



OIOS

Office of Internal Oversight Services

INTERNAL AUDIT DIVISION

AUDIT REPORT

Data Security Audit of UNJSPF Secretariat & Investment Management Service

21 May 2008

Assignment No. AT2007/800/01

United Nations  Nations Unies

INTEROFFICE MEMORANDUM

MEMORANDUM INTERIEUR

INTERNAL AUDIT DIVISION · DIVISION DE L'AUDIT INTERNE

OFFICE OF INTERNAL OVERSIGHT SERVICES · BUREAU DES SERVICES DE CONTRÔLE INTERNE

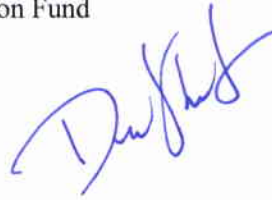
TO: Mr. Bernard Cochemé, Chief Executive Officer
A: United Nations Joint Staff Pension Fund

DATE: 21 May 2008

Mr. Warren Sach, Representative of the Secretary-General
for Investments of the
United Nations Joint Staff Pension Fund

REFERENCE: IAD: 08- 01328

FROM: Dagfinn Knutsen, Director
DE: Internal Audit Division, OIOS



SUBJECT: **Assignment No. AT2007/800/01 - Data Security Audit of UNJSPF Secretariat & Investment Management Service**
OBJET: **Management Service**

1. I am pleased to present the report on the above-mentioned audit.
2. Based on your comments, we are pleased to inform you that we will close recommendation 39 in the OIOS recommendations database as indicated in Annex 1. In order for us to close the remaining recommendations, we request that you provide us with the additional information as discussed in the text of the report and also summarized in Annex 1.
3. Your response indicated that you did not accept recommendation 25. In OIOS' opinion however, this recommendation seeks to address a significant risk area. We are therefore reiterating it and request that you reconsider your initial response based on the additional information provided in this report.
4. Please note that OIOS will report on the progress made to implement its recommendations, particularly those designated as critical (i.e., recommendations 1, 3, 4, 7, 8, 9, 12, 14, 15, 17, 19, 24, 25, 26 and 29), in its annual report to the General Assembly and semi-annual report to the Secretary-General.

cc: Ms. Susanne Bishopric, Director, Investment Management Service
Ms. Jaana Sareva, Secretary to the UNJSPF Audit Committee
Mr. Swatantra Goolsarran, Executive Secretary, UN Board of Auditors
Ms. Maria Gomez Troncoso, Officer-in-Charge, Joint Inspection Unit Secretariat
Mr. Jonathan Childerley, Chief, Oversight Support Unit, Department of Management
Mr. Byung-Kun Min, Programme Officer, OIOS
Mr. William Petersen, New York Audit Service, IAD/OIOS

INTERNAL AUDIT DIVISION

FUNCTION

“The Office shall, in accordance with the relevant provisions of the Financial Regulations and Rules of the United Nations examine, review and appraise the use of financial resources of the United Nations in order to guarantee the implementation of programmes and legislative mandates, ascertain compliance of programme managers with the financial and administrative regulations and rules, as well as with the approved recommendations of external oversight bodies, undertake management audits, reviews and surveys to improve the structure of the Organization and its responsiveness to the requirements of programmes and legislative mandates, and monitor the effectiveness of the systems of internal control of the Organization” (General Assembly Resolution 48/218 B).

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EXECUTIVE SUMMARY

Data Security Audit of UNJSPF Secretariat and Investment Management Service

OIOS conducted an audit of Data Security at the United Nations Joint Staff Pension Fund (UNJSPF) Secretariat and Investment Management Service (IMS). The overall objective of the audit was to i) identify risks relevant to the security of information assets; ii) determine whether adequate security controls are in place to ensure confidentiality, integrity, availability, accountability, authenticity, and reliability of data and information; and iii) follow-up on the implementation of previous related audit recommendations. The audit was conducted in accordance with the International Standards for the Professional Practice of Internal Auditing.

UNJSPF Secretariat

OIOS found that UNJSPF had in place a security system for the protection of data and information based on: a) detailed ICT security policies and standards; b) dedicated ICT security staff; c) well controlled physical security of the data center; d) protection of critical servers behind firewalls; e) implementation of intrusion detection/prevention systems; and f) periodic security health monitoring tests, as part of an initial implementation of the industry security standard ISO 27001.

OIOS identified, however, the following weaknesses and risks that, if not mitigated, could have a negative impact on UNJSPF operations in terms of loss of confidentiality, integrity and availability of data:

- i) Instances where the requirements of the UNJSPF ICT Security Policy and Standard had not been fully implemented;
- ii) Data classification not implemented;
- iii) Inadequate security of mobile computing devices;
- iv) Incomplete implementation of network security controls;
- v) Network traffic and passwords traveling the internal network in clear text;
- vi) Limited compliance with password policy;
- vii) Disaster recovery and business continuity documentation addressing only a limited part of the information that would be required in the event of a disaster; and
- viii) Additional steps needed to demonstrate adequate compliance with ISO 27001 security standard.

