not be polarised into technology versus business views as they were both important considerations in the management of ITS. He also feels that this will be the

same in the future.

Respondent 4 stated that the ITS manager should be focussed on the business at present (rated 4) as ITS developers move out into the business. This is influenced by her belief that this organisation is in transition at the moment and is taking the traditional approach of ITS driving the business. In the future the ITS function will look after the infrastructure and therefore be more focussed on internal ITS issues (rated 1.5) as the ITS function will be providing service to the business which in turn will drive the ITS area.

Respondents were asked to *position ITS applications* on the McFarlan & McKenny (1983) strategic grid.

Respondent 1 feels that ITS applications are currently moving from factory to turnaround as the emphasis has been on streamlining ITS applications in the modernisation program. He sees that the organisation is still using ITS for basic functions and that it is not used to its full potential as some applications could be classified as strategic in nature but only a small percentage. This respondent feels that many more applications will become more turnaround in nature in the next 3 years.

Respondent 2 did not understand the differences between the various categories as he sees that the open systems architecture is a tool to accomplish objectives related to a specific application. He feels that users should be more educated and therefore understand the use of ITS in relation to a better insight into the function and appreciation of technical issues.

Respondent 3 feels that personal computing dominated and that users see only the standalone and support/factory functions of ITS. Management sees the strategic/turnaround benefits, however, especially since the modernisation program has been implemented. He states that EUC users will eventually see the merits of ITS strategic applications. This respondent sees that there is a lot of reorganisation occuring and that users are essentially autonomous but that they still require access to the organisational systems (mainframes, central databases, integrated resources). This access needs to be properly managed and an open systems architecture will facilitate and enable this process.

Respondent 4 states that senior management within this organisation sees ITS as a strategic and support/service which is integral to the business and that this will be the same in the future as business drives the ITS strategy.

Respondents were then asked to describe the *open systems architecture business objectives* for their organisation.

Respondent 1 stated that automating operations in terms of productivity, more efficient communications with customers/clients, improving the quality of business decisions, product quality improvement or control, increasing the speed of business decisions in terms of responsiveness, reducing business costs in terms of productivity and reducing the "time-to-market" for new products/services in terms of the modernisation project (new objectives) were the most important business objectives both now and in the future. He also added that improving compliance with the law was a critical business

objective by using ITS to understand and respond to client requirements. This respondent feels that the modernisation program will help this organisation meet these business objectives as the new environment denotes flexible systems that are the critical underpinning to these objectives.

Respondent 2 stated that minimising information technology costs and reducing business costs were critical due to the move to a more efficient use of ITS within this organisation and that this would be the same in the future. This respondent felt that minimising ITS costs and reducing business costs had been achieved (rated 5).

Respondent 3 felt that minimising information technology costs, reducing business costs and reducing the "time-to-market" for new products/services were the most important business objectives closely followed by automating operations, improving the quality of business decisions and increasing the autonomy of user departments. He stated that streamlining relationships with suppliers was not important as this organisation did not want relationships with a large number of suppliers and that supporting basic functions should always be related to business functions.

Respondent 4 feels that the growth in EDI and the perceived need for a gateway will be of more cost and more customer effective and that 80% of all infrastructure and applications should be off-the-shelf. This would assist the organisation to save money due to the lack of need for development of new applications and the associated staff. The ITS architecture would then more easily cope with any growth and be able to stay independent from the client.

D.4.2 STRUCTURE Subjective Responses

Respondents within this case discussed the *ITS department structure* required to move to an open systems architecture.

Respondent 1 was not asked to comment on this as his position fell outside the ITS structure.

Respondent 2 stated that the ITS department structure was a direct result of their role as providers of the open systems architecture. The major impact on the organisation comes from the ITS area in their provision of an open systems architecture. He feels that the structure must stay as it is or be outsourced (either some or all).

Respondent 3 stated that the organisation was still in transition moving applications out to user areas.

Respondent 4 stated that this organisation is in a state of transition and that modernisation meant the redevelopment of key systems (central ledger etc) and that there has had to be an integration of other systems because of this. There has been a massive database redesign and a look to future integration. She felt that she was not in the position to comment on the restructuring of the ITS function at this time.

Respondents were then asked to describe the *open systems architecture technical objectives* for their organisation.

Respondent 1 was not asked to comment on this as it was not deemed to be within his area of expertise.

Respondent 2 felt that data interchange between business applications and interoperability were both critical and were business needs driven while new operating systems was also of prime importance and was driven by general industry forces and clients. This would not change in the immediate future. This respondent also felt that distributed databases would become more important in the future due to improvements in technology and the completion of the modernisation program, thus allowing more time and resources to explore this area. This respondent felt that data interchange and interoperability between applications had been largely achieved to this point in time (rated 3-5) and that new operating systems were just beginning to be explored (rated 1).

Respondent 3 commented on all of the new technology objectives (see list below).

- Moving applications off mainframes to smaller systems (not directive);
- Reducing size and/or number of mainframes (but no increase);
- Database redesign (no corporate database);
- Data interchange between applications (high integration less desirable -and in the future this will be even more important due to the emerging business systems requirements being better served by smaller and more modular systems);
- Interoperability between applications (high integration less desirable - see previous comment);
- Network management (no view but thought it was important);
- Multi-vendor network management (more complicated);
- Electronic data interchange (EDI) with customers (more and more);

- Electronic data interchange (EDI) with suppliers (no view);
- New operating systems (NT - operating systems reducing from suppliers);
- Systems based on information technology standards (also has to recognise business needs);
- Real time computing (OLP);
- Fault tolerance (organisation is important as there are 90 buildings to co-ordinate and operations staff are not in each building);
- Distributed databases (replication);
- Computer aided software engineering (CASE) (not much progress);
- Object oriented programming (seen as not being standard yet so not high on technology objectives priorities, however, if it were to become standard then this situation would be reviewed to a higher status);
- Client-server applications (no view but seen as important);
- On-line transaction processing (no view but seen as important);
- Image processing (the reality is that it is expensive on storage and communications bandwidth);
- Local area network(s) (no view but seen as important);
- Wide area network(s) (SNA is important here);
- Networks of dissimilar systems (no view but seen as important);
- Coherent ITS architecture (a must for this organisation); and
- End user systems development (painful but unavoidable and the organisation needs to agree on the applicable constraints on EUC for it to be cost effective).

Respondent 4 commented on the following new technology objectives (see list below).

