
8.7.6. BENEFITS IDENTIFICATION

A detailed benefits case for implementing a collaboration suite is very hard to develop – although elements of it can be quantified and estimated (see below). As widely-available market offerings, the benefits derived depend much more on the extent to which the product is ultimately used – and less on price and product features. Before attempting any quantification of benefits elements, the Group identified the main qualitative drivers that would help ensure a return on investment for a collaboration platform. The main drivers identified were:

- Minimum (ideally zero!) cost
- Full and widespread use of the system by sector employees so that increases in personal and group productivity result. This will require:
 - Easy to use, simple user-interfaces to encourage widespread use of the platform
 - Appropriate training (continual, not just one-off)
 - Change management to encourage use of the collaboration tools
 - Policies and procedures to force use for certain workflows (e.g. all meetings and meeting facilities can only be booked through the collaboration platform)
 - Communication of the benefits of use – with practical examples
- Security – since all users must know the system is secure

In effect, these drivers are critical risk factors that must be mitigated to ensure a return on investment.

8.7.7. VOICE OVER INTERNET PROTOCOL (VOIP)

VoIP uses internet technology to merge and integrate the data network with the voice network. It provides free voice communication for everyone that is connected to the same Wide Area Network. This has the potential to completely eliminate the need for landline based telecommunications voice networks (at this point in time mobile VoIP solutions have only very limited availability). VoIP can be integrated with other messaging platforms such as email and instant messaging; thus providing a better communication network VoIPs major advantage is in reducing international call costs. However special phone sets are required and at this stage of the technology they are still expensive. The two major providers of VoIP are Avaya and Cisco - both provide similar capabilities and are very comparable.

The Group discussed the merits and costs of implementing VoIP in the water sector. Analysis of annual phone bills (see the business case in Volume II) did not give a clear business case for implementing VoIP. The high costs of VoIP handsets and the relatively limited international calling within the sector does not support a business case for VoIP. The Group discussed whether a phased implementation might enable a stronger business case, but the high initial fixed costs still make this doubtful. Ms. Ruba Kajo, our MoICT representative was not aware of any plans to explore VoIP across the Jordanian public sector. VoIP was not considered further but should be re-visited when the ITMP is updated in 3-5 years time, as handset prices will have reduced substantially by then.

8.7.8. EVALUATION OF AVAILABLE COLLABORATION PLATFORM SOLUTION OPTIONS

The Group examined three different proprietary and well known collaboration platforms:

- IBM Workplace – which includes as its email and groupware platform Lotus Notes/Domino
- MS Sharepoint⁴⁴ – which uses the Outlook Exchange platform

⁴⁴ Note that WAJ has been actively exploring use of the Sharepoint platform.

- Oracle Collaboration Suite⁴⁵

The market is overwhelmingly dominated by the first two products – with the market analyst IDC estimating MS in late 2005 as having about a 50% share, and Lotus a 40% share. Oracle’s share at that time was 0.3% but this may have increased somewhat following a new release of their product and cheap introductory pricing. However the MS and IBM products still dominate the market by far. A number of open-source applications are also coming into wider use and these should be re-examined during formal systems selection for their potential use.

Broadly speaking the three major market offerings provide very similar functionality – with email, calendar and contact tools as well as groupware, document sharing and web conferencing. Lotus Notes with its additional groupware, web server, database, developer and programming capabilities will require a more technically able IT support. For e-Forms and work flow, the IBM and MS products are competitive and fully cover the business needs. However, Microsoft uses third party products to close the business cycle while IBM provides a total solution. The security features of the IBM product are also considered somewhat stronger.

Against that technical advantage, a high weighting should be given to price when selecting commodity software (as opposed to specialist systems like asset and maintenance management where technical functionality varies much more). Both the Microsoft and Oracle solutions are covered by MoICT national pricing agreements. While the limited market presence of the latter raises questions over its suitability, pricing is likely to be a significant advantage for the MS product.

Demonstrations of both the MS and IBM solutions were arranged by the Groups. However, the Group was unable to agree on the relative merits of the two products and recommends that normal best practice of a formal systems selection be followed.

Note that MoICT’s Collaboration suite is based around MS Sharepoint and also uses some third party plug-ins. At present there is no comprehensive collaboration suite in operation at MoICT. Collaboration features will be included in the proposed GRP initiative.

8.7.9. COSTING

Total Cost

Our total cost estimate includes the portal engine with all the required collaboration features, perpetual licenses for email, and improvements to email infrastructure and hardware. The e-Form generator is part of the portal engine in the Sharepoint software purchased last year by WAJ but not yet implemented. Additional software will need to be purchased to act as middleware between the client and the server. After inclusion of other costs such as hardware costs for the self-service terminals and 3 years support and maintenance, the total cost of the Collaboration initiative is around \$190,000.

8.7.10. BUSINESS CASE

For illustrative purposes, a business case for a paperless office is included in Volume II. Savings in paper and toner are examined as well as savings in personnel time. Note that the latter only has value if staffing levels are reduced accordingly (likely through attrition) or redeployed to more productive duties.

⁴⁵ Note that the Oracle Collaboration Suite is a standalone product that is distinct from some of the collaboration features already included in the Oracle e-Business Suite (mainly workflow modeling and workflow engine to model, optimize and manage the business processes covered by the Oracle e-Business Suite modules themselves).