Investment Management Service

OIOS found that IMS had in place a security system for the protection of data and information based on: a) detailed information systems policies; b) acceptable use statement for computing systems; c) detailed standard operating procedures; c) data workflow diagrams; d) well controlled physical security of the data center; e) protection of critical servers behind firewalls; and f) periodic security monitoring and scanning reports.

OIOS identified, however, the following weaknesses and risks that, if not mitigated, could have a negative impact on IMS operations in terms of loss of confidentiality, integrity, and availability of data:

- i) Inadequate definition of provisions for risks assessment, security training, and information security violations;
- ii) Data classification not implemented;
- iii) Limited physical security of fax communication devices;
- iv) Passwords traveling the internal network in clear text;
- v) Inadequate user registration procedures;
- vi) Obsolete firewall security rules; and
- vii) Incomplete business impact analysis

Common Issue

The ICT consolidation of UNJSPF and IMS operations does not include a clear definition of roles, responsibilities, and accountabilities for the management of information security, and the standardization of security applications and infrastructure.

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I. INTRODUCTION

1. The Office of Internal Oversight Services (OIOS) conducted an audit of Data Security Audit of the United Nations Joint Staff Pension Fund (UNJSPF) Secretariat and Investment Management Service (IMS). The audit was conducted in accordance with the International Standards for the Professional Practice of Internal Auditing.

2. UNJSPF (or the Fund) was established by the General Assembly to provide retirement, death, disability and related benefits for the staff of the United Nations and several other organizations. UNJSPF consists of two entities: Secretariat of the Fund, and IMS. The Secretariat of the Fund is responsible for actual pension related operations and services, whilst IMS is responsible for managing the Fund's portfolio of investments.

3. The Fund Secretariat has offices in Geneva and in New York. The Information and Communication Technology (ICT) operations of the two offices are centrally managed by the UNJSPF Information Management System Section (IMSS) in New York, with the assistance of the United Nations International Computing Center (UNICC) located in Geneva. The UNICC provides mainframe support for pension processing as well as certain project management and software maintenance services.

4. The operations of the Secretariat of the Fund are supported by a) information technology services, including the maintenance, design and update of operating systems; b) accounting, payment and treasury services; and c) other support services including executive office and legal functions. IMSS performs analysis, design, programming and production of new and existing systems, as well as all other tasks related to information and communication technology, including processing, recording, storage, retrieval and routing of information through an optical-based imaging system.

5. The Information Systems Section (ISS) of IMS is responsible for the technology, applications, policies, procedures and management of projects dedicated to the investment process, namely: portfolio management; trade and order execution (straight-through-processing); investment pre and post compliance; portfolio risk analysis and performance measurement for different asset classes; and back-office support: reporting and reconciliation of different databases including global custodian master record keeper, brokers and real-time market data. This section performs systems analysis to translate complex investment processes into complex technical requirements, and procures technology directly supporting the investment processes.

6. Comments made by UNJSPF and IMS are shown in *italics*.

II. AUDIT OBJECTIVES

7. The main objectives of the audit were to:

- a) Identify risks relevant to the security of information assets;
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b) Determine if access to the critical programmes and data within the information system are secure and restricted to authorized users based on appropriate identification, authentication and authorization;

c) Determine if the network environment and the servers related to the information system are secure physically as well as logically from unauthorized or inappropriate access;

d) Determine if controls are in place to ensure that modifications to the system environment are made using a structured policy, have appropriate authorizations, are well documented, and are tested before migration into production;

e) Determine if management has implemented procedures to ensure the accuracy, completeness and timely processing of system jobs;

f) Determine if a business impact assessment has been completed and business continuity plans developed and approved for all supported business processes; and

g) Assess whether controls are in place to appropriately secure ICT equipment and resources.

The audit also followed up on the implementation of previous related audit recommendations made by OIOS and the Board of Auditors.

III. AUDIT SCOPE AND METHODOLOGY

8. The audit was undertaken at UNJSPF Headquarters in New York, including the Secretariat and IMS. Interviews were held with key officers responsible for processes and assets. Documentation was obtained and reviewed, and tests were performed to ascertain the existence, adequacy, and effective implementation of data security controls.

9. The audit covered the following areas of the Fund's Secretariat and IMS:

- a) Policies & procedures;
- b) Risks relevant to the information assets;
- c) Application controls;
- d) Network infrastructure;
- e) Business continuity management;
- f) Documentation of controls in the eleven domains of the ISO Standard for Information Security Management Systems (ISMS);
- g) Control arrangements for security incidents and improvements;
- h) Awareness, education, and training;
- i) Network penetration testing;
- j) Vulnerability assessment of web applications;
- k) Data integrity tests; and
- l) Follow-up on relevant OIOS and/or BOA audit recommendations.

IV. AUDIT FINDINGS AND RECOMMENDATIONS

UNITED NATIONS JOINT STAFF PENSION FUND

A. Information Security Policies, Procedures and Organization

Information Security Policies

10. Information security at the Fund Secretariat is regulated by three main policy documents: (i) IT Security Policy and Standards Introduction; (ii) UNJSPF Information Security Policy; and (iii) UNJSPF Information Security Standards Version 5.7. These security policies present a detailed regulatory framework based on relevant best practices and industry standards, such as the ISO 27001. In practice, however, in some instances the requirements of the security policies had not been implemented. Furthermore, while the security policies included clear requirements for their revisions, these documents have not been subjected to the required periodic reviews. The sensitivity of data processed and stored in the UNJSPF systems, and costs associated with the management of the IT infrastructure require information security policies to be periodically reviewed for adequacy, and their implementation consistently monitored.

