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***Voice and Data Communications Infrastructure for the
Ministry of Justice of Rwanda:
Final Evaluation***

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1. EXECUTIVE SUMMARY

COMSYS, a telecommunications system that links the central office of the Ministry of Justice (MOJ), in Kigali, and the prosecutors offices (parquets), at the capitals of province in Rwanda, is an intermediate result of the Institutional Development Project to the Rwandan Ministry of Justice, initiative promoted and financed by USAID/Rwanda and implemented under contract by Management Sciences for Development, Inc (MSD).

At the beginning of 2002, MSD awarded the contract to implement the system to Computer Point (CP) and defined a delivery schedule with three implementation steps (packages). MSD commissioned PlanITech to assess the compliance of deliverables from CP. In December 2002, PlanITech conducted an initial assessment and found significant progress on Package 1 implementation. The second assessment, conducted in May 2003, included the evaluation of deliverables under packages 2 and 3.

CP completed the implementation of packages 1 and 2. Slightly more than 100 users at the MOJ central office (Kigali Central), twelve parquets, and Nyabisindu training center, now have access to a fully operational infrastructure that provides voice and data communications and office automation services according to contract specifications.

Implementation of Package 3, due May 31, 2003, is on going. Construction or remodeling of buildings is still taking place at Kigali PR and Nyabisindu PGCA. Four out of six parquets are waiting for leased lines. However, with the exception of Umutara and Gikongoro, where lines will not be available until October, the remaining sites of Package 3 should be ready by the end of June 2003. At the end of the implementation, COMSYS will have reached parquets at all capitals of province, becoming a nationwide communication system.

Functionality, quantity, and quality of goods delivered comply with contract specifications, except the leased lines of Gitarama, Kibuye, Gisenyi, and Ruhengeri that offer 64 Kbps bandwidth, instead of the required 128 Kbps, and the line used to access the Internet Service Provider in Kigali that has a bandwidth of 128 Kbps when it should be 256 Kbps. Network closets, PBX, and LAN cabling at parquets are cleanly installed and have professional appearance.

System is expandable. New services and users can be included at low cost. Parquets have enough connecting points for additional phones and computers. Routers have functionality and capacity to allow the secure connection of other users.

Implementation complies with the general objective of the system as stated in CP contract. Voice over IP (telephone calls carried over the leased lines), e-mail, text processing, and Internet in Kigali Central are the services more commonly used. Users like the system and many already consider it an essential tool. However, use of the system is still limited to the most basic functions. The MOJ and CP should conduct visits to all installed parquets to retrain users in MS Outlook and phone system, correct configuration problems in

some of the connected PCs, and promote the use of the system. Those visits should be the beginning of a plan to provide follow-up training to users on a periodic basis.

Electrical problems detected in parquets during the first assessment persist. Frequent blackouts and voltage fluctuations are also common in Kibungo, Cyangugu, and Ruhengeri. In some places, provincial offices do not pay electricity bills on time due to budget restrictions, causing the suspension of service to parquets. The MOJ should ask Electrogaz to conduct a comprehensive revision of all sites with recorded problems and request from the Ministry of Local affairs an increase in the budget assigned to pay electricity bills.

MSD's contract is nearing the end and the MOJ does not have the resources to substitute MSD in its role as manager of the project and technical auditor of the contract. In order to assure the success of the last implementation stage, the MOJ should complete the construction of buildings and get the leased lines required to finish the implementation of Package 3 sites before MSD contract ends.

The MOJ's IT group is now able to operate the system and provide basic assistance to users. However, it is not completely qualified to modify the configuration of services, routers, firewall, and PBX services. The organization and hierarchical dependency of the group is not clear. Additional resources are required to support the expected number of users and parquets. Salaries are low. The group does not have the experience or skills required to manage the project at the end of MSD's contract. The MOJ should review the organization and salaries of the group, design and develop a training program to increase its skills, hire an experienced ICT manager, and consider the possibility of outsourcing the support to some services. The MOJ should give the ICT manager authority to direct the project and to introduce and enforce policies and procedures.

The MOJ should develop policies, procedures, and forms for using the network and train users in using them. Standards for problem management, change management, Internet use, user management, and security could be the initial set to develop. The MOJ should consider the implementation of a Help Desk, a single point of contact for users to report problems or get answers to requests.

COMSYS implementation has pushed the limits of the MOJ budget. Since the approved budget does not consider payments for leased lines, the MOJ should define a strategy to secure the funds for the lines currently included in the CP contract (\$16,000 in 2003, starting October, \$99,000 in 2004, and \$115,000 in 2005). The Rwandatel tariff for Internet access is too high. The MOJ should explore other options including the subscription to one of the satellite-based Internet services that now seem to be available in Rwanda.

COMSYS is a source of opportunities for the MOJ and the Government of Rwanda (GOR). The system is a suitable platform for implementing nationwide information systems. Within the MOJ, it can support administrative, judicial records management, documentary, and case tracking systems, an immediate possibility being a case tracking system for the Gacaca processes. Other ministries and agencies, such as the Rwandan Tax Administration,

might consider COMSYS as a fast and secure way to implement nationwide systems. In the short term, the Electoral Commission could use the system for transmitting the preliminary results of the incoming elections. Since tribunals are near parquets or in the same buildings, the connection of Judiciary offices to COMSYS is easy to implement. The routers employed and the architecture of the network allows the inclusion of new users and the implementation of secure connections, making COMSYS a shareable infrastructure and an important element of the GOR communications backbone.