- Database redesign (not applicable as gateway assists);
- Data interchange between applications (organisational architecture);
- Interoperability between applications (internal integration - yes, external integration - no);
- Electronic data interchange (EDI) with customers (EFT important);
- New operating systems (strategic architecture);
- Systems based on information technology standards (important);
- Real time computing (gateway batch);
- Fault tolerance (redundancy takes care of this - system driven);
- Object oriented programming (gateway -important);
- Client-server applications (gateway -important);
- On-line transaction processing (system administration important);
- Image processing (organisational management project);
- Local area network(s) (15,000 in number so very important);
- Wide area network(s) (important);
- Networks of dissimilar systems (gateway and organisational factors important);
- Coherent ITS architecture (important); and
- End user systems development (important).

D.4.3 SYSTEMS Subjective Responses

Respondents were asked to give their *definitions of an open systems architecture* prior to answering questions about technical and business objectives.

Respondent 1 was not asked to comment on this as it was outside of his brief.

Respondent 2 defines an open systems architecture as a proprietary platform that many vendors can supply products to. This can be achieved through standards application, good architecture planning (or a combination) and the ability to acquire products from multiple suppliers that work together. Applications must have the ability to move across vendor's products and platforms. This is all necessary as this organisation requires the flexibility to deal with more that one supplier as they have to live in the real world. There will be no change to this in the future if products converge against standards. This respondent states that the total ITS budget is devoted to the open systems architecture and that the most important aspect of implementing an open systems architecture is the range of suppliers available.

Respondent 3 defined an open systems architecture as inexpensive to run, fast to build, portable, scaleable and an interoperable ITS architecture that is vendor independent. This was defined in this way as it is a simple reflection of the aspects of systems that give an organisation inexpensive flexibility. This supports federal government administration requirements for organisational flexibility and recombination of departments. This definition will remain the goal in the future but will probably be achieved more through recognition rather than application of de-facto standards such as

UNIX (as this may not maintain portability).

Respondent 4 defined an open systems architecture as machine-to-machine interoperable standards to share work. She defined open systems architecture in this way due to the selling of EDI benefits to this organisation and other federal government departments via open systems architecture policy. She sees that this definition will change in the future as other components are added other than the EDI focus in order to make the open systems architecture broader. She believes that the most important aspect of implementing the architecture is the commitment from people to make the standards work in the architecture rather than look different (open systems architecture standards).

The state of the *ITS architecture and infrastructure* at the time of the interviews was outlined at length and the following information technology was identified as core to the move to an open systems architecture.

Respondent 2 described the ITS architecture and infrastructure as being: *operating systems* including MS-DOS, MVS, OS2 ,UNIX and PRIMOS (and the future would depend on the success of Chicago to replace MS-DOS and whether this is taken up by the organisation); *GUIs* including Macintosh DTP, Microsoft Windows and the internally developed PRIME BASE (in the future it was seen that the organisation would be Microsoft dependent); *networking* technologies that encompass LAN Manager (network), OSI (FTAM to bring information in from outside), SNA (which is critical for LANS to connect to the mainframe), TCP/IP, X.25 and Ethernet (XNS) which are described as all being important (in the future it was seen that there would be a greater move to TCP/IP to become less reliant on XNS); *databases (relational)* which were

prdominately DB2 and ADABAS with a minor role played by Oracle, Ingres, Informix (other than on mainframes) and a range of EUC database products. *OITSA frameworks* that were used were GOSIP compliant with minor roles played by POSIX (IEEE) and SAA (IBM). This respondent felt that the technology base would not change in the immediate future.

Respondent 3 described the ITS architecture and infrastructure as being: *operating systems* including MS-DOS (across the entire organisation), MVS (a solution for transition processing across the organisation), UNIX (client/server applications) but stated that NT advanced server would have more impact on the organisation in the future; *GUIs* including Microsoft Windows and Motif/X Windows (which is government recommended and makes a lot more sense for many applications); *networking* technologies that encompass LAN Manager (not for UNIX based applications), OSI (global messaging X.400 and X.500 therefore cannot die), SNA (no other available for large numbers of users), TCP/IP (using this more and more), X.25 (remains important to communications suppliers) and Ethernet (which is the largest implementation that they know of); *databases (relational)* DB2 for MVS machines and any other that exhibits an SQL compatibility (therefore it can be supported technically). *Open systems frameworks* that were used were GOSIP and POSIX (IEEE) as well as the Australian federal governments AGGOS. This respondent felt that the technology base would change with technological advances.

Respondent 4 did not comment on the basic technologies underpinning the open systems architecture but did highlight the importance of establishing a distributed gateway in major population centres utilising existing management structures which would be

physically separate from the organisation' s internal networks. This gateway should be RISC based and established without having to redevelop internal systems. Bulletin boards should enable the distribution of key information to clients and customers in the future.

D.4.4 STAFF Subjective Responses

Respondents within this case discussed the *positions/impacted* by the move to an open systems architecture.

Respondent 1 sees not just a requirement for new ITS positions but for more business analyst positions both now and in the future.

Respondent 2 says that the major effect at the moment is due to the movement to contract out this work to about 700 positions. These positions will change the nature of the work and therefore have more to do with the open systems architecture than the more permanent positions.

Respondent 3 sees that the ITS area is still supporting core business applications on more proprietary platforms, therefore, open systems architecture has little influence and in fact makes management of ITS more complicated. If the organisation is becoming more conscious of the need to "open the architecture" then there is a requirement for a more open "mind set" (transition) re-orientation of goals. This is a large organisation so the transition must be gradual as the old systems must still exist to support core

business. This organisation is preoccupied with production line systems as they are the success of the organisation to date. This organisation is aware of the total integration problems (non-maintenance and non-recovery of systems) so they may need to allow branches to operate in an offline mode. In the future this respondent hopes that this situation would change and that staff would see the benefits of datawarehousing/mining and midrange distributed systems (the backbone of an open systems architecture).

Respondent 4 sees that the position of technical architect has been created as a bridge to the organisation and that this type of position may expand into a specialist ITS group function. Most other ITS positions are taking on an open systems architecture "mind set" of best practice, sharing resources, facilitating better communications and being future driven with the technical architects role in mind. The technical architect is still learning about this open systems architecture "mind set" but he/she does have highly developed technical skills (helpful) and procurement skills.

D.4.5 STYLE Subjective Responses

Respondents were asked to identify the *characteristics of a successful ITS manager* in the move to an open systems architecture.

Respondent 1 sees interpersonal skills as most important (ranked 1) followed by implementing a systems architecture to support the company vision for the future (2), then learning about the business (3) and increasing the technological maturity of the organisation (4). Leadership is defined by this respondent as guidance, therefore, this quality is important to open systems architecture effectiveness rather that managerial

qualities. This respondent also sees the same attributes being required into the future.