Recommendations 1 and 2

(1) UNJSPF/Information Management Systems Section should implement and monitor compliance with the requirements stipulated in its IT security policies and standards.

(2) UNJSPF/Information Management Systems Section should perform periodic (at least annually) reviews of its information security policies and standards to ensure that significant changes in the internal and external environments (i.e. introduction of new technologies) are timely addressed.

11. *UNJSPF accepted recommendations 1 and 2, and stated that: a) monitoring and compliance with IT Security Policy and associated guidelines will take place in May 2008 and annually thereafter; and b) a yearly review of the Fund's Information Security Policies and Standards will be scheduled together with the yearly Information Security Health Check. Recommendations 1 and 2 remain open pending the result of the scheduled yearly review.*

Information classification

12. The formal issuance of stringent security policies was not followed by concrete actions to implement these requirements. For example: the Information Security Policy, dated 11/02/2002, stated that: "All UNJSPF information will be classified according to some predetermined criteria, such as data value, risk of loss or compromise, legal requirements, etc. Printed or hard copy information should be labeled with the appropriate information classification. Information not labeled is assumed to be "public" information." Since the Fund had not yet complied with the classification requirements, by virtue of this policy, all information was to be considered public. Owing to the sensitive and privileged nature of the information processed by the Fund, immediate attention from both the policy and operational levels of the Fund management is required.

Recommendations 3 and 4

(3) UNJSPF/Information Management Systems Section should develop and implement data classification criteria based on: a) inventory of structured and unstructured data; b) taxonomy of data; c) criticality and sensitivity; d) life-cycle of information; e) data owners; f) changing events; g) retention schedules; and h) archive and destruction requirements.

(4) UNJSPF/Information Management Systems Section should use the results of the data classification exercise to determine, in collaboration with the representatives of substantive offices, the application of controls for access, archiving and encryption.

13. *UNJSPF accepted recommendations 3 and 4, and stated that it is taking appropriate steps as part of the pre-implementation activities for a new Pension Administration System. UNJSPF also indicated that it has a project underway to create a data dictionary which will be used to identify and inventory each data element, and assign security controls for data classification. Recommendations 3 and 4 remain open pending the deliverables of the UNJSPF project in terms of: i) data dictionary; ii) data inventory; and iii) data security classification and controls.*

Compliance with industry standard

14. The Fund Secretariat planned to achieve compliance with the information security management system (ISMS) standard issued by the International Organization for Standardization (ISO) and the

International Electro-technical Commission. The name of the standard is ISO/IEC 27001:2005 - Information technology — Security techniques — Information security management systems – Requirements, but it is commonly known as "ISO 27001". OIOS included in the audit a review of the ISO 27001 prescribed controls, to assess the level of compliance of the Fund's security system with the requirements of the standard. The results of this review indicated that the Fund has taken important steps in line with the ISO requirements, such as i) issuance of detailed security policies and procedures; ii) establishment and functioning of an IT management forum; iii) implementation of technical mitigating controls; iv) conduction of training and awareness initiatives; and v) periodic monitoring of its controls. Additional steps, however, must still be taken by the Fund to demonstrate adequate compliance with the ISO standard.

Recommendation 5

(5) In order to improve compliance with industry standard, UNJSPF/Information Management Systems Section should establish a number of key controls including the following:

a) Define the ICT assets included in the scope of the Information Security Management System and their criticality for the effective and efficient continuity of the UNJSPF operations;

b) Define the boundaries of the Information Security Management System, including its perimeter, interfaces and dependencies;

c) Document and categorize the evidence of the controls implemented in accordance with security policies and procedures, for all assets in scope;

d) Develop a risk management framework to enable the evaluation of threats and vulnerabilities, including their likelihood and impact; and

e) Rate the information security risks, document and justify the corresponding mitigating controls, and assess the residual risk.

15. *UNJSPF accepted recommendation 5 and stated that in cooperation with the Fund's business users, the Information Management Systems Service will improve compliance with industry standards, and that full compliance with the recommendation depends on approval of previously requested additional human resources. Recommendation 5 remains open pending receipt from the Fund of: i) list of ICT assets included in the scope of the ISMS; ii) definition of the*

ISMS boundaries; iii) evidence of the controls implemented; iv) risk management framework; and v) information risk assessment and ratings.

Information security organization

16. The Fund Secretariat has a dedicated IT Security Officer who manages a vast range of technical and procedural solutions, and also provides support for security awareness initiatives and assistance to other offices of the Fund Secretariat. However, due to the lack of sufficient staff resources the IT Security Officer also attended to a variety of other activities that were not strictly related to his functions, leading to an inadequate segregation of duties. These activities included the supervision of the user registration processes, help desk ticketing resolution, and network administration. This condition could lead to undetected errors and conflict of interests.