The preparation of an IT strategic management plan that defines objectives, strategies, and projects is a step that the MOJ should take in the next months to exploit the opportunities of the new infrastructure according with the reality of the organization and the priorities and objectives of the institution.

Finally, the implementation of COMSYS has proved that it is possible to build and operate a nationwide communication system using existing resources in Rwanda. The MOJ should document its experience and share it with others that are interested on starting similar projects. Standard presentations of the system and the project are useful for this purpose and, of course, for raising support from the GOR, cooperating agencies, and donors.

2. BACKGROUND

This document presents the second and final assessment of the Communication System (COMSYS). COMSYS is an intermediate result of the Institutional Development Project to the Rwandan Ministry of Justice (MOJ), initiative promoted and financed by USAID/Rwanda and implemented by Management Sciences for Development, MSD.

The Institutional Development Project aims to promote greater efficiency, accountability, and performance in judicial administration. COMSYS, a telecommunications network, will contribute to this objective by supporting and improving the communication processes that take place within the MOJ. It will provide voice and data communication services to the central office (Kigali Central), to prosecutors offices (“parquets”), and to Nyabisindu’s training center. COMSYS also will be a basic platform for implementing information systems and an important element of the communication backbone that the Government of Rwanda (GOR) wants to deploy in the next years.

At the end of 2001, MSD requested offers for the goods and services required to implement COMSYS and in May 2002 signed a subcontract with Computer Point (CP). The delivery schedule defined three implementation steps (packages). Package 1, included the MOJ central office at Kigali (Kigali Central) and five prosecutors offices (parquets) near to Kigali Central, and the implementation of common services required by all parquets. Package 2 covered the remaining sites where Rwandatel was offering communication lines. Package 3 grouped the rest of parquets. During the execution of the contract, the configuration of packages has suffered some modifications due to unexpected restrictions (mainly availability of lines), changes in institutional priorities, and construction and movement of offices. Table 1 shows the current configuration.

Table 1 – Current implementation packages

Package	Sites
1	Kigali Central, Kigali PGCS, Kigali PGCA, Butare, Byumba, Kibungo
2	Cyangugu PGCA & PR, Gitarama, Kibuye, Nyabisindu CNFJ, Nyanza PR, Ruhengeri PGCA, Ruhengeri PR
3	Gikongoro PR, Gisenyi PR, Gacaca, Kigali PR, Nyabisindu PGCA, Umutara PR, upgrade to Kigali PGCS

When Package 1 implementation ended (November, 2002), MSD commissioned PlanITech to conduct an intermediate evaluation of the project. PlanITech found a fully operational infrastructure and correctly installed and configured Hardware and Software at the installed sites. In general, the implementation was technically sound and in compliance with the contractors’ scope of work except for minor outstanding items (mainly

documentation and training of users in the operation of PBX and phones). An important finding was the lack of skilled technical personnel at the MOJ side to support the system.

At the end of May 2003, PlanITtech returned to Rwanda to conduct the following assessment of COMSYS. The evaluation took place between May 24 and June 3, 2003. Findings and recommendations of this assessment are presented below.

3. PURPOSE AND METHODOLOGY OF THE ASSESSMENT

The assessment sought to evaluate the status of the implementation, verify the functionality, quantity, and quality of the products and services delivered by Computer Point (CP), and identify the factors that will determine the future of the system.

The assessment included interviews with members of the project team, analysis of referential materials, visits to sites, meetings with users, and presentations of findings to stakeholders.

The list of consulted documents appears as Attachment A. CP contract and its modifications, the Mid-term evaluation report, and inspection reports of sites, prepared by MSD IT national consultant, were major references for the assessment. Consultant found inspection reports consistent with the contract and therefore used them to verify completeness of implementation packages.

The IT Consultant visited and met users at the following places

- Kigali Central
- Gitarama PR
- Kibuye PR
- Ruhengeri PR and Ruhengeri PGCA
- Nyabisindu CFNJ
- Nyabisindu PGCA and Nyabisindu PR
- Gisenyi PR
- Kigali PGCA and Kigali PR
- Gacaca office

Note: PR = Parquet de la République, Parquet Général près la Cour d'appel, CNFJ = training center

In each place the following items were examined:

- Equipment and software delivered and installed.
- Local area network (LAN) components
- LAN wiring.
- Voltages and grounding of outlets installed by CP
- Availability and bandwidth of leased line. Bandwidth was measured using *wsttcp*
- Use of the system
- Existence of manuals
- Quality of services provided by Computer Point as perceived by users

At the end of the visit to Rwanda, the consultant presented major findings, the results of a SWOT analysis, and a preliminary list of recommendations to the MSD/Rwanda's Chief of

Party, the Minister of Justice, the USAID/Rwanda Mission, and RITA (Rwanda IT Agency) Director.

4. FINDINGS

Findings are grouped into a) pending issues from Mid-Term evaluation, b) implementation status, c) functionality, quality, and quantity of goods and services delivered, d) available resources to maintain and operate the system at the end of CP and MSD contracts, and e) other findings.

4.1 Pending issues from Mid-Term evaluation

1. Electricity fluctuations

Low voltage and voltage fluctuation problems persist. Similar problems were found in Kibungo PR, Cyangugu PGCA, and Ruhengeri PR. The Minister formally complained to Electrogaz but no response has been received yet.