8.7.11. RISK FACTORS AND THEIR MITIGATION

Even though the total investment here is small, achievement of a return is still a priority – even moreso given its high sector visibility. The key risk factors are described below.

Ensuring Return on Investment

Clearly if the collaboration platform is implemented and very few staff use it, the benefits will be very small. It is therefore important to develop use cases that can be easily adopted and their benefits readily understood and communicated across the sector. A phased “middle-out” implementation is recommended – starting with the new HQIT organization, reaching out to IT departments in the Operating Utilities, then extending to middle and senior management in the Headquarters Organizations, followed finally by wider deployment to lower levels of staff for self-service e-Forms use. Benefits of implementation should be broadly communicated as they accrue and examples of specific success stories publicized in each functionality area.

Strengthening Computer Skills

Not all potential users have even the basic computer skills needed to take full advantage of the collaboration suite functionality. In some cases, this means more senior staff as well as more junior staff. This is quite typical in many organizations. Often the initial solution for senior staff is providing them with a dedicated and fully computer-literate secretary. Over time though, senior staff usage will increase naturally. For junior staff, a number of basic computer literacy courses are available which could be offered by the Training Department as indeed some already are. Self-service terminals should be designed to require little or no computer skills.

Deployment for Cost-Effective Access

In an ideal world, almost all sector staff would have access to the collaboration tools. In practice this is unrealistic and appropriate and cost-effective strategies to deliver access must be developed. Most professional and professional support staff already have desktop access so deployment to the user group that can extract the largest benefits is straightforward. As stated above, self-service terminals located strategically within the Headquarters building and Operating Utilities headquarters can readily extend access to more junior staff for e-Forms access.

Importance of Proactive Coordination with MoICT

Continuous and upwardly proactive coordination with MoICT is recommended on the collaboration suite. As MoICT plans unfold, there are likely to be opportunities to either leverage new initiatives or learn from their experiences and someone within the new HQIT should be expressly responsible for such coordination.

8.7.12. TIMING OF IMPLEMENTATION

Implementation of the collaboration suite is one of the earliest ITMP components. This is because of the need for the new HQIT to begin to immediately leverage its potential, and because of the broad reach of its benefits. Development of detailed functional specifications, systems selection, and program management of implementation here is also relatively straightforward – so this implementation will provide an ideal proving ground for HQIT to hone its new program management skills.

HQIT will however have to give careful thought to, and prepare detailed plans for, use cases and deployment strategies to ensure a return on investment. HQIT will be accountable for achieving that return – so indicators and monitoring processes (in this case largely input based) will need to be included in the planning. HQIT will also need to take on the communications role to broaden awareness of the suite and its impacts on sector productivity, and provide technical training to those who specifically require it.

8.7.13. USAID'S POTENTIAL ROLE

USAID's support of this initiative is low-cost, low-risk, easily contracted locally, and potentially high return if appropriate monitoring and check points are designed into the implementation. The technical assistance to the new HQIT organization will enable support and oversight of the selection and implementation process.

8.8. Infrastructure, E-readiness and E-Government

8.8.1. EXECUTIVE SUMMARY OF WORKGROUP RECOMMENDATIONS

Infrastructure investments usually follow systems investments that are defined by real business needs – since they enable the systems investments to be deployed. With the increasing move to web-enabled applications (even in the case of in-house developed specialist systems), network infrastructure and its management will become more important to the sector.

Generally, the backbone IT infrastructure of the sector is adequate for current and future needs and bandwidth can easily be expanded as required under operating budgets. Longer term there may also be an opportunity to leverage the MoICT's fiber optics infrastructure investment under the Ministry of Education's Jordan Education Initiative.

In the short-term however, there are some specific upgrades to the headquarters LAN that need to be completed to support future expansion and improve sustainability and performance. A comprehensive program of LAN/WAN and associated hardware upgrades covering remote locations was also defined – with the improved connectivity being a key enabler of the supply-chain benefits discussed above, as well as making backbone systems and collaboration tools available across all sector sites. There are also significant opportunities across the sector to standardize and better utilize hardware investments.

Additional funding requests from NGWA – primarily for additional hardware in the Regional Offices, support for hand-held meter readers, and implementation of a NGWA call center – were received after the formal closure of the Working Group process. These estimates were developed with input from the Severn-Trent management consultant with the aim of improving customer service, increasing cash collections, and reducing collections costs. While detailed due diligence on the need for, and costing of, these requirements could not be completed within the ITMP timeline, the incremental requirements have been added to the ITMP costing. They should however be reviewed in detail by HQIT before any procurement is initiated – and such review should include possible duplication with infrastructure upgrades carried out under the GMED and BMFO projects.

In addition, requirements for appropriately scaled and scoped but essential investments in both Infrastructure Management Tools and Application Lifecycle Management Tools are discussed.

Finally, e-Government initiatives, and their relevance to the ITMP, are also discussed in this section.

8.8.2. AS-IS IT INFRASTRUCTURE

Backbone Communications Infrastructure - WAN

The existing communications backbone for the water sector is built over widely-used frame relay technology provided by Batelco, a local telecoms and internet services provider. This is a blind network that functions as a packet transmitter providing a secure and reliable Wide Area Network. Frame relay is one of the most cost effective WAN designs for data transmission for intermittent traffic between local LANs and between end-points in a WAN.