17. OIOS was informed that a request for additional posts was not approved and that the adequacy of resources would be reconsidered during the whole office review exercise mandated by the United Nations Joint Staff Pension Board.

Recommendation 6

(6) UNJSPF/Information Management Systems Section should ensure adequate segregation of the functions pertaining to ICT security, network administration and user registration, and minimize conflicts in the responsibilities for the definition, implementation, monitoring and enforcement of security-related controls.

18. *UNJSPF partially accepted recommendation 6 and stated that complete segregation of security control definition, implementation, monitoring and enforcement requires additional resources. UNJSPF indicated that full compliance with the recommendation depends on approval of previously requested additional human resources, which are not expected to be available until approval of the budget submission for the 2010-2011 biennium. Recommendation 6 remains open pending the segregation of functions pertaining to ICT security, network administration and user registration.*

B. Physical and environmental security

19. The data center of UNJSPF Secretariat, located on the 4th floor of the DHP building, appeared to be well designed and properly maintained with adequate monitoring, fire suppression, and ventilation systems. Multiple physical access control devices (card reader and iris-recognition) were installed and functioning as intended. In addition, UNJSPF has put in place mitigating controls, consisting of battery backup systems (uninterrupted power supply, UPS) for immediate and

short-term power and a disaster recovery plan that includes off-site locations for recovery during prolonged power losses.

20. However, the data center was not supported by a generator against the risk of prolonged power losses, and that the air-conditioning system was not under the control of the Fund's staff but was managed and supported by the managing company of the DHP building. This condition, combined with the reliance of the Fund on the use of off-site recovery locations and the contractual agreements with third party service providers, requires the establishment of adequate monitoring mechanisms and testing procedures.

Recommendation 7

(7) UNJSPF/Information Management Systems Section should establish a process to regularly monitor and test: a) recovery procedures and equipment for both short-term and prolonged power losses, confirming that power can be switched to alternative supply sources without any significant effect on business operations; and b) air-conditioning support services provided by third party entities, confirming their reliability and effectiveness.

21. *UNJSPF advised that it partially accepts recommendation 7 and stated that: a) It agrees that regular testing of the UPS environment should take place at established intervals, (e.g., by running on battery power for a certain amount of time). UNJSPF indicated that this will take place in conjunction with the Disaster Recovery testing planned with the International Computing Center; b) The air conditioning support services are provided by a company contracted for this purpose. UNJSPF foresees establishing an extended Service Level Agreement (SLA) with a building-authorized company. UNJSPF advised that full compliance with the recommendation depends on procurement of necessary services. OIOS considers the actions planned by UNJSPF to adequately mitigate the risks identified. Therefore, recommendation 7 is considered to be fully accepted, and it will remain open pending receipt from UNJSPF of the results of fail-over tests and the details of the extended SLA with the building-authorized company.*

C. Security of mobile computing

22. Laptops were assigned to Chiefs of Offices for remote connectivity with the Fund's systems, as well as for office-related processing activities off-site. OIOS interviewed staff members using these laptops to ascertain their level of security awareness and whether adequate procedures were being followed in the use of these devices. The results of these interviews highlighted that the distribution of these laptops had not been supported by the provision of specific training and/or instructions on how to mitigate the exposure of these laptops to

the risks of loss and/or corruption of sensitive data. Furthermore, there was a lack compliance with the Information Security Policy Standard for Unattended User Equipment (9.3.2), requiring that “laptops must have hard drive passwords enabled, in addition to using power-on passwords”.

23. UNJSPF Secretariat was in the process of creating a usage policy, which is to be issued to and signed by all staff members upon receiving a laptop. OIOS was also informed that hard disk encryption software has been acquired by UNJSPF/Information Management Systems Section for technical evaluation.

Recommendations 8 and 9

(8) UNJSPF/Information Management Systems Section should train its staff on information security practices for the use of official mobile computing devices and on how to prevent loss of equipment and data.

(9) UNJSPF/Information Management Systems Section should configure all official laptops in accordance with its information security standards, requiring hard disk passwords before allowing a user access.

24. *UNJSPF accepted recommendations 8 and 9, and stated that: a) UNJSPF already trains staff on the use of portable computer equipment, and plans to further expand upon this; and b) laptop security awareness guidelines will be added to the security awareness documentation. UNJSPF indicated that it has a limited number of hard disk encryption software licenses, but it plans to have them installed on all laptops. Recommendations 8 and 9 remain open pending UNJSPF’s issuance of the security awareness documentation, and the complete installation of hard disk encryption software on all laptops in use at the Fund.*

D. Security of the network

Management and configuration of Internet Addresses

25. The management of UNJSPF network was based on established best security practices and generally accepted standards. These included a) protection of mission critical systems behind firewalls; b) isolation of mail servers; and c) installation of intrusion detection system (IDS) and intrusion prevention system (IPS).

26. OIOS conducted technical tests to verify the reliability of network controls in place and found that some critical servers of the UNJSPF network, although not “visible” from outside, had routable public internet protocol (IP) addresses. These public internet addresses

were protected with additional filtering rules defined at the level of firewall and router configurations.