2. Lack of French or Kinyarwanda guides and manuals

CP prepared and distributed French manuals for MS Excel, MS Word, and MS Outlook, and guides for using the Internet and phone system.

3. Missing LAN certifications / inexact wiring diagrams

CP certified and documented LAN cabling and provided new schematic layouts.

4. Environmental problems at Kigali Central Server Room

The MOJ installed an air conditioning unit at the Server Room that will solve dust and high temperature issues raised during the previous assessment. However the room still present problems: lack of curtains to protect equipment from sun and maintain a proper temperature, lack of a vacuum cleaner, insufficient number of electrical outlets, neighbor office connected to one of the UPS outlets, and messy and improperly organized cables behind the wiring closet.

5. Capability of IT group to support system

IT group is now able to provide basic support to COMSYS, including starting and stopping services, performing common maintenance tasks with MS Windows 2000 and MS Exchange servers, configuring PCs, and diagnosing and solving PC and printer problems. However, the group is not qualified to modify the configuration of services, reconfigure routers, or provide support to PBX services.

6. Courses using English instead of French or Kinyarwanda

For packages 2 and 3, most courses were given in French or Kinyarwanda.

7. Bandwidth of line use to access the Internet Service Provider

Line bandwidth is still 128 Kbps.

4.2 Implementation status

a) Package 1 (6 sites, due October 2, 2002) and Package 2 (8 sites, due April 30, 2003)

Common findings:

- CP delivered and installed all goods and services included in packages 1 and 2.
- Communications services are operational at Kigali Central and installed parquets.
- In general, use of the system is limited to the most basic functions. Voice over IP, printer sharing, text processing with MS Word, e-mail, and Internet are the services more commonly used. Users can place calls using the Nortel phones but most of them are not able to transfer calls, place conferences, manage multiple calls, or use the hands free function.
- Users like the system and for many it is now an essential tool.
- Between four and five computers are connected to the communications network at each parquet. Some of them are not well configured for MS Outlook, employ MS Windows'95, and lack Norton Antivirus (these issues are outside the responsibility of the contractor)
- In some places, due to budget restrictions, provincial offices do not pay electricity bills on time, causing the suspension of service to parquets.

Specific findings:

- At Cyangugu PGCA, electricity supply presents fluctuations that exceed the tolerance of equipments. 180 V and less have been recorded.
- Gitarama and Kibuye report electrical problems caused by poor internal wiring.
- Ruhengeri PR and PGCS experience frequent power blackouts.
- At Nyanza PR, system started to operate at the same time that other Package 2 sites. Currently the system is not operating at that site because the MOJ decided to move the branch to Nyabinsindu's PGCA building. Under a separate agreement with the MOJ, CP reinstalled the equipment at the new place. Remodeling of the building has finished and although CP still has to certify the LAN it's expected that COMSYS services will resume by the second week of June.
- Nyabisindu PGCA will now provide phone and routing services to Nyanza PR. The PBX, router, VoIP gateway, and connecting rack assigned to Nyanza are no longer required. The MOJ decided to reassign them to Kigali PGCS.
- For the last two weeks, Kigali PGCA did not have electricity due to lack of payment. Building has deteriorated, has poor ventilation and limited electrical capacity. Overcrowding create uncomfortable work environment.

b) Package 3 (due May 31, 2003)

Implementation of package 3 is still an on-going activity:

- Umutara PR and Gikongoro PR

CP delivered and installed all goods and MSD inspected them but the functionality of the system is limited to LAN services because Rwandatel still does not offer leased lines for these towns. It is estimated that lines will be available around October, 2003.

- Gacaca (Remera) office

Construction of building has been recently finished. Computer Point delivered the equipment but still has to install it, provide training, and certify the LAN. Site is pending for leased line. It is expected that implementation at this site will be completed by the second week of June.

As per the contract, CP provided 12 double outlets for phone and data devices. Since this office will house between 50-60 users it will require additional connecting points.

- Gisenyi

CP delivered and installed all goods. However, there are some pending issues: set up of PCs for MS Outlook, set up of network printers, installation of missing LAN points, and training of users in MS Outlook. Leased line and communication services are already working.

- Nyabisindu PGCA

Remodeling of building is almost finished. CP will deliver the PC's and printers as soon the site is ready which probably will occur by the second week of June. LAN wiring was completed. Leased line and services are already operating.

- Kigali PR

Construction of new building is on going. Building will be ready around the third week of June. CP already wired the building but has not certified the LAN nor installed the leased line. Only outlets installed by CP comply with voltage and grounding requirements. Other outlets, including one at the server room, are not grounded.

4.3 Functionality, quality, and quantity of goods and services delivered at completed sites

- Implementation complies with the general objective of the system as stated in the contract. Hardware, software, communication lines, and LAN components form a fully operational communication system
- The delivered infrastructure provides the voice communication, data communication, and office automation services defined in CP contract. Through this infrastructure it is possible to
 - Place or receive internal, local, and long distance calls between all sites using either the public network (PSTN) or the Intranet (VoIP). Users can establish call conferences, and forward, park or pick up calls.