Frame relay puts data in variable-size units called "frames" and leaves any necessary error-correction up to the end-points. This speeds up overall data transmission. For most services, the network provides a permanent virtual circuit (PVC), which means that the customer sees a continuous, dedicated connection without having to pay for a full-time leased line, while the service-provider figures out the route each frame travels to its destination and can charge based on usage. Frame relay is not generally suitable for voice or video data transmission.

Frame relay networking is fully scalable depending on the ISP capabilities. When more bandwidth is needed, the ISP will increase the bandwidth limit. It is simple process that does not require any major new capital investment in backbone infrastructure, and is met instead from operating budgets.

Remote Site LAN/WAN connectivity

A number of remote sites exist across the sector (see Volume II for a full list by site type). They include Area Directorates or Regional Offices, other Customer Service locations, Central Labs, Remote Stores, Workshops, Treatment Plants, JVA Stage Offices, Dams and major Pumping Stations. The importance of LAN/WAN connectivity at these sites depends on the type of business processes carried out there, and the volume and frequency of data transfers to and from the site.

Many of these remote sites are connected to the sector's WAN through the backbone frame relay system. While most of these sites also have the hardware to connect to the WAN, many of the connection have not actually been activated, apparently because of breakdown of management communications. (It is not uncommon in parts of the sector to have a surplus of unused hardware – this issue should be eliminated completely under the new HQIT initiative). Most of the remote offices also have at least a primitive LAN, but this may have been installed by a semi-IT-technical individual such as a mechanical engineer who happens to work at that remote location. As a result, at these locations, the number of LAN outlets may be inadequate, outdated and non-standard technology is in use, speed may be inadequate, security (both physical and network access) and data backup procedures are weak, and a variety of different communications protocols may be in use. A small number of remote locations have no LAN, or they have a LAN but either no WAN connection or just a dial up line.

Most of the remote locations do not have a proper server room or cabinet, and proper design and operating documentation is often missing. The LANs operate as isolated islands and do not communicate with each other. Remote locations will also need basic Infrastructure Management Tools (IMTs). While these could be provided centrally, the Operating Utilities may choose to deploy their own solutions.

Finally there is a serious shortage of qualified staff in remote locations. Most of the work is done manually and applications if present at all are very basic. There is little or no integration of remote applications with centralized systems (even between remote stores and the Oracle e-Business Suite INV module. WIS seems to have most coverage in the sector, but no real time integration is present.

Desktop Computers

In general the sector has up to date desktop computers. Most of the new desktops are located at the center and at the independent Operating Utilities. A total of some 800 desktop computers are deployed across a sector with some 8,600 permanent staff. The sector has a wide range of desktop computers distributed as follows:

The sector has a wide range of desktop computers distributed approximately as follows:

- Pentium IVs account for 80% of Headquarters machines and 70% of Operating Utilities machines but only 15% of remote WAJ and JVA sites
- Pentium III's account for 10% of Headquarters, 20% of Operating Utilities, and 30% of remote office machines
- Older machines make up the remainder in each case – meaning 55% of remote office machines are older than Pentium IIIs

Over time, newer desktops do find their way to the remote sites as brand new ones replace them elsewhere.

There is no standardization in terms of the software being run and many computers are not running basic utilities like anti-virus or firewall software.

Servers

WAJ has the most up-to-date and consolidated servers as they have recently acquired blade servers (multiple servers housed in one chassis with dedicated management systems and power supplies). The WAJ blades are installed, but only 2 out of 11 servers are activated. Proper utilization of the new blade servers can be ensured by the new HQIT – this would save the sector a significant investment in servers as the blade servers are very powerful and leading edge.

Generally however, the sector is running on much older servers, even at the Operating Utilities. More than 50% of the servers are more than 2 years old. The server network for the sector will need a major upgrade under the ITMP because we will be deploying new and demanding applications. Server upgrades should generally be determined at the time of application implementation but in the meantime there is certainly an advantage to standardizing and consolidating server types. The number of types has multiplied because of GoJ procurement regulations emphasizing least cost. Procurement under the ITMP can therefore focus on standardization as well as cost.

MWI is currently using old desktops as servers – this needs to be rectified quickly and the servers consolidated. Such consolidation would save the sector money and help to create a network that is stable, fully scalable and highly available.

Infrastructure Management Tools

Infrastructure management tools support a wide variety of systems functions – from monitoring the operation and performance of networks, servers and other hardware, allowing IT administrators to manage the systems configuration (e.g. for security reasons), to deployment of software. Other tools support IT asset management and help desk support.

Currently, the sector's infrastructure management is purely reactive. Network managers are constantly fighting fires and have very limited tools and resources to anticipate and troubleshoot problems. The sector has acquired the basic Network Node Management module from HP's OpenView infrastructure management suite. However the module has not been fully activated and the training provided during implementation was inadequate. It therefore does not add much value at this time – and highlights the issue of choosing solutions appropriate to sector needs and capabilities, and again program managing implementations to ensure training is adequate and real skills transfer occurs.

A very basic help desk system was developed under Lotus Notes. It provided a tool to request technical support and follow up on such requests. The system was developed in association with a USAID funded project "WQICP – Water Quality Improvement and Conservation Project" and deployed sector-wide, but, except in the PMU, has not been utilized since 2000. Its use is limited by the Lotus Notes platform not being Arabized, and by the user-friendliness of some of the screens. Similarly a computer inventory system "Clicknet" was deployed but again has not been used since 2000. This has now been decommissioned due to lack of technical support.