27. The combined effect of public IP addresses assigned to critical servers, the need for additional filtering rules, and the existence of internet connections other than the one provided by UN-ITSD, exposed UNJSPF to the following risks:

a) A non authorized user could exploit some not-yet-known vulnerability of the router and/or the firewall to bypass the additional rules and establish a connection directly to a critical server;

b) The need to define and monitor additional rules to transform public IP addresses into non-routable addresses is a complex solution prone to human error, and could lead to security breaches.

28. In consideration of alternative compensating controls put in place by UNJSPF (i.e. Network Address Translation), and the acceptance of other relevant recommendations issued to strengthen the security of the Fund's network, OIOS is not recommending any further actions on this matter.

Firewall protection against internal and external security risks

29. Although the Fund has two independent layers of security protection, its current network security design is focused on the role played by the perimeter firewalls in protecting the internal computing environment from external threats. The reliance of the Fund in protecting critical servers from external attacks with mainly firewalls is not effective with regard to the risk of internal attacks.

30. Furthermore, in the event of a technical malfunction or human error that would cause the unavailability of the firewall's defence, the Funds' critical systems and applications could be exposed to a large variety of external threats. This condition is not in line with ICT security best practices that require the implementation of a "layered security" approach, where several layers of protections should be put in place to mitigate the possible failure of one or more controls. The referenced requirement for non-routable addresses established in the "UNJSPF Information Security Standard, Ver. 5.7", was one example of the layered security approach that, if complied with, would improve the security posture of the Fund.

Recommendation 10

(10) UNJSPF/Information Management Systems Section should improve its network security system with the implementation of the following mitigating controls:

a) Remove unneeded network services on critical servers, even if these machines are not visible from outside;

b) Close network ports that are not needed on critical servers, even if these machines are not visible from outside;

c) Encrypt internal traffic, especially password;

d) Allocate dedicated resources to the periodic review of known vulnerabilities that could impact the UNJSPF environment and implement proactive defense measures;

e) Install an Intrusion Detection System (IDS) and Intrusion Prevention System (IPS) dedicated to the internal network, in compliance with UNJSPF Security Standard 10.2.2.2, which requires that systems administrators will utilize checks and controls to protect the integrity of UNJSPF data during and between processing runs, and that management must establish and maintain controls capable of assuring that UNJSPF information is free from a risk of undetected alteration (e.g. Intrusion Detection Systems, operating system transaction audit logging and review, etc.);

f) Separate the production and development environment in compliance with UNJSPF Security Standard 8.1.5, which stipulates that development, test and production environments are used for different purposes. Each one is required to be separated from the others for security as well as technical reasons;

g) Implement application access controls in compliance with UNJSPF Security Standard 9.6, stating that with the security-in-depth approach, application access control is another layer of security that limits a user's access to information;

h) Monitor the activity of system operations and database administrators in compliance with the UNJSPF Security Standard 8.4.2, stipulating that UNJSPF will log and monitor operator activities;

i) Adequately document the process and dataflow and control the integrity of data output in

compliance with UNJSPF Security Standard 10.2.4, stating that UNJSPF will ensure that all data output from application systems are validated as correct and appropriate for output, and also that UNJSPF information systems must incorporate user identification and authentication techniques to ensure that all output information is provided on a need-to-know basis, appropriate to the classification of the information, and the status and privileges of the user.

31. *UNJSPF accepted recommendation 10 and reported the following actions taken in response to the specific sub-heading:*

a) and b) UNJSPF started a project to periodically (weekly) assess servers;

c) UNJSPF has taken steps to encrypt passwords traveling the internal network for the Lawson system;

d) UNJSPF is currently performing a periodic review of known vulnerabilities;

e) The Fund's NAC solution incorporates IDS/IPS functions and will enable UNJSPF to put the required controls in place;

f) The Fund applies segregation of production and development infrastructure;

g) UNJSPF's core systems (PENSYS, Novell ACL's, CM queues, Lawson access rights) rely on Application Access Control to further limit unauthorized access to information;

h) The Fund intends to establish a capacity to monitor operation and database administration as part of ongoing initiatives;

i) The Fund will ensure that all data output from application systems are validated as correct and appropriate.

UNJSPF indicated that full compliance with the recommendation depends on approval of previously requested human resources, to be resubmitted in the budget for the 2010-2011 biennium, and procurement of necessary tools and/or services.

32. Recommendation 10 remains open pending receipt of evidence from UNJSPF of the following: i) removal of unneeded network services; ii) encryption of traffic on all critical systems; iii) periodic review of known vulnerabilities; iv) implementation of the Network Access Control solution; v) monitoring of systems operations and database administrators; and vi) validation of all data output from application systems, with reference to user's status and privileges, and the classification of information.

Network services

33. OIOS conducted a sample test of selected active services on the Fund's network and found that unnecessary services were actively running on critical servers such as: Iris, Email Lotus Notes, and Lawson RS/6000. These unnecessary services included the "terminal emulation

programme” (telnet), and “secure shell connection programme” (ssh), both of which supported remote connectivity, without the added security of encryption protection. This condition exposed UNJSPF network to the risk of eavesdropping that may result in possible instances of unauthorized access to confidential data.