- Send and receive e-mails on the minijust.gov.rw domain.
- Access the Internet
- Send faxes
- Prepare text documents and spreadsheets.
- Send files to other users or share them.
- Use the services of an institutional directory
- PBX, router, and switch at parquets are cleanly installed. Cabling complies with category 5 standard. Outlets and rack terminals are labeled. Although wiring and network closets are well finished and have a professional appearance, UPSs are placed on the floor, over chairs or on temporary stands and connected to non-grounded outlets.
- The use of MS Outlook is limited to prosecutors. Other users employ yahoo.fr and Internet to send e-mail. Users have forgotten their passwords, do not know well how to use Outlook, or their computers are not set up for using it.
- Leased lines offer adequate availability.
- Bandwidth of leased lines complies with contract specifications (128 Kbps) except in Gitarama, Kibuye, Gisenyi, and Ruhengeri where bandwidth is 64 Kbps (Observed using “wsstcp”).
- Bandwidth of line for Internet access is still 128 Kbps (Contract specification: 256 Kbps)

Response time for Internet users is a function of line bandwidth and number of users trying to concurrently access the service. 128 Kbps is not enough to provide acceptable response time for the growing number of users.

- With French and Kyniarwanda-speaking instructors, CP trained users in MS Outlook, MS Word and MS Excel. Not all selected users attended the courses. At all parquets users stated that they needed additional training to use MS Outlook. The moment selected to teach MS Outlook and the lack of hands on training could explain the ineffectiveness of the training provided.

4.4 Resources available to maintain and operate the system at the end of the contract

- MSD’s contract is nearing an end. MSD/Rwanda has managed the project, supervised the execution of the contract, and controlled the quality of the products delivered by the contractor. At present, no person or group exists that could play the same role at the MOJ. That capacity is required to complete the implementation of Package 3 sites and implement new services or sites.
- According to the contract, CP must provide support to sites during the initial operation of the system. Based on actual delivery dates, CP support will end around June 15 for package 2 sites. The MOJ IT group is not competent to

provide the level of support that CP is currently providing. Backup and recovery, router and firewall configuration, management of ISA and Exchange servers, and PBX configuration are areas for which the IT group is not still qualified.

- MSD assisted in the implementation of a procedure for managing problems reported by users but no other policies or procedures have been developed.
- The MOJ does not have budget for paying leased lines. For the third quarter 2003, the MOJ will require \$16,000, during 2004, \$99,000, and for 2005, \$115,000 (see details in Attachment B)
- IT group is now able to operate the system and provide basic assistance to users. However, it is not completely qualified to modify the configuration of services, routers, firewall, and PBX services. The organization and hierarchical dependency of the group is not clear. Additional resources are required to support the expected number of users and parquets. Salaries are low.
- According to contract, once the warranty period expires, CP will continue providing remedial maintenance to goods for one year. Since most of the goods have a one-year warranty, the MOJ will have to sign the first maintenance contracts by October 2004.

4.5 Other findings

- The MOJ decided to move the PBX, router, and VoIP gateway originally assigned to Nyanza PR to Kigali PGCS, in order to replace an obsolete PBX and provide Voice over IP services at that important parquet. To implement the VoIP service the project team decided to employ a leased line instead of the fiber optic link that already connects the parquet to Kigali Central. The leased line will duplicate the functionality of the fiber optic link at a higher cost and with no technical advantages.
- The RFP specified that PBXs at parquets should come with battery backup to support operation for up to 1 hour. In its offer, CP explicitly accepted the requirement. However, delivered PBXs do not have that feature.
- The MOJ has developed an English/French/Kinyarwanda Web page (<http://www.minijust.gov.rw/index%201.html>) that offers some information about the MOJ. No one is in charge of updating the page.
- Price of Rwandatel Internet service is too high (\$2,264 / month) Companies are now offering in Central Africa 128 Kbps access to Internet through satellite links starting at \$150 / month.

5. CONCLUSIONS

- CP delivered and installed all goods and services under packages 1 and 2.
- It is highly probable that implementation of package 3 sites will finish by the end of June, with the exception of Umutara and Gikongoro where leased lines will not be available until October 2003.
- Implementation complies with the general objective of the system as stated in CP contract. Hardware, software, communication lines, and LAN components delivered form a fully operational communication system.
- Functionality, quantity, and quality of goods delivered comply with contract specifications. The lines installed at Gitarama, Kibuye, Gisenyi, and Ruhengeri, and the line used to access the Internet Service Provider in Kigali do not have the contracted bandwidth.
- CP provided MS Outlook training as specified in contract but its effectiveness is doubtful.
- Use of the system is still limited to the most basic functions. Voice over IP, printer sharing, texts processing with MS Word, e-mail, and Internet access are the services more commonly used. Users can place calls using the Nortel phones but do not use the advanced functions offered by the PBX. Users like the system and have accepted it.
- Electricity problems detected during the Mid-term assessment persist and are common in the remaining parquets.
- The MOJ is not still prepared to manage the project and maintain the system. The MOJ does not have an organized group and resources to continue managing the project. The IT group is now able operate the system and provide basic assistance to users but lacks the skills, organization and procedures to manage the system and provide the level of support that MSD and CP have been providing. The MOJ does not have budget to pay the leased lines.

6. STRENGTHS, WEAKNESSES, OPPORTUNITIES, and THREATS (SWOT) ANALYSIS

Findings are useful to assess the status of the implementation and today's situation and to define corrective actions. However, an analysis of the gaps that exist between what the MOJ has now and what it will likely need in the future could be a useful complement to determine, in a more comprehensive manner, the course of action that the MOJ should follow at the end of the implementation. The future is the vision of COMSYS that guided the design of the system. An analysis of the strengths and weaknesses of the system and the opportunities and threats that it faces (SWOT) is helpful to find the gaps.