Other

Other points relating to As-Is infrastructure include:

- The sector has a wide array of networking and communication devices – their performance being dependent on the experience of the individual staff using it. At Headquarters Organizations and in the Operating Utilities, where most of the experienced employees are, In the center, there is generally good utilization of infrastructure. In remote locations, equipment has often been deployed but has either not been activated or is no longer in use.
- The sector has also acquired printers, scanners, and hand held devices, and some water meters now use GSM technology for automatic meter reading. Expensive resources such as plotters are scattered throughout the sector. Such devices should be standardized, inventoried, and made more widely available where needed across the sector.

-
- SCADA infrastructure has been deployed in many locations across the kingdom with particular focus on the King Abdullah Canal in the Jordan Valley and in Amman. A comprehensive nation wide SCADA plan is being prepared by the PMU, and HQIT will need to coordinate with this plan.
 - There is no a comprehensive disaster recovery plan – only manual tape backups happening largely independently across the sector.
 - IT human resources vary widely in their skill level. Proper training and knowledge transfer plans have to be established – this will be a major thrust of the new HQIT initiative.

8.8.3. MOICT INFRASTRUCTURE PLANS

As in a number of other areas already discussed, it is important when planning infrastructure upgrades to consider MoICT's plans. The two most important infrastructure initiatives are:

Secure Government Network

The Secure Government Network is a government initiative that will route all government electronic communication through one data center. The project is using Microsoft technology and is expected to fulfill the needs of the whole government within the next two years. Its scope is however limited to Amman.

Communications Infrastructure

As part of the Jordanian Education Initiative, MoICT is connecting over 3,000 schools, learning centers, colleges, and universities across the kingdom through a fiber optic network over 5,000 km in length. This network will be owned and operated by the Ministry of Education. Potentially, negotiating access to this geographically extensive network could save the sector future capital investment in expanding their communications network.

8.8.4. MOICT AND E-GOVERNMENT PLANS

e-Government is a National Program initiated by his Majesty King Abdullah II. The purpose of this program is to enhance the performance of government in terms of service provision, efficiency, accuracy, time and cost effectiveness, transparency, high level of customer satisfaction, cross-Governmental integration, and many more elements related to the style in which the GoJ works and the public's perception of this.

e-Government Portal

MoICT's e-Government unit is designing a government portal that will connect citizens, businesses, and government together. The vision here is that the portal will act as a one stop shop for all government services. A citizen will be able to contact and connect with any government official electronically and transparently in order to settle business with the government. The portal will be supported by a payment gateway that will enable the settlement of financial issues online. The water sector can elect to serve clients directly through the MWI portal or they can connect through the general government portal.

GRP Software

MoF, MoPIC and MoICT are all involved in the planning phase for selecting and implementing a Government Resource Planning (GRP) system. Jordan's Integrated Technology Group (ITG) has already deployed Phase One its GRP solution, WaveGRP™ at the Jordanian Ministry of Tourism & Antiquities. The goal of the GRP system is to connect the financial operations arm of each government office back to the Ministry of Planning. Such an initiative will help create more transparent and efficient government operations. Given that the water sector is already implementing Oracle Financials there will be a need to examine how this system integrates with the planned GRP –

though this is unlikely be a big issue and could potentially be leveraged into the Budget Preparation support needs identified by the Back Office Group.

Other

The e-Government program is also sponsoring a multitude of initiatives to enhance the competitiveness of the Jordanian economy and the IT sector. These include continuous training and rehabilitation of the government workforce and increasing the operational efficiency of the different government offices all over the kingdom.

8.8.5. OPTIMUM IT ARCHITECTURE FOR THE SECTOR

The networking infrastructure architecture provides another essential foundation for the ITMP. Just as the HQIT addresses the human resources and capacity building needed to ensure the success of the ITMP, the network infrastructure is needed to assure maximum access and availability to applications as needed across the sector.

An optimum IT architecture that is proposed is shown in Figure 11 below.