Respondent 2 states that interpersonal skills (figurehead - symbolic duties, leader - set directions, motivate staff, liaison - co-ordinate with others) is important as is creating an ITS vision and selling it and implementing a systems architecture to support the company vision for the future. He feels that this is all concerned with direction setting and knowledge of the target and the leadership skills to hit it. This will be the same into the future.

Respondent 3 feels that the informational leader (the monitor –follow environment, the disseminator - communicate within the organisation, the spokesperson - communicate outside the organisation) is important along with the decision making leader (entrepreneur - look for opportunities, disturbance handler – fire fighting), resource allocator which is a very authoritarian role as well as the provision of resources (which is an ongoing problem) as well as the negotiator (resolve conflicts). The manager's ability to learn about the business, (or at least train to) as well as the survival skills associated with establishing the ITS department's credibility are also important. This respondent also feels that the technological maturity of the organisation, in some areas, may be decreasing due to the modernisation program and the use of new business solutions.

Creating an ITS vision and selling it is also seen as critical, as the ITS vision should really be a business vision encompassing business opportunities and requirements. Implementing a systems architecture to support the company vision for the future is seen as a key area by this respondent as this architecture should not be limited but open (open

systems architecture) and so this will increase in importance over the next three years. This respondent envisages that the Open Systems movement will assist in its establishment.

Respondent 4 feels that all of the leadership requirements listed would be impacted by the move to an open systems architecture and that this should only be viewed as another application.

D.4.6 SKILLS Subjective Responses

Respondents within this case discussed *the ITS skill requirements* for a successful move to an open systems architecture.

Respondent 1 states that the ability to understand users and involve them in the change process is very important. ITS staff must understand the way clients do business and understanding user areas and especially have a good understanding of where technology is taking the organisation and how people will interact with the technology. Cost benefit analysis skills and the use of a corporate framework are a must in order to achieve this. Creativity and the ability to link technology to the total organisational process rather than individual functionality (total picture and perspective) is also a must. Skills in technology e.g. DB2 are necessary both now and in the future.

Respondent 2 feels that people are no longer skilled in products of one supplier, which is a major area of transition in the implementation of an open systems architecture. There is now a propagation of products of numerous suppliers that are evolving to a true open

systems architecture e.g. the numerous versions of UNIX. He feels that there will be more of this in the future that will make the management of open systems architecture more difficult.

Respondent 3 states that flexible open "mind sets" and a push for business change are critical skills for an open systems architecture. In the future traditional ITS staff will need to change their technical comfort zones to non-proprietary technical skills, although this need to be controlled and focussed.

Respondent 4 feels that new telecommunications skills as well as frameworks like GOSIP and the new open systems architecture experience at present should be passed on to others (to facilitate an open "mindset").

Respondents within this case discussed *the ITS education/training needs for a successful move to an open systems architecture.*

Respondent 1 states that training in work process effectiveness rather than application function and project management is now more essential. Non-traditional areas of technology training such as data mining approaches and technologies are now necessary. New systems mean new business approaches, therefore, training must be applicable.

Respondent 2 feels that there should be better education in open systems architecture standards and in the product range from numerous vendors and that this will increase in difficulty into the future.

Respondent 3 states that technical communications staff are very adept at making the move to open systems architecture technical understanding (grows naturally) as this work is gradual (to make disparate systems talk to one another). The implementation of database service software on LANs is an example where learning various applications is a transition experience rather than the promotion of any official training policies. Organisations need to supply training where required and find out what to do on a needs basis as business drives technology use. Organisations need to be able to develop systems faster rather than rely on large mainframe systems development. He sees that the future is one of "sink or swim" (self preservation).

Respondent 4 feels that open systems architecture are technical and open architecturally and therefore, UNIX (AIX), EDIFACT and EDI business engineering are important educational areas of focus. In the future she sees that management business engineering will become very important as a result of open systems architecture impact as a business enabler.

D.4.7 SUPERORDINATE GOALS Subjective Responses

Respondents were asked to identify *priority concerns* that need to be addressed in the move to an open systems architecture.

Respondent 1 ranked user-involvement, external users as well as clients and aligning ITS with business strategy as number one priority. The success of products that are developed depend on their effectiveness in the workplace. If they are not effective then effort can be misdirected. This respondent also saw data management and control and

more effective information systems/technology development as critical areas for the business. He feels that all of the above areas will still be crucial areas of focus into the future with the issue of coping with new information technologies emerging over the next 3 years.

Respondent 2 states that integrating diversified technologies is important as the world of open systems architecture does not really exist (utopian) and therefore integration across suppliers is very important. User involvement is also critical as decisions are no longer being made solely by ITS management and staff, therefore, some understanding of ITS is required by users. Technological constraints are also rated very highly by this respondent as users must understand the limits of technology as they try to push beyond its capabilities e.g GUIs (which were not very advanced at the time of this study). This respondent feels that these will be the same issues into the future.

Respondent 3 sees that all factors on the list are important but has focussed on the following as key areas: internal organisation of the ITS function (as this will be reduced in size and user involvement will become more important as EUC becomes more pervasive), integrating diversified technologies (becomes less important as an open systems architecture becomes a reality), organisational impacts of ITS (will become more important as the organisation moves away from production line systems), cost justification of spending on ITS projects (will become more ITS focussed rather than business oriented), ITS staff resources (will be downsized), user awareness and education (will be constrained due to ITS and organisational limitations) information systems maintenance management (will become important in controlling ITS costs) and top management support for ITS and budget constraints of ITS (critical both now and in

the future).

Respondent 4 feels that all of the priority concerns listed would be impacted by the move to an open systems architecture and that this should only be viewed as another application.

D.5 Case Organisation 5

This section of appendix D describes individual subjective case accounts for Organisation 5.

D.5.1 STRATEGY Subjective Responses

Respondents were asked to discuss their thoughts on the *ITS Manager's role* both within the ITS department and also within the organisation in general.

R*espondent 1* feels that the ITS manager should be currently focussed on high level business issues (4-5 on the 1-5 scale). This is because it is the business which drives the ITS division as a service provider and as such needs to identify opportunities for the use of ITS. The ITS manager does in the short term, however, need to focus some attention on the messy ITS architectural issues brought about by historical circumstances as these need to be resolved before ITS can be truly business driven. There needs to be an understanding of technical and business issues. In the future the focus should be also be on high level business issues (4-5 on the 1-5 scale) as there will still be the redevelopment of the department's fragmented systems ongoing as well as cost efficiency considerations and the requirement of more information about how technology will meet the organisation's needs. The redevelopment will require the bringing together of 23 different systems into 1 as currently these disparate systems reflect a very limited strategic focus (of the department) as well as an historical fragmented response to government through a non-corporate response (narrow focus).