34. The existence of these unnecessary services was also not in compliance with UNJSPF Information Security Standard 9.4.1, which states that “Services that are not required must be removed, not just disabled”.

Recommendations 11 and 12

(11) UNJSPF/Information Management Systems Section should remove those network services that are not strictly necessary in accordance with paragraph 9.4.1 of the UNJSPF Information Security Standard, which requires their full removal.

(12) UNJSPF/Information Management Systems Section should replace necessary network services with more secure applications, adding encryption layer protection to prevent eavesdropping.

35. *UNJSPF accepted recommendations 11 and 12 and stated that: a) the Fund started a project to periodically (weekly) assess servers. The Fund indicated that this is an ongoing effort that soon will result in complying fully with this recommendation; and b) UNJSPF has already removed most Telnet services and intends to add encryption layer protection to all applications supporting this technology. Recommendations 11 and 12 remain open pending receipt of evidence from UNJSPF of the following: i) full removal of Telnet services; ii) complete installation of encryption layer protection on all relevant applications; iii) full removal of unnecessary network services; and iv) installation of secure applications for the replacement of those network services deemed necessary.*

Security and critical patches

36. IT Security staff performed periodic network security monitoring tests to ensure that the latest security and critical patches were installed on the network. In addition, a centralized patch management solution was in place to monitor patch deployment to New York and Geneva-based workstations and servers. However, OIOS used a vulnerability scanning tool and found some network services enabled on critical hosts with vulnerabilities classified as high risk. These results were shared with the IT Security Office of the Fund, and were addressed during the course of the audit. The presence of these vulnerabilities could expose critical systems to the risk of being hacked. It should also be noted that the "UNJSPF Information Security Standard, Ver. 5.7" required that

Network services with known vulnerabilities must not be enabled until necessary patches have been applied.

Recommendation 13

(13) UNJSPF/Information Management Systems Section should establish formal procedures for the timely updates and installation of security patches, and ensure that network services are enabled only after all latest security and critical patches have been applied.

37. *UNJSPF accepted recommendation 13 and stated that it will update and patch all systems with a software solution (PatchLink) recently procured. UNJSPF advised that full compliance with the recommendation depends on approval of previously requested additional human resources. Recommendation 13 remains open pending UNJSPF complete update and patch of all systems with the PatchLink software.*

Internal network traffic

38. The results of the network traffic tests conducted by OIOS showed that data traveled in clear-text (i.e. non-encrypted form) within the UNJSPF network, and between the Fund facilities of New York and Geneva. This condition neutralized all the mitigating controls in place to secure confidentiality of data, and exposed sensitive information to the risk of being intercepted by “sniffing” applications. In addition, the status of this control was not in compliance with the requirements defined in paragraph 10.3.2 “Encryption” of the UNJSPF Information Security Standard, Ver. 5.7: “Link encryption in the context of this requirement is encryption at the Data Link layer of the OSI model and only protects the confidentiality of the information payload of packets, not their addressing. (It is sometimes referred to as link layer encryption, as link encryption can also refer to an internal process within an encryption algorithm.) Link encryption must be used as required, generally when: communication links exists between facilities.”

Recommendation 14

(14) UNJSPF/Information Management Systems Section should implement the requirement of its Information Security Standard paragraph 10.3.2, and apply link encryption to network traffic traveling between facilities such as New York and Geneva.

39. *UNJSPF accepted recommendation 14 and stated that UNJSPF will procure a link encryption solution in order to further secure its direct network links with Geneva. The Fund advised that full compliance with the recommendation depends on procurement of necessary tools*

and/or services. Recommendation 14 remains open pending UNJSPF's purchase and installation of the link encryption software for the network connection between New York and Geneva.

E. Access Control

User password

40. User identification and authentication to the Fund's critical systems (i.e. Lawson, Pensys) was based on a combination of a biometric device - fingerprint recognition via thumb drive - and single-sign-on procedures. However, the technological and procedural solutions adopted by the Fund could lead to an over-estimation of their protection and thus provide a false sense of security. As reported in paragraph 37, network traffic traveled the internal computing environment of the Fund in clear-text (non-encrypted form). This traffic included the passwords of the staff members who, after being authenticated by the thumb-drive and single sign-on process, connected to the critical systems. In addition to exposing passwords to the risk of interception by "sniffing" applications, this procedure was not in compliance with the requirement defined in paragraph 9.3.1 "Password use" of the "UNJSPF Information Security Standard, Ver. 5.7": 'Passwords must be encrypted when traveling over the network.'

Recommendation 15

(15) UNJSPF/Information Management Systems Section should encrypt the transmission of passwords over the network, in compliance with the requirement of its Information Security Standard 9.3.1, which stipulates that "passwords must be encrypted when traveling over the network".