USAID and the MOJ envisioned a communication system “between the MOJ central office, parquets, communes (Police Inspectors), and ...the ministry's outlying offices capable of supporting the complex communications needs of gacaca as well as routine communications” (USAID/MSD Institutional Development to the Rwandan Ministry of Justice contract). The achievement of this goal requires the implementation of a nationwide infrastructure capable to offer voice and data communication services, and since it has to last in time, the development of an organization with resources, and procedures to operate and maintain it. Two other ideas helped to shape the system. The system should be the basis and starting point for implementing nationwide information systems at the MOJ and a shareable infrastructure that could provide communication services to others, mainly the Judiciary.

The SWOT Analysis attempts to focus the attention on the match between what COMSYS and the MOJ have and what the vision of the system demands by looking at the current situation from the internal perspective (strengths and weaknesses) and the external point of view (opportunities and threats).

6.1 Strengths

- COMSYS has wide geographical coverage. At the end of the implementation, it will have reached all capitals of province, becoming in fact a nationwide communication system.
- COMSYS provides, at the office and central levels, the communication elements, servers, and PCs required to implement nationwide information systems.
- COMSYS is an operational network, robust and made of well-tested homogenous components.
- System is expandable. New services and users can be included at low cost. Parquets have enough connecting points for additional phones and computers. Routers have the functionality and capacity to allow the secure connection of other users.
- Users have accepted the system. More than 100 users are regularly using VoIP, e-mail, and Internet services. For many users they are now essential tools.

- IT group is well motivated and now is able to provide basic support to users and solve common problems.

6.2 Weaknesses

- The MOJ does not have an organization with competent people to perform the managerial and technical support functions MSD has been providing during the implementation of the system
- The MOJ IT organization is not qualified to modify the configuration of services, reconfigure routers, or support PBX services and does not have enough resources to provide adequate assistance to the expected number of users
- There exist some isolated initiatives to implement information systems, but the MOJ still does not have a strategy and formal plan to integrate those initiatives and develop other information systems.
- Except for problem management, no operating policies or procedures have been developed.
- Communication equipment is not protected against extreme voltage fluctuations or lightning discharges making it vulnerable to problems originated in Rwandatel lines
- The full potential of COMSYS is difficult to obtain because Parquet users have to share a limited number of computers and phones (At the end of the implementation the ratio OMP, secretaries to computers will be 4:1)
- Limited budget for electricity impedes the inclusion of new PCs at parquets
- Users only employ a minimal portion of the functionality offered by the system

6.3 Opportunities

- COMSYS is a suitable platform for implementing nationwide information systems.

Within the MOJ, COMSYS is an adequate basis for implementing administrative, judicial records management, documentary, and case tracking systems. An immediate possibility is a case tracking system for the Gacaca processes.

Other ministries and agencies, such as the Rwandan Tax Administration, might consider COMSYS as a fast and secure way to implement nationwide systems. In the short term, the Electoral Commission could use the system for transmitting the preliminary results of the incoming elections.

- Since tribunals are near to parquets or in the same buildings, the connection of Judiciary offices to COMSYS is easy to implement. Probably all that will be required to provide e-mail and VoIP services to selected Judiciary users at the provincial level is extending the LAN wiring to the tribunal and adding one switch to the parquet network closet.

- Rwandacell offers GSM-based voice and data transmission services to places where Rwandatel lines are not available. Using that technology, remote places not currently included in COMSYS can have access to e-mail and phone services.
- The routers employed and the architecture of the network allows the inclusion of new users and the implementation of secure connections, making COMSYS a shareable infrastructure that could be the starting point for the implementation of the GOR communications backbone.
- Implementation has proved that it is possible to build and operate a communication system using existing resources in Rwanda. Project experience can be shared with others that are starting similar projects.

6.4 Threats

- System implementation has pushed the limits of the MOJ budget.
If the MOJ does not obtain the funds to pay the leased lines, Rwandatel will cut off the service causing the suspension of all communications services.
Late payment or lack of payment of electrical bills at parquets can cause the suspension of services. If that occurs frequently, users will lose confidence in the system and will stop using it.
- Although Rwandatel advertised that it had enough lines to satisfy the requirements of COMSYS, reality has shown that availability of lines is very limited. The lack of lines could delay the connection of Package 3 sites. The quality of service received by package 2 sites where Rwandatel delivered 64 Kbps lines instead of the promised 128 Kbps can suffer in the mid-term when users increase the use of the system.
- If the MOJ does not appoint a person to manage and develop COMSYS and does not give him resources and authority to maintain it and promote and enforce its use, it will inexorably decline in time. The skills deficit, the resistance to change established work patterns, the scarcity of resources, and the natural dissatisfaction that users feel when problems occur, are negative resisting factors that must be overcome for the system to grow.
- Trained IT staff unmotivated by low salaries received can leave the organization affecting the service.
- Frequent blackouts and voltage fluctuations at some parquets caused by Electrogaz problems can slow down the use of the system and damage the equipment.
- Electrical problems at Kigali Central can affect the performance and availability of the system for all users.
- VoIP has become an essential feature of the system. Although there exists an authorization to use that protocol on the MOJ Intranet, the issue of VoIP use in Rwanda has not been legally defined.