Respondent 2 states that the ITS manager should be focussed on internal to ITS and business issues (rated 3 on the 1-5 scale) as technical problems still need to be solved while acknowledging business requirements. The redevelopment effort of core systems, over the next 4 years, came about due to the messy department ITS environment due to the historical organisational formation (agglomeration of many different organisations to form the department). This meant that many different ITS strategies and a disparate ITS architecture was inherited. In the amalgamation many staff were lost (as well as their expertise), and the situation at present is a national network (HDS/MVS – with 12-13,000 terminals and 12-13,000 PCs). New systems are being developed under DB2 (transaction based) utilising the IEF case tool. This respondent also feels that the ITS manager focus will be the same in 3 years time as there will still be a balancing act between the demands of business and the capability of the ITS architecture.

Respondent 3 states that the ITS manager should spend an equal amount of time on internal ITS issues and business issues (rated 3). In the future he sees that as becoming more internally ITS focussed as the redevelopment process starts to take effect.

Respondents were asked to *position ITS applications* on the McFarlan & McKenny (1983) strategic grid.

Respondent 1 feels that products such as IEF (case tool) will assist in the systems integration process by looking at the organisation from a strategic decision making view rather than the current LAN/WAN communication at the office outlet level (support).

Respondent 2 states that while there is a solid attempt to redevelop and rationalise systems the rise in unemployment means development of new labour market programs. These necessitate new quickly developed systems to service them so, therefore, some resources may be diverted. While there is a movement to an integrated systems environment there will always be a need to respond quickly to government policy therefore redevelopment and integration is currently confined to the mainframe environment and key applications areas. There is an emphasis on strategic applications however, they are also seen as supporting the business. Some new technologies (such as touch screens to access job vacancies) are being looked at but are not as important as the mainframe redevelopment. In the future this respondent feels that the business direction of applications development will be "invisibly strategic" but "visibly supportive" .

Respondent 3 feels that ITS is currently used as a support to the organisation. Staff in general think that ITS is too difficult to worry about as they don't understand how the technology can be used or is being used. In the future he feels that it will enter a turnaround phase as staff leave the organisation to pursue other interests and as well the risks of a change in government, effecting a change in public service leadership which may in turn effect the types of systems and expenditure on them.

Respondents were then asked to describe the *open systems architecture business objectives* for their organisation.

Respondent 1 stated that more efficient communications (knowledge, information and services) with customers/clients was the most important current business objective and then highlighted improving the quality of business decisions through expert systems and decision support systems (rated 2) was critical as well as reducing business costs (rated 3). Increasing the speed of business decisions was also mentioned as was minimising technology costs which was seen as an eventual critical area after the redevelopment effort. Future objectives of importance include (in no particular order): automating operations, reducing business costs and supporting basic functions. The respondent qualified these answers providing that the new redevelopment was a success otherwise he sees the current issues a still being the most important ones.

Respondent 2 stated (in no particular order) that more efficient communications with customers and clients, increasing the speed of business decisions and reducing business costs were all currently very important and that this would not change in the future.

Respondent 3 listed product quality improvement, increasing the speed of business decisions and reducing the time to market for new products and services as critical in the current environment as each of these business objectives will support the high profile of this department. These initiatives will also enable the department to react to change and policy initiatives so that they need to deliver systems with this business focus. In the future this respondent sees that automating operations, improving the quality of business decisions and reducing business costs will become more important as the organisation will be able to lower costs to business once there is a better understanding of how to do things with ITS. Costs then become relevant and decisions become important.

D.5.2 STRUCTURE Subjective Responses

Respondents within this case discussed the *ITS department structure* required to move to an open systems architecture.

Respondent 1 was not asked to answer this question.

Respondent 2 feels that the communications and networks areas will be impacted due to the effects of GOSIP/OSI compliance. The telecommunications an engineering staff have always seen the need for standards to communicate. The applications area will be minimally impacted because this department needs a large centralised mainframe as they have a large amount of transactions to cope with (1.4 million per day) therefore individual applications will not be impacted. There is no way of knowing at this stage, however, what effect the large injection of capital for redevelopment will have on these applications as they are core to the business and there may be too much risk involved in a client/server approach to this area of the business. In the future this respondent see that the current mainframe redevelopment will be seen through and then maybe a look at more distributed approaches will emerge.

Respondent 3 stated that he felt that there would be a major impact in the communications and support branch and also in the applications branch, as non-mainframe applications would force this area to readdress the way that they developed applications (more client-server oriented). He stated that the future would be much the same.

Respondents were then asked to describe the *open systems architecture technical objectives* for their organisation.

Respondent 1 did not answer the question as it was outside the scope of his position within the organisation.

Respondent 2 stated that: moving applications off mainframes to smaller systems (link to client server – policy but very cautious); database redesign; interoperability between applications; systems based on information technology standards; computer aided software engineering (CASE); client - server applications; on-line transaction processing, local area network(s) and wide area network(s) were all important current open systems architecture technical objectives.

In the future there would be greater use of LANS and client/server architectures.

Respondent 3 stated that: database redesign; data interchange between applications; network management; computer aided software engineering (CASE); client - server applications; on-line transaction processing; local area network(s); wide area network(s) and a coherent ITS architecture were all of importance now.

In the future: reducing size and/or number of mainframes (in the future the nature of the mainframe will change and be used in a different way); EDI with customers; EDI with suppliers; new operating systems; object oriented programming and image processing would become much more important.

Some of these are already starting to appear but the systems are not mature enough to

use effectively at the moment.

D.5.3 SYSTEMS Subjective Responses

Respondents were asked to give their *definitions of an open systems architecture.*

Respondent 2 defines an open systems architecture as the ability to develop and implement systems which are compatible, interoperable and portable which interconnect and are relatively vendor independent. He defines it in this way due to his own experience and does not feel that this definition will change in the future. 100% of the budget for large systems will be spent on becoming GOSIP compliant with the most important aspect of the implementation of an open systems architecture being price/performance while adhering to an open strategy and functionality as much as possible.

Respondent 3 stated that an open systems architecture was a developed set of standards on which to build an ITS architecture (no set definition – defacto standards). He defined it in this way as he sees that more will be achieved by industry based defacto standards rather than looking to a standards body for leadership. He sees that this will not change in the future and that the most important aspect of an open systems architecture is the networking communications advantages.