41. *UNJSPF accepted recommendation 15 and stated that it has already taken steps to encrypt passwords traveling the internal network (Lawson upgrade). UNJSPF indicated that for the legacy systems it will await the introduction of the Pension Administration System. Recommendation 15 remains open pending the complete implementation of the password encryption solution on all UNJSPF legacy systems.*

Password audit

42. OIOS conducted a password audit on a sample subset of passwords used to access the financial system Lawson. The test was based on a "dictionary attack" that compared passwords against a list of dictionary words. The results of the test showed that many users had simple passwords, and were not in compliance with the Fund security policy that gave guidance on choosing strong passwords. There were also no mechanisms in place to control and enforce the use of strong passwords. In a relatively limited time (10 hours), it was possible to

recover 40% of the user password (70 passwords over 178 accounts). Most of the cracked passwords could be easily guessed:

Description of the password	No. of Accounts
Accounts with password composed of letters only	28
Accounts with password equal to a first name	17
Accounts with password composed of only three letters	7
Accounts with the password "pension"	4
Accounts with password composed of only five characters	4
Accounts with password of only four numbers	2
Accounts with password of only two letters	2

43. The cases of noncompliance with the password requirements included not only end users but also service staff (i.e. a senior IT professional staff member in UNJSPF/Information Technology Operations Unit, and other chiefs of organizational units of the Fund).

44. In addition, the two files containing the list of users and the user accounts ("password" and "password security") respectively did not reconcile. The number of user accounts was higher than the number of users, and could be indicative of: i) inadequately processed requests for new accounts; or ii) user accounts created by non- authorized personnel.

45. Based on the results of the tests conducted, the status of the controls in place was not in compliance with the requirements defined in paragraph 9.2.3 "User Password Management" of the "UNJSPF Information Security Standard, Ver. 5.7": "The following password rules will apply on all UNJSPF systems where technically possible: Passwords must contain both alphabetic and non-alphabetic characters (special characters and numbers). Passwords will be a minimum of six characters. Passwords must not include the same character next to each other."

Recommendation 16

(16) UNJSPF/Information Management Systems Section should configure systems and applications so that users are requested to select passwords in compliance with UNJSPF Information Security Standard 9.2.3, which requires users to set passwords that contain alpha numeric characters, as well as special features such as upper case.

46. *UNJSPF accepted recommendation 16 and stated that it will update the Fund's Information Security Standards with the password complexity rules. Recommendation 16 remains open pending the complete implementation of the UNJSPF password standard.*

Access control of unauthorized devices

47. Unprivileged users could connect external devices (i.e. personal laptops) to the Fund's network, without any specific controls able to detect foreign equipment. This condition exposes the Fund to the risk of someone, equipped with a laptop containing tools to exploit known vulnerabilities, connecting to the network and obtaining access to privileged information. However, UNJSPF has procured a Network Access Control (NAC) solution that, once implemented, will solve this problem once implemented.

Recommendation 17

(17) UNJSPF/Information Management Systems Section should ensure that, pending the implementation of the "Network Access Control" solution, all ports of the network are restricted to known (registered) devices. Therefore, all official devices should be registered for network use before they can be connected.

48. *UNJSPF accepted recommendation 17 and stated that it will use the Network Access Control (NAC) solution to enable the network connectivity of known devices and block network access to non-registered devices. UNJSPF advised that full compliance with the recommendation depends on approval of previously requested additional human resources. Recommendation 17 remains open pending the installation and configuration of the Network Access Control Solution.*

Third party remote account

49. The Fund provided dedicated modem lines to third party entities for remote support and technical troubleshooting to data center equipment. These connections had not been removed once the remote services were no longer required. This condition exposed the Fund's network to the risk of unauthorized access to sensitive data and information, and in particular the risk of "call forwarding". This risk is explicitly addressed in the security standard referenced by UNJSPF (Code of Practice ISO 27002-2005-clause 11.4.2). The risk identified in this finding can be mitigated if the callback procedure guarantees that calls directed to the predefined number cannot be subject to 'call transfer' and/or 'call forwarding'. Furthermore, there was no evidence of any third party risk assessment performed by the Fund in accordance with UNJSPF Security Standard 4.2.1.2, documenting the assessment of this risk. There was also lack of compliance with the Fund's policy that acknowledged the inherent risks of these operations in "UNJSPF Information Security Standard, Ver. 5.7", paragraph 9.4.5: "These devices (modems) provide remote access to the equipment and generally are not secure.....Remote access devices must be removed from equipment when the equipment no longer requires remote access."

Recommendation 18

(18) UNJSPF/Information Management Systems Section should establish and implement procedures for the formal review and authorization of all requests for third party remote access. Furthermore, checks should be undertaken to ensure that all open ports are closed once access is no longer required.

50. *UNJSPF accepted recommendation 18 and stated that it will implement this recommendation as soon as possible. Recommendation 18 remains open pending the establishment and implementation of procedures for the formal review and authorization of requests for third party remote access.*

Wireless access points

51. The fund managed wireless connectivity in accordance with industry best practices and by using technological solutions (Radius) based on encrypted authentication methods. The solution was in full compliance with the "UNJSPF Information Security Standard, Ver. 5.7", stating under chapter 8.7.5 that "Wireless devices must not be used without industry proven encryption if used to transmit UNJSPF sensitive information". However, the Fund did not have adequate controls in place to detect unauthorized wireless access devices that any staff member could have potentially installed and enabled on their machines (i.e. personal laptops). This condition exposed the Fund to the many inherent risks posed by these devices. Unauthorized wireless access points installed within the DHP Building would become available to any client within range, and could be accessed by anyone outside the premises. As a result, the UNJSPF network would become directly accessible by unauthorized third parties, circumventing firewall's protection. OIOS acknowledges that the Fund had already identified this risk exposure and initiated a procurement process for the purchase of a solution based on Network Access Control (NAC) that would address this risk. The procurement process concerning the acquisition of NAC was still in progress at the time of the audit.