6.5 Critical Success Factors

To successfully complete the implementation and secure the sustainability of COMSYS the following factors are important:

1. End of the on-going constructions and procurement of the lines required to finish the implementation of all Package 3 sites before MSD project ends.
2. Enough funds to pay leased lines starting October 2003.
3. Signed contract and enough funds that guarantee the provision of maintenance services after equipment warranties expire.
4. ICT organization at the MOJ with an experienced manager and enough resources and skills to solve user requests, fix common problems, reconfigure services as needed, pay periodic visits to parquets, and train users on a periodic-basis.
5. Training program oriented to assure a correct use of the system and a full exploitation of its capabilities.
6. Existence of policies and standards of use and security promoted and enforced at all levels of the MOJ.
7. Administrative procedures, information systems, or services provided to other users that require COMSYS and justified its operating costs.
8. Stable electricity supply at parquets.
9. Availability, reliability, and adequate bandwidth of communication lines.
10. Since VoIP has become an essential service, clear legal authorization to use that feature on the MOJ Intranet.

7. RECOMMENDATIONS

a) Recommendations for immediate action

- The MOJ should complete the construction of buildings and get the leased lines required to finish the implementation of all Package 3 sites before MSD project ends.
- The MOJ should define a strategy to secure funds for paying lines costs after October of this year and to obtain budget for 2004 and 2005.
- The MOJ should ask Electrogaz to conduct a comprehensive revision of all sites affected by power blackouts and voltage fluctuation problems.
- The MOJ should negotiate with the Ministry of Local Affairs an increase in budget to pay for electricity consumed by parquets.
- The MOJ should hire an experienced ICT manager and give him authority to introduce and enforce policies and procedures.
- The MOJ should develop policies, procedures, and forms for using the network and train users in using them. Standards for problem management, change management, Internet use, user management, and security could be the initial set to develop.
- The MOJ should hire a qualified electrician to review electrical circuits at Kigali Central and parquets where electricity problems are common. CP should be involved in this revision since it was one of its obligations as per clause C.3.2
- The MOJ and CP should conduct visits to all installed parquets to retrain users in MS Outlook and phone system use, correct configuration problems in connected PCs, and promote the use of the system
- MSD should analyze CP contract, CP offer, and RFP to find out if CP is obliged to provide backup batteries for PBXs

b) Recommendations for the medium term (MOJ)

- Prepare an IT strategic management plan that defines the objectives and strategies to develop the organization, technology, and information systems at the MOJ. Based on that reference frame, define projects to obtain support and cooperation from the Government, cooperating agencies, and donors.
- Review the organization and salaries of the IT group. Develop a training program to increase its skills. Consider the possibility of outsourcing the support to routers, firewall, and PBX.
- Prepare a standard presentation of the system and use it to raise interest from donors, potential users, RITA, and stakeholders
- Establish a Help Desk. The Help Desk will be a single point of contact in Kigali Central for users to report problems or get answers to requests. The Help Desk

will be responsible for problem recording, tracking, ownership, and resolution. Problems that the Help Desk cannot resolve immediately are passed on to other people but monitored to make sure they get resolved.

- Implement a plan of visits to parquets to provide follow-up training to users on a periodic basis and solve problems of system use. Include in training plan MS Outlook, MS Word, MS Excel, and phone system functions.
- At Kigali Central, implement a log book to record normal events, (start/stop of system, backups taken, etc), as well as problems presented and changes in configuration, scripts or systems files.
- Document the scripts used to perform backups, the location(s) of backup tapes, and all pertinent backup-related information.
- Start recording and saving information about Internet use (top sites visited, number of users, Web traffic by users), e-mail (number of messages, size of messages), PBX use, and problems presented (electricity, lines, system, training)
- Improve the conditions of Kigali Computing Center. Procure a vacuum cleaner, and install dark curtains or sheers to stop the direct sunlight from entering the room, and protected outlets for all equipment in server room.
- Connect existing analog phones and external lines to the new PBX and restrict external calls to authorized users.
- Use the existing fiber optic link to provide VoIP services to Kigali PGCS instead of using a leased line
- Search for alternatives to Rwandatel's Internet service.
- At each parquet, connect all available PCs to the LAN. Install MS Windows 2000 Professional or MS windows XP on all PCs
- Procure surge protectors to protect communication elements (router, switch, VoIP gateway) from voltage surges
- Designate a person or contract the services of a third party to reorganize and maintain the Web page. Use the page to disseminate information about institutional activities and services, and store and publish administrative, legal, and judiciary information

Attachment A – Consulted Documents

1. CP contract, modifications 1 to 4, and projected modification 5
2. “Voice and Data Communications Infrastructure for the Ministry of Justice of Rwanda, Midterm Evaluation”, Marcel Guzman de Rojas Wesner, December 2002
3. Update on package 2 and 3 COMSYS Implementation Process report, Joseph Ntaganzwa, MSD IT Consultant, May 12, 2003
4. Inspection reports filled by MSD on inspection and acceptance of goods delivered

Reports have been signed by representatives from MSD, CP, and the MOJ, and contain the quantity, description, and serial number of goods received. The IT Consultant reviewed the reports for