The state of the ITS *architecture and infrastructure* at the time of the interviews was outlined at length by all respondents and the following information technology was identified as core to the move to an open systems architecture.

Respondent 2 described the ITS architecture and infrastructure as being: *operating systems* including MS-DOS, MVS, VM (migrating to MVS) and UNIX (some interest but not at the moment); *GUIs:* Microsoft Windows (standard); *networking* technologies that encompass LAN Manager (network), OSI (as much as possible), SNA and Token Ring (LAN standard); *databases (relational)* which were predominately DB2 (mainframe) and AIM, IDMS and ADABAS (migrating from these to DB2) and a range of EUC (midrange and PC) database products which would be compatible and interoperable with DB2. *Open systems frameworks* that were used were GOSIP compliant (for the future) a major role still played by SAA (due to the heavy mainframe IBM influence). This respondent felt that the technology base would not change in the immediate future.

Respondent 3 commented on the fact that in the (future) there would be a need for high speed communications for graphical applications and that this would have to be reliable and stable. There is also a need for case tools like IEF (now) and flexible, portable applications.

D.5.4 STAFF Subjective Responses

Respondents within this case discussed the *positions/impacted* by the move to an open systems architecture.

Respondent 1 and 2 did not comment on this.

D.5.5 STYLE Subjective Responses

Respondents were asked their opinion of *what it takes to be a good ITS manager*.

Respondent 1 felt that the ITS manager should have good interpersonal skills (rated 1) as this person needs to build a strong rapport with people by gaining access to them. They must have a developed understanding of the business but they must also be capable of liaison with the rest of the organisation. Learning about the business (rated 2), establishing the ITS department's credibility (rated 3), creating an ITS vision and selling it (rated 4), increasing the technological maturity of the organisation (rated 5) and implementing a systems architecture to support the company vision for the future (rated 6) were also deemed important.

Respondent 2 felt that implementing a systems architecture to support the company vision for the future (rated 1) and establishing the ITS department's credibility and keeping it (rated 2) were most important while increasing the technological maturity of the organisation was an ongoing issue.

Respondent 3 felt that the ITS manager should have good interpersonal skills, be able to create an ITS vision and sell it, increase the technological maturity of the organisation and implement a systems architecture to support the company vision for the future (in no particular order). He saw that informational and decision-making skills would emerge in importance in the future one all of the other objectives were achieved.

D.5.6 SKILLS Subjective Responses

Respondents within this case discussed *the ITS skill requirements* for a successful move to an open systems architecture.

Respondent 1 felt that while there should be some adherence to the traditional ITS skill sets that these needed to become more business oriented (quality assurance and control) at present. In this respondent's area there were 5 applications which supported the labour market programs and these needed to be managed from a business perspective. Future skill sets were seen as being oriented towards ITS business needs analysis and then to the application of technology to meet these needs. There is also a requirement to overcome the narrowness of the old proprietary (IBM) architecture and change the culture to a more corporate base of systems skills. This respondent felt that in the future there would also be a need to educate the users in traditional ITS skills so that they could become more attuned to what ITS has to offer them. This respondent also felt that the current base organisation skills were not stable due to the movement of staff in and out of the organisation (from bad to good).

Respondent 2 stated that more communications skills would be required in-house as suppliers and vendors would no longer support their proprietary communications products in the open standards environment so organisations would have to do it themselves. Suitable training would need to be organised in these areas.

Respondent 3 stated that support would have to be across more diverse technologies which would be more difficult to maintain and present a challenge to train and keep people. If these technologies can deliver these new tools and architectures then the business user/ ITS specialist delineation will become more blurred. He sees that in the future this will become more so.

Respondents within this case discussed *the ITS education/training needs* for a successful move to an open systems architecture.

Respondent 1 felt that the ITS staff need to have a greater business appreciation while users need to have a greater ITS appreciation. This needs to be facilitated by emerging technology training to enable an objective evaluation (by all stakeholders) of the technology. This needs to be reinforced within the organisational culture.

Respondent 2 felt that due to the requirements for more communications skills that courses in OSI and GOSIP as well as basic networking skills would be appropriate but there would also need to be a recognition of and catering for more diverse technology architectures and infrastructures in training courses.

Respondent 3 feels that there are quite different broader technical training effects due to the way the ITS division is structured (not functional). Due to this structure there is a need to look at a more integrated department structure with multi-skilled ITS people (communications/DBA/networks). Client-server technology will also impact the way business will be done so that the ITS department function will be located where it is best needed. This respondent sees that all of these factors will have more of an effect in the future.

D.5.7 SUPERORDINATE GOALS Subjective Responses

Respondents were asked to give their impressions of *ITS priority concerns* for their organisations in the move to an open systems architecture.

Respondent 1 feels that aligning ITS with the business strategy is the most important concern closely followed by (in no particular order), user involvement, user awareness and education and more effective information systems/technology development (online systems should be quicker and more responsive). In the future (in no particular order) he sees that identifying opportunities for the use of ITS, integrating diversified technologies and the information systems long range plan would become more important. Reasons for the identification of these priority concerns as performance indicators include: user acceptance and support (user friendliness) is a fundamental part of the business; projects must be within budget; requirements for fast track development with a very short time frame so that applications are still relevant as well as applicable to business.

Respondent 2 stated that aligning ITS with business strategy (ongoing due to business

changes), ITS project management and implementation and coping with new information technologies, all needed to be done successfully and were equally important. On a lesser note (in no particular order) were internal organisation of the ITS function (completed in the last 12 months), integration of diversified technologies (work in progress due to diverse ITS platforms), organisational impacts of information technology (redefinition of systems history, cost justification of spending on ITS projects (important to Information Technology Steering Committee), user involvement (user ownership policies) and more effective information systems/technology development (DB2 and IEF uses).

Respondent 3 stated that: aligning ITS with business strategy; coping with new information technologies; integration of diversified technologies; organisational impacts of information technology; internal organisation of the ITS function; development and management of EUC; information systems management; location of the ITS function in the organisational structure; ITS security; and data management and control all needed to be done successfully and were equally important due to the current state of the organisation. He also saw that aligning ITS with business strategy would be of ongoing importance with relations between ITS and user departments, user involvement and budget constraints of ITS emerging in the future as the technology becomes more settled and there is a need to exhibit savings.

D.6 Case Organisation 6

This section of appendix D describes individual subjective case accounts for Organisation 6.