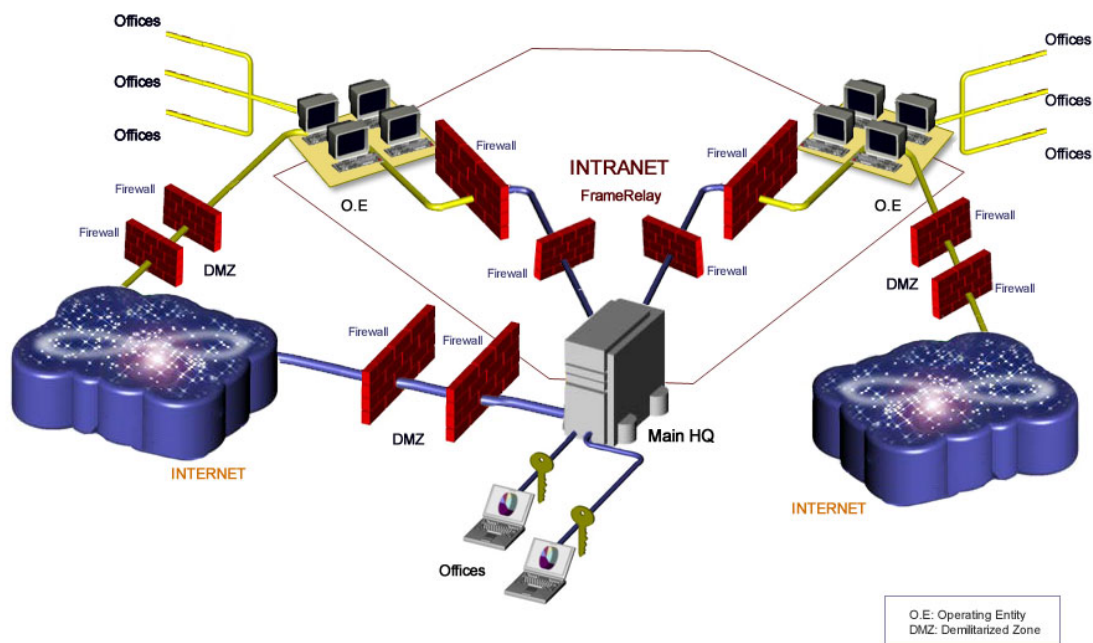


Figure 11 – Proposed Architecture of the sector’s network

The proposed architecture adheres to industry security and quality standards including ISO 17799 and Information Technology Information Library (ITIL). It will continue to be based over a Frame Relay network - but one that now connects all entities together. The secure intranet will allow full integration of all applications and resources in the water sector. The collaboration solution (described in the previous section) will reside on the intranet as will other systems such as EIS.

The proposed architecture will be built to assure high availability of all applications and resources on the network. Single point network failure will be eliminated. The network design will utilize stringent security measures, isolating the intranet from outside dangers such as hackers. The public will not be able to access the sector’s network except in a controlled manner and on specific segments of the network known as demilitarized zones (DMZs).

Hardware and software solutions will be in place to detect and stop intrusion attempts, viruses, spam and any other threat that may affect the network’s performance. Such solutions will be deployed wherever necessary on the network, such as on internet gateways and between the entities and the headquarters.

8.8.6. CRITICAL INFRASTRUCTURE NEEDS

The Group identified four main infrastructure upgrade components. Each one is described below:

Headquarters LAN Upgrade

Additional detail on the As-Is situation at Headquarters is provided first, before describing the upgrades that are required below:

LAN

The Headquarters LAN is currently shared between all entities at the head quarters, and managed by Mahmoud Shloul. The LAN has now reached its full capacity in terms of the number of ports it can support. The network backbone switch that connects all the ports across the two adjacent

Headquarters buildings is a layer 2 switch with a very limited number of ports and limited expandability.

On the plus side, the HQ LAN is interfaced to the internet through a hardware firewall box that provides full protection and servicing including

- Anti Virus
- Anti Spam
- Intrusion detection and prevention
- Packet filtering
- Main relaying

Server Room

The power supplies and backup Uninterruptible Power Supplies (UPSs) for the main server room are not sized or stable enough to adequately sustain the hardware and systems at the Headquarters. Operational conditions for the main server room are also not up to international standards for the following reasons

- Air-conditioning is inadequate for current needs
- Physical security and access rights are weak – there is no controlled access system and the server room is not locked at all times
- Server room floor space is not adequate - parts of the server room are in fact used as staff workspace
- Power and data hookups are substandard and need upgrading
- The server room does not have clear labeling and its configuration is not adequately documented.

Servers

The HQ LAN is managed by two non-clustered mid-range servers with insufficient fault tolerance. Two proxy servers are installed on top of the LAN to control internet access for all entities. One of the servers is a Pentium II desktop with very limited functionality. The front end servers are Pentium IIIs – again with limited fault tolerance. There are two mail servers - one for the sector and one for the PMU. One of these servers is new and the other is a Pentium a PIII. Again the design lacks redundancy. Applications servers support a wide range of applications at the Headquarters. Some of the application servers are Pentium II desktops, while others are premium blade server components.

Improvements Needed

The improvements recommended to the Headquarters LAN are summarized in Table 12 below:

Item	Justification	Remarks
Network outlets	To add new key users to the LAN to improve their productivity and share information and expertise.	
Replacement of the current backbone layer 2 modular switch	To cover the existing needed ports for servers on the backbone, enable future expansion, and support VLANs to improve performance and maintain LAN sustainability through “layer 3 protocols”	The existing switch can be used elsewhere in the sector or traded in.
Upgrade server room	To control servers access and ensure good operational conditions to avoid any faults	
UPS for all Telecomms Cabinets	To provide enough power for communication device to allow data recovery	

Item	Justification	Remarks
Internet speed	To improve the speed of communication with the internet to normally accepted international standards	
Firewall system	To protect the LAN from hackers, viruses, spam, and any other source of intrusion	
Training	To enable local staff to manage the LAN professionally	

Table 12 - HQ LAN Upgrades

The total costs of these upgrades are estimated at \$0.21M.

Implementation Risks

HQIT will install and run the new Headquarters LAN – so there should no risks here.

Remote LAN/WAN upgrades (including associated hardware upgrades)

The As-Is situation here was described in some detail above. The suggested improvements are listed below:

Potential Improvements

- Install standard LANs to normal professional standards where needed – including locations currently running legacy or sub-standard LANs
- Provide WAN connectivity for remote sites where justified by the business needs – this should be a priority for locations that already have the communications hardware installed
- Upgrade servers, server rooms and cabinets and desktop computers as appropriate
- Provide end user training

Estimated Costing

After carrying out an extensive inventory of existing remote site LAN/WAN connectivity and hardware, with very detailed inputs from JVA, NGWA and LEMA in particular, the total estimated cost of required remote site LAN/WAN and associated hardware upgrades is just over \$1.1M.