- Gitarama PR
 - Kibuye PR
 - Ruhengeri PR
 - Ruhengeri PGCA
 - Nyabisindu PR (Nyanza?)
 - Cyangugu PGCA
 - Gisenyi PR
 - Gacaca
 - Gikongoro PR
5. Training manuals in French for
 - Microsoft Excel
 - Microsoft Word
 - Microsoft Outlook
 - Internet use
 - Hands out on the usage of telephones
 6. Attendance reports for training courses and evaluation forms
 7. Schematic layouts of LANS installed at
 - Kibuye PR
 - Gitarama PR
 - Ruhengeri PGCA
 - Ruhengeri PR
 - Cyangugu PGCA
 - Cyangugu PR
 - Nyanza PR
 8. Network testing reports issued by CP at the end of LAN certification
 - Kibuye PR (Report not labeled)
 - Gitarama PR (Report not labeled)
 - Kigali Central
 - Kibungo PR

- Gitarama PR
- Byumba PR
- Butare PR
- Kigali PR
- Cyangugu PGCA
- Cyangugu PR
- Nyabisindu CNFJ
- Nyanza PR
- Ruhengeri PR
- Ruhengeri PGCA

9. Configuration manual for package 1 sites prepared by CP

Attachment B – Annual Cost of Leased Lines

Site	Monthly Cost		Installation date	Annual Cost		
	RF\$	US\$ ⁽¹⁾		2003	2004	2005
Package 1						
Internet line	\$ 1,200,000	\$2,264	1-Oct-2002	\$6,792	\$27,170	\$27,170
Kigali PGCA	\$ 110,000	\$208	1-Oct-2002	\$623	\$2,491	\$2,491
Byumba PR	\$ 288,000	\$543	1-Oct-2002	\$1,630	\$6,521	\$6,521
Butare PR	\$ 288,000	\$543	1-Oct-2002	\$1,630	\$6,521	\$6,521
Kibungo PR	\$ 288,000	\$543	1-Oct-2002	\$1,630	\$6,521	\$6,521
Package 2						
Cyangugu PGCA	\$ 288,000	\$543	1-Dic-2002	\$543	\$6,521	\$6,521
Gitarama PR	\$ 288,000	\$543	1-Nov-2002	\$1,087	\$6,521	\$6,521
Kibuye PR	\$ 288,000	\$543	1-Nov-2002	\$1,087	\$6,521	\$6,521
Nyabisindu CNFJ	\$ 288,000	\$543	1-Mar-2003		\$5,434	\$6,521
Ruhengeri PR	\$ 288,000	\$543	1-Nov-2002	\$1,087	\$6,521	\$6,521
Package 3						
Gikongoro PR ⁽²⁾	\$ 288,000	\$543	1-Oct-2003		\$1,630	\$6,521
Gisenyi PR	\$ 288,000	\$543	1-Mar-2003		\$5,434	\$6,521
Gacaca ⁽²⁾	\$ 110,000	\$208	1-Jul-2003		\$1,245	\$2,491
Umutara ⁽²⁾	\$ 288,000	\$543	1-Oct-2003		\$1,630	\$6,521
Kigali PR ⁽²⁾	\$ 110,000	\$208	1-Jul-2003		\$1,245	\$2,491
Nyabisindu PGCA ⁽³⁾	\$ 288,000	\$543	1-Mar-2003		\$5,434	\$6,521
Kigali PGCS ⁽²⁾	\$ 110,000	\$208	1-Jul-2003		\$1,245	\$2,491
Annual cost				\$16,109	\$98,604	\$115,381

Assumptions:

- 1 US\$ = RF\$ 530
2. Estimated
3. Nyabisindu PGCA cost includes 4 months of Nyanza PR lines used between March and June 2003

Attachment C – Inspection reports – Packages 2 and 3

Sources: For package 2, MSD IT Consultant Joseph Ntaganzwa inspection reports verified and complemented by PlanITech consultant. For Nyanza PR at new location and package 3 sites, consultant notes.

PACKAGE 2

1. GITARAMA PR

GOODS

All goods were delivered and in accordance with contract specifications except leased line (observed bandwidth: 62 Kbps).

15-labelled network points (Voice and data) are installed.

SERVICES

Internet and mail are functional, VoIP is working, telephones are installed and working, MS Office automation services are installed and working (MS Office, E-mail and faxing)

GROUNDING AND ELECTRICITY

Grounding has been properly installed. Measurements taken were satisfactory.

Live to neutral: 220 V

Live to ground: 220 V

Neutral to ground: 0 V

All closet room equipment is connected to the UPS. (PBX, switch, Router VoIP gateway, Modem)

Electrical problems were reported (apparently caused by poor internal wiring).

TRAINING

Training was done for MS word, E-mail, networking, Internet and VoIP.

Training was done in French, Kinyarwanda and English.

Training Evaluation reports (MS Outlook and telephone training) were delivered.

OTHER ISSUES

Wiring certification report was delivered.

Site file including network diagrams with labelled points have been delivered.

Users employ the system to place calls to Kigali and other parquets using VoIP. Only the prosecutor uses MS Outlook. Other users received training in MS Outlook but prefer to use yahoo.fr for E-mail because they find the latter simpler to use.

Five PCs are connected to the LAN.

2. KIBUYE PR

GOODS

All goods were delivered and in accordance with contract specifications except leased line (observed bandwidth: 64 Kbps).

15-labelled network points (Voice and data) are installed.

SERVICES

Internet and E-mail are functional, VoIP is working, and telephones are installed and working.

MS Office automation services are installed on delivered computers.

GROUNDING AND ELECTRICITY

Grounding has been properly installed. Measurements taken were satisfactory.