D.6.1 STRATEGY Subjective Responses

Respondents were asked to discuss their thoughts on the *ITS Manager's role* both within the ITS department and also within the organisation in general.

Respondent 1 feels that the ITS manager should be currently focussed between internal ITS issues and business issues (3 on the 1-5 scale). At the moment this organisation is attempting to cope with how to charge back applications and infrastructure use while at the same time moving to an open systems architecture primarily utilising TCP/IP while staying GOSIP compliant. Current users of the systems are driving the move to the new platforms while also trying to save money. As this is occurring there is also a strong move to PC based platforms, therefore indicating that end users need a stronger applications focus. There is some interaction with legacy systems to maintain this application focus however this is limited due to technical constraints. This organisation has spent a lot of time with vendors attempting to derive interoperable solutions for user transparency across platforms. Portability, issues and strategies must be derived that allow legacy systems to still play a role. Electronic lodgement and dissemination of information are currently being evaluated. In the future this respondent cannot see any change in this focus for the IS manager as he/she attempts to find the cost effective use of open systems architecture in the organisation to achieve business aims.

Respondent 2 stated that a client business focus was important for the ITS manager now (5 on the 1-5 scale) and that a more strategic ITS needs focus would be important for the future (4 on the 1-5 scale).

Respondents were asked to *position ITS applications* on the McFarlan & McKenny (1983) strategic grid.

Respondent 1 feels that many applications are factory/support with some in turnaround mode to a strategic focus. This organisation has a complex mainframe environment with some 250 core applications. There is a need for a secure applications environment and specialist operating systems utilities i.e. accounting capabilities for charge-back. Through all of this there needs to be a better recognition throughout the organisation of the strategic value of applications as a result of applications development. This respondent sees a conflict in the recognition and perception of this value between individuals (users) versus the organisation as a whole (ITS area).

Respondent 2 feels that ITS applications are primarily strategic with a large support role (with large volumes being handled in a turnaround mode). He stated that this would not change in the future.

Respondents were then asked to describe the *open systems architecture business objectives* for their organisation.

Respondent 1 stated that reducing business costs was important now and in the future while more efficient communications with customers and clients was a focus for the future. He stated that there would need to be a rethink of business processes for the future and that the client/server focus would become more important as time goes on.

Respondent 2 stated that product quality improvement or control (open systems architecture allows the use of a range of tools over a range of platforms to client base e.g SAS insight for online data analyis), minimising technology costs (costs are a big influence), reducing business costs and reducing the time to market (driven by business needs to supply data) were all important business objective now and in the future.

D.6.2 STRUCTURE Subjective Responses

Respondents within this case discussed the *ITS department structure* required to move to an open systems architecture.

Respondent 1 feels that the technical support and infrastructure area should focus on the impact of moving to an open systems architecture and that the research and development area (technical area) should be having ongoing talks with all vendors about open systems architecture pressures within the organisation. This respondent states that the applications development areas should not be involved in this as they are close to users/clients and their views might/should be aligned here. In the future the applications development area will be more heavily involved with the technical infrastructure and research and development areas as dissemination and lodgement of information becomes a more important area of focus.

Respondent 2 stated that currently the ITS area was a bureau affected by general technical changes and constant re-skilling efforts. In the future there would still be and impact but this would be managed (see notes on skills and training needs).

Respondents were then asked to describe the *open systems architecture technical objectives* for their organisation.

Respondent 1 stated that interoperability between applications, computer aided software engineering (CASE), object oriented programming and end user systems development were important both now and in the future. He stated that EDI with customers and suppliers would become important as there was a wider application of the use of electronic communications.

Respondent 2 felt that data interchange between applications, interoperability between applications, EDI with customers, systems based on new technology standards, client server applications (right way to develop systems), image processing and a coherent ITS infrastructure were all important factors now while database redesign (due to the age of systems and OO technologies) and object oriented programming would become more important in the future.

D.6.3 SYSTEMS Subjective Responses

Respondents were asked to give their *definitions of an open systems architecture* prior to answering questions about technical and business objectives.

Respondent 1 did not give a definition of an open systems architecture.

Respondent 2 stated that he felt that an open systems architecture was an architecture that was not vendor specific, not size specific with user transparency enabling uniform client access. He felt that this would not change in the future.

The state of the ITS *architecture and infrastructure* at the time of the interviews was outlined at length and the following information technology was identified as core to the move to an open systems architecture.

Respondent 1 described the ITS architecture and infrastructure as being: *operating systems* including MS-DOS, MVS (MSP Fujitsu), OS2, UNIX and some Macintosh systems; *GUIs* Microsoft Windows (standard) with a movement towards NT; *networking* technologies that encompass OSI (some elements), FNA (Fujitsu), TCP/IP, X.25, Token Ring & Ethernet (LAN standard); *databases (relational)* which were predominately Oracle and ADABAS (mainframe) and SAS. *Open systems frameworks* that were used were GOSIP compliant as well as TCP/IP based. This respondent felt that the technology base would not change in the immediate future.

Respondent 2 did not comment on architectural components.

D.6.4 STAFF Subjective Responses

Respondents within this case discussed the *positions/impacted* by the move to an open systems architecture.

There was no comment by *Respondent 1 or 2* regarding this question, however, both felt that comments on skills and training indicated the type of likely change that would take place in positions within the area.

D.6.5 STYLE Subjective Responses

Respondents were asked what *qualities an ITS manager should have* for successful implementation of an open systems architecture.

Respondent 1 feels that an ITS leader should be a visionary and it is the role of his area to see how his area (Computer Services Division) can support this though the provision of strong technical leadership and by keeping up to date with technological trends.

Respondent 2 stated that learning about the client's business and creating and ITS vision and selling it were both important now and in the future and providing both of these issues were addressed by the ITS leader then everything else would fall into place.

D.6.6 SKILLS Subjective Responses

Respondents within this case discussed *the ITS skill requirements for a successful move to an open systems architecture.*

Respondent 1 stated that systems building (applications) skills were very important in the area of new technologies, interfaces, applications impact on networks, client server technologies. He also felt that infrastructure skills in the areas of new technologies, network management and integration and use of open systems architecture tools were important. He feels that there will be a change of the general user population from within the organisation to the general public as electronic dissemination and lodgement of information become more important.

Respondent 2 felt that technical skills (languages, environments – Lotus Notes, Windows, Unix etc), managerial skills (people skills with a client focus) and business corporate understanding (flexible processes that are appropriate and project based) were important both now and in the future.

Respondents within this case discussed *the ITS education/training needs* for a successful move to an open systems architecture.