Justification

The remote site upgrades are justified on the basis of making the collaboration tools and backbone applications available to all sites. In addition, upgrades at remote store locations will be critical to realizing the substantial supply chain benefits identified above in Section 8.3.

Additional hardware requests from NGWA

Additional incremental hardware requests were received from NGWA after the formal closure of the Working Group process. These were developed with input from the Severn Trent management consultant. They have not been subject to detailed due diligence by the Group, but have been included in the overall ITMP cost nevertheless. These requests should be reviewed in detail by HQIT before any procurement is initiated – and such review should include possible duplication with infrastructure upgrades carried out under the GMED and BMFO projects.

Infrastructure Requests

- New file, printer and domain servers in the Regional Offices plus additional PCs and associated peripherals
- Server upgrades at the NGWA HQ office
- Incremental licenses for basic software installs required for the above - including antivirus, firewall and anti-spam
- Installation of a call center at NGWA HQ – plus associated telecoms infrastructure and interfacing to the legacy billing system
- Provision of handheld meter reading units and their interfacing to the legacy billing system

Justification

The remote site upgrades above will significantly improve customer service, increase collections and lower collections costs – in addition, again, to making the collaboration tools and backbone applications available to all sites.

Estimated Costing

NGWA’s cost estimate for this additional infrastructure is \$0.7M.

Infrastructure Management Tools (IMT)

Current Situation

The As-Is situation here was described in some detail above.

Justification

An adequate suite of infrastructure management tools is essential for smooth operation of the LAN, WAN, servers, desktops and communications components in the sector. Such tools enable real-time assessment to enable predictive maintenance in anticipation of network bottlenecks. High availability of systems across the sector is essential – particularly for billing software, email and web services for example. IMTs will also be needed to manage rollout of more systems and systems upgrades across the sector. Deploying the ITMP systems components without proper IMTs could significantly impair their usefulness – especially given that most of the new applications will be web-enabled.

Recommendation

While IMT’s are clearly essential to the sector, we do need to find an appropriate balance between functionality and price and invest wisely as the price tag on such tools can very expensive. IMT suites can range widely in price according to the vendor who makes them and the capabilities provided. cost range for such a solution highly depends on the capabilities of such a system. Prices can range from \$50,000 to \$4M. Without further detailed study, it is difficult to estimate the costs of the requirements here. Independent specialist analysis is probably required to develop such estimates and this could readily be done at implementation. However, the group accepted that an investment of the order of \$300K would be a significant step in the right direction – especially given the plans above to upgrade the network anyway. This would cover all HQIT infrastructure responsibilities – i.e. the Headquarters LAN and the WAN up to the Operating Utility’s firewall. The tools could also be made available to Operating Utilities if preferential licensing could be negotiated.

Application Lifecycle Management Tools (ALM)

Current Situation

Although these tools do not strictly fit under the Infrastructure Group, having robust applications and maintaining their integrity through successive customizations and upgrades is just as important as maintaining network and communications infrastructure performance. This is especially true given that the sector will continue to need in-house developed systems, and these will now need to be routinely integrated with Oracle e-Business Suite modules. Currently the sector has neither standardized procedures nor supporting tools for application lifecycle management.

Justification

In order to bring standard processes, rigor and discipline to all aspects of software development and maintenance, it is important to establish appropriate policies and procedures. This point was made clear in the IT Organization discussion where the importance of referencing international standards was made. ALM tools complement these international standards in the same way that IMT would complement network and infrastructure management policies and procedures. The functionality included in ALM tool suites covers requirements management, configuration management, process and change management and IT project management. The newer tool suites are now also able to support and track Oracle e-Business Suite configuration changes which will be increasingly important also going forward.

Recommendation

An appropriate initial investment in ALM tools is estimated to be around \$150K based on 20 users. Packaged solutions are readily available with low implementation and support costs.

8.8.7. COSTING ASSUMPTIONS

Inclusive of hardware, software, implementation and support costs the total cost of the infrastructure component is estimated at

8.8.8. IMPLEMENTATION RISKS

Implementation Risks

Based on past experiences, the main risks appear to be over-investment and under-use. The establishment of the HQIT and its effective management of both systems specification and selection and implementation and support will be the main way to mitigate this risk. Training in all the skills and tools involved in infrastructure management (and applications management) is an integral part of the HQIT proposal.

Implementation risk is also high in the case of IMT. Implementation should only be done by very highly qualified professionals. A previous attempt to acquire such tools failed because of under qualified installation engineers. To further mitigate risks, the implementation should be phased and rolled out on a modular basis according to prioritized needs. This is fully consistent with a phased investment in such tools.

8.8.9. TIMING OF IMPLEMENTATION

The importance of infrastructure upgrades as a foundation for other ITMP components means that this component is also one of the first to be completed under the plan. The Headquarters LAN upgrade is becoming urgent, and the remote site LAN/WAN upgrades are fundamental to extending the reach of applications and in particular realizing some of the benefits identified in the supply chain area. Similarly early embedding of both IMT and ALM tools will support the development of the foundation policies and procedures needed by the new HQIT. Lastly, with the exception of the IMT, infrastructure upgrades are generally straightforward and the program management burden on the

HQIT in its early post-consolidation days will still be manageable.

8.8.10. POTENTIAL USAID INPUTS

USAID's direct involvement in this component is important to facilitate standardization of hardware items that is difficult to achieve under GoJ procurement rules. Procurement could be done in this case under Geographic Source Code 899 which would allow both local and US-based procurement.