Voltages:

Live to neutral: 220 V
Live to ground: 220 V
Neutral to ground: 0 V

All closet room equipment is connected to the UPS. (PBX, switch, Router VoIP gateway, Modem)
Some electrical problems were reported apparently caused by poor internal wiring

TRAINING

Training was done for MS Word, E-mail, networking, Internet and VoIP.
Training was done in French, Kinyarwanda and English.
Training Evaluation reports (Ms Outlook and telephone training) were delivered.
Wiring certification report was also delivered

OTHER ISSUES

Users employ the system to place calls to Kigali and other parquets using VoIP.
Three PCs are connected to the LAN but only two are set up for MS Outlook use.

3. RUHENGARI PR

GOODS

All goods were delivered in accordance with contract specifications.
10-labelled network points (Voice and data) are installed.
Observed bandwidth to Ruhengeri PGCA through wireless link, 1,408 Kbps

SERVICES

Internet and mail are functional, VoIP is working, and telephones are installed and working.
MS Office automation services are installed on delivered computers.

GROUNDING AND ELECTRICITY

Grounding has been properly installed. Measurements taken were satisfactory.
Voltages:

Live to neutral: 220 V
Live to ground: 220 V
Neutral to ground: 0 V

All closet room equipment is connected to the UPS. (PBX, switch, Router VoIP gateway, Modem)
This parquet experiences frequent power blackouts, about one per day.

TRAINING

Training was done for MS Word, E-mail, networking, Internet and VoIP.
Training was done in French, Kinyarwanda and English.
Training Evaluation reports (MS Word, MS Excel Internet, network use, E-mail and telephone training) have been delivered.

OTHER ISSUES

Documentation of site.
(Site file including network diagrams with labelled points).
Wiring certification report has also been handed in
Users are not using MS Outlook. PC assigned to Secretary has not been set up for MS Outlook

4. RUHENGARI PGCA

GOODS

All goods were delivered and in accordance with contract specifications except leased line (observed bandwidth: 64 Kbps)
10-labelled network points (Voice and data) are installed.

SERVICES

Internet and mail are functional, VoIP is working, and telephones are installed and working. MS Office automation services are installed on delivered computers.

GROUNDING AND ELECTRICITY

Grounding has been properly installed. Measurements taken were satisfactory.

Voltages:

Live to neutral: 220 V

Live to ground: 220 V

Neutral to ground: 0 V

All closet room equipment is connected to the UPS. (PBX, switch, Router VoIP gateway, Modem) Parquet experiences frequent power blackouts.

TRAINING

Training was done for MS Word, E-mail, networking, Internet and VoIP.

Training was done in French, Kinyarwanda and English.

Users were asked to send attachments and they did it without problem.

Training Evaluation reports (MS Word, MS Excel Internet, network use, E-mail and telephone training) have been delivered.

PACKAGE 3**1. GIKONGORO PR**

Site not visited by consultant

Goods have been delivered and installed and LAN cabled. Currently Rwandatel does not offer leased lines at this locality.

2. GACACA (Remera)

Construction of building has been recently finished. Computer Point delivered the equipment but still has to install it, provide training, and certify the LAN. Site is pending for leased line.

Some LAN points are wired but not labelled.

As per the contract, CP provided 12 double outlets for phone and data devices. Since this office will house between 50-60 users it will require additional connecting points.

3. GISENYI PR**GOODS**

All goods have been delivered.

Network room equipment have been installed. LAN has been wired but not certified (some connecting points are still missing)

PCs have software installed but none of them have been set up to use the network printer. One of the PC cannot be used for MS Outlook because it still has to be prepared for that function.

Observed bandwidth of leased line was 50 Kbps.

SERVICES

LAN and Network connection are operational. VoIP is working well.

TRAINING

Users received training but only the prosecutor knows how to use MS Outlook.

4. NYABISINDU PGCA**GOODS**

CP wired and certified the LAN. All goods, except PCs, printer, and phones have been delivered. 20-labelled network points (Voice and data) are installed. Leased line has been delivered and is providing 123 Kbps bandwidth.

SERVICES

Internet and mail services are working.

GROUNDING AND ELECTRICITY

Grounding has been properly installed. Measurements taken were satisfactory.

Live to neutral: 226 V

Live to ground: 226 V

Neutral to ground: 0 V

All closet room equipment is connected to the UPS. (PBX, switch, Router VOIP gateway, Modem)

TRAINING

CP still has to train users of this parquet

5. KIGALI PR

CP already wired the building but has not certified the LAN nor delivered the PCs, printer, and active communication components.

Grounding has been properly installed. Measurements taken were satisfactory.

Voltages:

Live to neutral: 221 V

Live to ground: 221 V

Neutral to ground: 0

Only outlets installed by CP comply with voltage and grounding requirements. Other outlets, including one at the server room, are not grounded.

6. UMUTARA PR

Site not visited by consultant

Goods have been delivered and installed and LAN cabled. Currently Rwandatel does not offer leased lines at this locality.

Attachment D – Acronyms

COMSYS	Communications System
CP	Computer Point (the contractor)
GOR	Government of Rwanda
MOJ	Ministry of Justice
MS	Microsoft
PR	Parquet de la République
PGCS	Parquet Générale près la Cour Suprême
PGCA	Parquet Générale près la Cour d'appel
PSTN	Public Switched Telephone Network
VoIP	Voice over IP (telephone calls carried over the leased lines)
RFP	Request for Proposal