Respondent 1 feels that the charge-back of IS facilities is necessitating his area to step out of the traditional ITS role to one of a technical perspective to the business. Consulting approaches as well as those that enable the leverage of technology for effective resource ($) use are now important. Also high on the list are better communications skills and an understanding of the business as well as client interaction skills.

Respondent 2 stated that ongoing staff development, the availability of appropriate training and targeted training to facilitate change were of critical importance. He felt that training should take the form of courses, self paced training, computer based training (1/2 day courses), video and multimedia and work-based training (use of a tool on a small project). He stated that project roles would become more competency based.

D.6.7 SUPERORDINATE GOALS Subjective Responses

Respondents were asked what were the main priority concerns to be addressed in the successful move to an open systems architecture.

Respondent 1 feels that integrating diverse technologies (more of a challenge in the future, to keep vendors on the straight and narrow), aligning ITS with business strategy, development and management of end user computing (this will grow positively the more that this adds value to the organisation and so this will become a challenge to ensure correct management and adherence to a corporate vision), ITS security (outside impacts of lodgement and dissemination continue to be a challenge as statistical data and corporate knowledge and expertise move from a paper based to electronic format) and data management and control (complex due to changes in the organisational internal environment and the nature of doing business takes and enormous effort) are all important both now and in the future. This is because of the difficult technical problem solving environment where different skills are required ("backroom boys" are no longer required) as there is a need to communicate directly with clients. A more complex and greater understanding is needed for organisational operations and applications interaction. This highlights the need for proactive opportunity seeking.

Respondent 2 stated that integrating diversified technologies (use of a wide range of technology with a lot of legacy integration – while new technologies for data capture e.g. EDI imaging OCR would mean it would not matter in the future) and coping with new information technologies (staff development and skills) was important now. ITS staff resources (always and issue – too many or too few estimates), ITS security (integration of open systems architecture has major security problems as well as the push by outside clients for internet access), and data management and control (data holdings always increase due to business along with access management issues) were important both now and in the future. Development and management of end user computing would be critical in the future.

Please see print copy for the next 6 pages

APPENDIX E

FORMAL STANDARDS GROUPS & DEFINITIONS

From: Australian Government Guide to Open Systems – June 1993

FORMAL STANDARDS GROUPS

CCITT: Comite Consultatif International de Telegraphie et Telephonie

An international organisation, the CCITT is part of the International Telecommunications Union, which is a United Nations treaty organisation formed in 1865. It is now a specialised agency of the United Nations.

The CCITT's primary mission is to develop standards supporting the international interconnection and interoperability of telecommunications networks at interfaces with end-user systems, carriers, information and enhanced-service providers, and customer premises equipment.

CEN/CENELEC/CEPT

The Comite Europeen de Normalisation (CEN), Comite Europeen de Normalisation Electrotechnique (CENELEC), and the European Committee for Post and Telecommunications Administration are European regional standards committees responsible for developing and publishing European standards. CEN is an association of EC (European Community) and EFTA (European Free Trade Association) members. It is active in making members' standards into ISO standards and European standards. CENELEC is the counterpart of CEN that deals exclusively with electrotechnical matters. CEPT is the CEN counterpart that deals with telecommunications matters.

IEC: International Electrotechnical Commission

The International Electrotechnical Committee is the equivalent of ISO, but for electrotechnical standards. ISO and the IEC have converged many of their information technology efforts to form JTC1.

ISO: International Organisation for Standardisation

ISO has the task of developing international standards, excluding standards for electrotechnical matters which is the responsibility of IEC.

Standards Australia

Standards Australia is recognised by the Federal Government as the peak standards writing body in Australia. It is as independent not-for-profit organisation whose primary role is to prepare, publish and maintain Australian standards through a process of consultation and consensus in which all interested parties are invited to participate.

Standards Australia has close links with major overseas standards bodies. Whenever possible it aligns Australian standards with international standards from either of the two international standards-writing organisations, the International Organisation for Standardisation (ISO) or the International Electrotechnical Commission (IEC). It maintains strong links with Standards New Zealand and the two organisations now have a formal agreement on publishing joint standards.

Other Formal Standards Organisations

ECMA: European Computer Manufacturers Association

Established in 1961 to develop data processing standards, ECMA is a trade organisation, open to any computer firm developing, manufacturing, or selling in Europe. The ECMA has about 20 members, and approximately 13 active Technical Committees. ECMA contributes to the ISO standards development efforts, in addition to issuing its own standards.

IEEE: Institute of Electrical and Electronic Engineers

The IEEE is a professional scientific, engineering, and educational society that develops and publishes standards and specifications in a variety of computer and engineering areas. The standards and specifications published are of three types: true standards, recommended practices, and guides.

NIST: National Institute of Standards and Technology

The National Institute of Standards and Technology (formerly the National Bureau of Standards), within the U.S. Department of Commerce, is a major driving force behind standards development. The Institute for Computer Sciences and Technology, within the NIST, develops and publishes Federal Information Processing Standards (FIPS) for the United States. Federal agencies use these in their computer equipment procurements.

NIST develops test methods and performance measures to help users and vendors implement standards and to test the conformance of vendor implementations to FIPS specifications.

Besides defining standards, the NIST has defined an Application Portability Profile (APP), which comprises a series of nonmandatory specifications and a guide for U.S. Government users to use in developing a portable, interoperable architecture and environment.

For further information contact the National Institute of Standards and Technology, Gaithersburg, MD 20899, Telephone: 301 975 2000.

T1

T1, established in 1984, is an ANSI-accredited standards body that is developing standards and technical reports. The standards and reports are intended to support interconnection and interoperability of telecommunications networks at interfaces with end-user systems, carriers, information and enhanced-service providers, and customer premises equipment.

X3

X3, established in 1961, is an ANSI-accredited standards body that develops computer, information processing, and office systems standards. X3 also participates in the development of international standards in these areas. In addition, it serves as a Technical Advisory Group (TAG) to ANSI for most of the subcommittees working on international standardisation projects within FTC1.

STANDARDS RELATED ORGANISATIONS

The following organisations are active in either promoting, implementing or reviewing information technology standards.

AIIA: Australian Information Industry Association

The Australian Information Industry Association (AIIA) is the major national organisation in Australia representing local and international companies involved in the development, production and distribution of computer and telecommunications hardware, software and services. The mission of the AIIA is "to be the Voice of the Industry".

AOW: Asia/Oceania Workshop

AOW is one of the three ISO workshops set up around the world, responsible for generation of profiles using published ISO standards in the ISO 7-layer model area. (The other workshops are EWOS and OIW.)