9. OTHER IT COMPONENTS NOT INCLUDED IN THE MASTER PLAN

A number of other IT components common in water sector operations were not identified as real priorities in the development of the ITMP, either because they are relatively small investments, require extensive specialist technical or engineering knowledge to develop them, or other projects are already extensively supporting them. The focus of the ITMP is on where to invest to achieve maximum return in absolute JD terms.

Specific areas that were not developed include GIS, SCADA, Laboratory Information Management Systems (LIMS) and hydraulic and network modeling tools. A SCADA master plan for WAJ is under development by the PMU funded by the EU, and the extensive SCADA systems for JVA's management of the King Abdullah Canal are performing well though require some hardware upgrades which have been included in the ITMP Infrastructure component.

Hydraulic and network modeling tools are generally used by outside consultants for specific engineering studies. While some internal capacity to use these tools already exists and could be extended, the investments required are small and require specialist inputs that were not available to the project team.

The LIMS is a critical system for ensuring water quality and compliance with environmental standards across the sector (especially following centralization of the labs). The current system was supplied by Applied Bio Systems, a leading vendor of LIMS systems. It was implemented in 2001/2002 and uses an Oracle database. There appear still to be bugs and support issues with the new LIMS, which are clearly operational issues.

Other key issues include difficulty in uploading of historical data from other systems and labs (often necessitating patches), lack of appropriate integration with GIS, the need for development of sector-wide coding systems, and the need to develop one centralized database of water quality data with sophisticated reporting tools to analyze and manipulate that data. LIMS tools primarily manage the handling, processing and analysis of samples, and are not sophisticated data management tools.

Many of these issues are operational or institutional and are therefore considered outside the scope of the ITMP. The GIS integration issue should be addressed as part of a Working Group discussed below.

When the ITMP project selected the investment components it would detail, based on the Consultant's as-is recommendations presented at a workshop in December 2005, GIS was identified as a backbone system for the sector. However, recognizing ongoing support of GIS by both the EU through the PMU and GTZ, the ITMP Steering Committee agreed with the Consultant not to include GIS as an ITMP component for further detailed. The GIS representative on the ITMP did express some concern over this decision – recognizing that the ITMP represented an opportunity to rejuvenate and better coordinate GIS initiatives. However, no GIS Working Group was established.

In March 2006, at a meeting in Aqaba, the Steering Committee questioned the progress and achievements of the sector's GIS initiatives. Specific issues related to the organizational roles and responsibilities that the proposed HQIT should play in relation to GIS, to the apparently stalled efforts to establish a sector-wide GIS clearinghouse, and to the need for a larger vision of GIS that goes beyond viewer type applications to support systems integration across the sector to provide a spatial dimension where needed to improve planning, performance, and oversight of the sector. The Steering Committee requested that a follow-on Working Group be established (likely under USAID funding as

an early part of the ITMP implementation phase) to address this issues. The Consultant was asked to develop a Terms of Reference for the proposed GIS Working Group – which is attached as ANNEX 8 – GIS WORKING GROUP TORS.

10. PHASING OF COMPONENTS

In recommending an appropriate phasing of the ITMP components, there are many factors to balance and trade off including:

- Front-end loading as many components as possible that bring large benefits to the sector
- Quick win opportunities
- Front-end loading ITMP components that enable other components (e.g. Infrastructure and source systems essential to the EIS)
- Management capacity of the HQIT to cope with a high workload from overlapping component implementation

ANNEX 9 – PHASING OF ITMP COMPONENTS provides an overview of the suggested phasing of each ITMP component. Essentially the ITMP is a series of investments over a four and a half year period that, if implemented well, will reap performance improvement benefits for the sector. We recommend that the ITMP be revisited every 3 – 4 years by the HQIT organization as sector needs evolve.

The HQIT technical assistance provides the foundation which runs through the entire program. The first components implemented are relatively straightforward hardware and networking infrastructure improvements, and implementation of an off-the-shelf collaboration suite. Implementation of these can begin even alongside the comprehensive training and capacity building program which continues into 2008.

Various Back-Office systems will be implemented next. The Legal application leverages the Collaboration Suite and is therefore an obvious starting point. HRM and Project Management applications can be centrally deployed, and will likely be custom-built in conjunction with an outside vendor who is experienced both in Oracle e-Business suite implementations and in design of custom-built solutions that are tightly integrated with that suite. Recognizing their importance to the effective operation of the new HQIT, we suggest that vendors be approached early to provide proof of concept and a small scale pilot application for early deployment at HQIT. This can then be evaluated and improved for broader rollout. Budget Preparation and Lands are likely the two most complicated components of Back Office and may need to be developed last when the management capacity, program management and QA skills have reached acceptable levels in the HQIT. Given the Lands system is core to JVA's operations, there may be a need to identify some short-term fixes here as an interim measure. This was anyway recognized as a possible solution option here.

By this point, corporatization of the HQIT should have been achieved, and the problem of staff sustainability fully solved. The staff training program will be complete and the HQIT will have both the broad and deep management and IT skills needed to take on the remaining two major initiatives.

The first of these is the sector-wide implementation across all Operating Entities of a comprehensive Asset Management-Maintenance Management system that is tightly integrated with an optimally configured set of Oracle Supply Chain modules. The second is the detailed design and implementation, primarily across headquarters organizations, of the Executive Information System. The latter will require extensive preparation work – both on data flows and sources and on preparing headquarters staff for its effective use in performance management. As discussed under the EIS component, there may be some advantage in early procurement of the BI tool to support advance efforts on EIS development using non-HQIT staff. This could help solve short-term issues with for example WIS/WMIS/Project Database integration.