It consists of a number of Special Interest Groups (SIGs) and member countries come from the Asia-Pacific basin, including Australia.

COS: Corporation for Open Systems

COS is a U.S.-based, international, nonprofit association of vendors and users, formed in 1985 to promote and accelerate the adoption of interoperable, multivendor products and services based on OSI and ISDN standards. To accomplish its goals, COS provides a user-vendor forum for the statement of user requirements and the discussion and management of the issues surrounding the deployment of open systems. COS also identifies test requirements, and sponsors test tools development and conformance and interoperability testing to verify that computer products and services conform to OSI or ISDN standards.

ESPRIT (European Strategic Programme for Research and Development in Information Technology)

The European Strategic Programme for Research and development in Information Technology is a European research programme initiative, started in 1982 and sponsored by the Commission of the European Communities.

EWOS: European Workshop for Open Systems

The EWOS is an ongoing regional workshop, formed in 1987, to provide and coordinate European input to the international standard profiles process. It was formed as the result of an initiative of SPAG, in conjunction with CEN/ CENELEC.

INTAP (Interoperability Technology Association for Information Processing)

The Interoperability Technology Association for Information Processing, in Japan, is a national agency, funded by MITI. It deals with information

technology, and specifically OSI products and advanced projects.

MAP/TOP User Group: (Manufacturing Automation Protocol and Technical and Office Protocol)

The MAP Task Force was formed in 1980 to identify a common OSI-based networking standard for plant-floor systems. Its specifications are known as Manufacturing Automation Protocol (MAP). The MAP specifications mostly reference OSI standards, but they also draw on ANSI, IEEE, EIA, CCITT, and various industry standards.

In 1985, Boeing sponsored a similar effort to specify common networking protocols, known as the Technical and Office Protocols (TOP), for the engineering and business offices. TOP is largely compatible with MAP, differing only at the lower two layers and the application layer where TOP addresses requirements of the technical and office user, rather than factory users.

OIW: Open System Environment Implementors Workshop

OIW is an expansion of the OSI Implementors Workshop, also known as OIW. Because the requirements of distributed, multivendor systems goes well beyond OSI networking, the OIW has an expanded scope which encompasses the entire Open System environment. The OIW addresses the common applications development environment on multiple vendors' systems, in addition to OSI-based interoperability among multiple vendors' systems.

OMG: Object Management Group

OMG is an international organisation of systems vendors, software developers and users, founded to promote the theory and practice of object management technology in the development of software.

OSF: Open Software Foundation

The Open Software Foundation is a nonprofit, international vendor organisation. Formed in 1988 by nine sponsoring computer manufacturers, its goals are to develop specifications for an open computing environment, develop software based on the specifications, and sponsor research and develop in open systems.

OSIcom

OSIcom is a group of product and service providers united by a commitment to the implementation of OSI standards and the enhancement of Australian industry capability in this area.

OSIcom aims to provide an OSI interoperability demonstration capability, provide advice and guidance on OSI related matters, act as a focal point for Australian liaison with similar bodies overseas and raise Australian skill levels in OSI within the vendor and user communities.

SPAG: Standards Promotion and Application Group

The Standards Promotion and Application Group (SPAG), founded in 1983, is a nonprofit, international research and development consortium of about 65 information technology manufacturers and users. In 1986, it became a company registered under Belgian law as SPAG Services s.a. SPAG's goals are to promote multivendor, interoperable products based on international standards, particularly OSI, and to keep its members informed about the latest developments in functional standards and conformance testing of products.

SQL Access Group

The SQL Access Group is a vendor group formed by a number of people in the ISO Remote Data Access (RDA) Group. The Group is chartered to define a common subset of SQL functions to get around the many SQLs that exist, to accelerate the work of the RDA group, and to work on putting more distributed functionality into RDA.

UNIX International

UNIX International (UI) is a nonprofit industry association responsible for directing the evolution of the open system environment based on System V UNIX from AT&T. This version of the operating system is sold by several suppliers, under licence from AT&T.

X/Open

X/Open is an independent, nonprofit, consortium formed in 1984 to determine user and market requirements and to specify a complete, source-level-portable application environment and test suites. Although its members were initially vendors, X/Open's membership now encompasses users, system integrators, value-added resellers, government agencies worldwide, other industry-standards groups, and academic and research institutions.

OPEN DISTRIBUTED PROCESSING

The objective of Open Distributed Processing (ODP) is to enable distributed computing systems to interwork seamlessly, despite heterogeneity in equipment, operating systems, networks, languages, data base models, or management authorities. An ODP system must supply the mechanisms which mask underlying heterogeneity from users and applications.

Under ISO's work item on ODP, mechanisms for the communication and coordination of distributed information within an organisation will be specified in a set of ODP standards. The main focus is in terms of the specification of a basic Reference Model for Open Distributed Processing (RM-ODP), which will provide a framework for the definition of new standards and for the use of existing standards eg. OSI, to achieve Open Distributed Processing.

The Basic Reference Model specifies the architecture, common functionality, concepts and terminology of ODP. It provides a technical framework of abstraction for the positioning, description and understanding the structure of distributed information systems. RM-ODP creates an architecture for information processing systems, within which hardware and software components:

- may be heterogeneous;
- are capable of operating concurrently and/or in parallel;
- can be physically and/or logically distributed;
- are portable, both statically and dynamically;
- are capable of interworking with one another; and
- are capable of being configured dynamically.

The ISO and CCITT are currently jointly developing the Open Distributed Processing standards for distributed computing. Australia is the Secretariat and Convenor of the ISO ODP Working Group and the key focus is on standardising the ODP Architecture and interfaces in order to allow integration of heterogeneous and reusable distributed computing components into a coherent system.

The ODP architecture is object oriented. It defines a standardised framework to support the development, distribution, interoperation and portation of applications across disparate systems. It also identifies where ODP component standards are needed and their relationship, and defines tools for the specifications of ODP standards. The ODP Architecture standards (two) parts are under ISO draft ballot and are expected to reach Draft International Standards (DIS) status by end 1993 or early 1994 and full ISO status by early 1995.

Some existing distributed computing components already provide some aspects of the ODP functional components. Where this exists, the ODP architecture will position components in a standardised framework, prescribing the necessary

standardised Application Programming Interface (Object Interface) for component interoperation, eg Object Request Broker. There are many other ODP components that have not yet been standardised nor developed, eg ODP Trader, which is currently being standardised under ISO/CCITT concurrently with the ODP Architecture.

Further information on ODP may be obtained from Standards Australia.