11. CONSOLIDATED COST ESTIMATES

11.1. Assumptions

Cost estimates for technical assistance components have been estimated using standard USAID costing principles, rates and multipliers applicable under the current SEGIR II IQC contracting vehicle. Since all other ITMP components are routed through the HQIT Organization technical assistance, they are therefore subject to normal USAID G&A markups. No contingency is applied to the HQIT component.

The costs of other ITMP components have been estimated using standard IT costing benchmarks and vendor inputs. 15% contingency has been added to the labor, ODCs and G&A subtotal. This is considered appropriate given that final costings will be dependent on development of detailed functional systems specifications and formal selection of the best vendor.

Costs are stated throughout in 2006 dollars – i.e. there is no allowance for inflation

11.2. Cost Buildups

ANNEX 10 – ESTIMATED FUNDING NEEDS BY COMPONENT presents cost estimates in summary form by ITMP component by year. Each cost element is estimated by calendar year, allowing consolidated funding requirements to be derived by year for USAID budgetary and programming purposes.

12. OVERALL ITMP BUSINESS CASE

The overall business case for the ITMP is summarized in ANNEX 11 – OVERALL ITMP BUSINESS CASE. This aggregates the benefits streams where these have been quantified, discounts them further to correct for the fact that some components are not implemented immediately, and then compares the result with the PV of the ITMP disbursements.

A conservative discount factor of 10% is applied. This represents the opportunity cost of money provided by the government sector or the donors. In reality this is likely to be much lower than 10%, confirming our conservatism. Note also that ongoing support costs (widely perceived as a major issue in the sector) have been factored in appropriately. They are readily absorbed if the benefits of the systems implementations are fully realized and the sector's belief that these are a barrier is shown to be unwarranted.

The ITMP is shown to have a net benefit of \$7.1M based on the conservative assumptions used throughout. Significant additional benefits that cannot easily be estimated would accrue from other ITMP components such as EIS, Lands, Budget Preparation, and Legal, as well as the Collaboration Suite.

Note that the AM-MM-Supply Chain initiative alone covers almost 80% of the ITMP costs. While the major portion of these net benefits (from our individual component analyses above) derives from the Supply Chain portion, the two initiatives are interlinked and will reinforce one another in reality. CIS/Billing tips the balance of the ITMP firmly to the net benefit side. However, the benefits need to be captured during or possibly soon after the X7 implementation.

13. SUMMARY OF QUICK WINS POTENTIAL

The largest and most immediate quick win lies in improving the rollout and implementation of the X7 CIS/Billing System, largely through coordinating process improvement and institutional changes. However, unless robust program management and process skills can quickly be allocated within the sector, this quick win is “at-risk”.

Implementation of the Collaboration Suite is another significant quick win – although its benefits will have to be phased in over time. The e-Forms functionality and workflow may be a particularly quick win, speeding approvals and freeing up resources for more value-added activities.

Another potential quick win is providing early connectivity to the many remote stores thereby making the Oracle INV module available to those stores to begin better management and reduction of inventory.

Lastly the pilot implementation within HQIT of the HRM and Project Management tools will support quick wins in the capacity and performance of the HQIT organization.

14. CONCLUSIONS

An IT Master Plan founded on building strong and sustainable IT management and operations skills in the Jordanian water sector has been developed. The total program cost is estimated at some \$21.6 million over the next five years. Funding requirements start out at around \$8.5M in 2007 and peak at around \$9 million a year in 2008 because of the high front end funding required for the HQIT, and the fact that a number of different systems initiatives kick in then.

While \$21.6M may well seem high at first sight, the benefits that the ITMP can bring to the sector far exceed its costs. Based on conservative assumptions, and counting only the systems initiatives for which tangible benefits can be derived (Asset and Maintenance Management-Supply Chain and CIS/Billing) the ITMP has a potential net value of some \$14M. Even without considering the substantial benefits that are likely to be gained from the EIS, Lands and Budget Preparation initiatives for example, if USAID were to fund the plan in full, they would give the sector \$21.6M in grants,

which the sector could then turn into an additional \$11M in benefits from those grants. This suggests that the usual practice of GoJ co-financing normally required by the donors can easily be justified.

Early investment in building sustainable IT capacity in the sector underpins implementation of the whole ITMP. Establishing the HQIT and ensuring that it champions the philosophy and underlying principles of the ITMP across the sector and among the donors will bring real objectivity, rigor and consistency to IT investments and ensure they provide a guaranteed return. Systems must now be selected on the basis of business process improvement potential (not just business “needs” in the narrow activity sense). Equally systems implementations must be program managed much more robustly according to accepted best practices, with implementation quality measured on realized business benefits, and transfer of in-depth skills and knowledge to sector staff. The burden and responsibility of both world-class technical and program management of the ITMP falls on the HQIT, underpinning the need to ensure its capacity is adequately and quickly built. Building this capacity internally however, is much more likely in the long run to maintain the integrity of the ITMP and its principles and lead to sustainability of quality IT support to the sector.

Finally, the need for much more regular, detailed and upwardly proactive coordination with donors and MoICT regarding their IT initiatives and plans has also been identified. This will ensure that the sector can fully leverage, and ensure full compatibility with, other IT investments in the Jordanian government sector