Recommendation 19

(19) UNJSPF/Information Management Systems Section should put into place a system to ensure strict monitoring of wireless connections to prevent unauthorized access to the network pending the implementation of the 'Network Access Control' system.

52. *UNJSPF accepted recommendation 19 and stated that it will use the Network Access Control (NAC) solution to enable the network connectivity of known devices and block network access to non-registered devices. UNJSPF also indicated that full compliance with the recommendation depends on approval of previously requested additional human resources. Recommendation 19 remains open pending the installation and configuration of the Network Access Control Solution (NAC).*

F. Security of web applications

53. The Fund signed a Memorandum of Understanding (MOU) and additional Service Delivery Agreements (SDAs) with the United Nations International Computing Center (UNICC) for the support of its computing services. A specific agreement disciplined the services for the hosting by UNICC of the Fund's web applications. The MOU and SDAs included adequate provisions regarding the confidentiality and security of information. In addition, OIOS obtained from UNICC a final report on the Statement on Auditing Standard No.70 (SAS 70 readiness and gap analysis), issued on February 2007 by the consulting firm Deloitte & Touche. The report presented some areas of weaknesses in: a) roles and responsibilities; b) changed control procedures; c) communication with UNICC client; d) business continuity planning and disaster recovery; and e) supervisory review. For the purpose and scope of this audit, however, the report confirmed that controls relative to the delivery and support of UNICC's services were particularly well developed with effectively designed internal controls observed in the areas of IT security, problem monitoring, escalation and resolution and service delivery agreement procedures. UNICC informed OIOS that a second phase of the SAS70 project will follow. This phase is designed to close the gaps and to provide UNICC with a consolidated Service Operations Manual by summer 2008.

54. Nonetheless, OIOS requested a specific vulnerability assessment on the web applications hosted by the UNICC. The ICT Security Officer of the Fund was successful in arranging and conducting the tests that in a scale of 1 to 5, with five being the highest risk level, produced an average security risk of 3. OIOS verified the basis of this rating and found that it was caused by old versions of software needed for maintaining backward compatibility with applications still used by many clients of the Fund.

Recommendation 20

(20) UNJSPF/Information Management Systems Section should ensure periodic conduct of vulnerability scans of the web applications hosted by UNICC, and use the results as input to the comprehensive IT risk management process of the Fund.

55. *UNJSPF accepted recommendation 20 and stated that it will request UNICC to amend the hosting agreement currently in place, to provide for the periodic conduction of vulnerability assessments on the applications hosted by UNICC. Recommendation 20 remains open pending receipt of evidence from UNJSPF of the periodic conduct of vulnerability assessments.*

G. Disaster recovery and business continuity

56. The Fund Secretariat developed a revised disaster recovery plan in response to the audit of OIOS (AS2006/800/04). The revised plan addressed only a limited part of the information that would be required in the event of disaster, such as:

a) The disaster recovery documents were mostly developed in the form of instructions rather than detailed procedures indicating the roles and responsibilities of key staff;

b) The indication of the disaster recovery sites for New York (IBM) and Geneva (UNICC) was not immediately evident. This information was only contained in the Remote Access Instructions;

d) In most cases the authors of the recovery procedures were unknown, and important details about who administers the systems, along with the internal contact information, were not included;

c) None of the guidance addressed the issue of which officer(s) is responsible for taking action and from whom to take instructions in the event of a disaster;

d) The test review forms named “DR Reports”, in some cases, contained incomplete information. In these cases, the officer completing the form did not indicate why the other sections of the form were not completed;

e) Contact lists of IT staff in UNJSPF New York and Geneva included limited amount of information. Two UNJSPF IT DR staff lists were issued, both of which contained different names, were not dated and did not include versioning information to determine which list was the most up-to-date;

f) The document “DR Recovery Plan 2006” was limited to a set of instructions about restoring the AS400 system. No information was included about the author of the document, the contact details of key staff, and periodic tests; and

g) The disaster recovery test plans pertaining to Content Management, Email, Insight, Lawson, Novell and Remote Access indicated the availability of internet connection as a prerequisite. The

plans, however, did not clarify what alternative action(s) should be taken if the prerequisite is not met or unavailable.

Recommendations 21 and 22

(21) UNJSPF/Information Management Systems Section should integrate its Disaster Recovery Plan with a reference document containing a consolidated inventory of systems and applications covered by the plan.

(22) UNJSPF/Information Management Systems Section should formally issue instructions for all systems and applications included in the Disaster Recover Plan, listing: a) the name of the author of the instructions; b) staff responsible for all activities identified in the Disaster Recovery Plan; c) the frequency of Disaster Recovery tests; c) the details of the Disaster Recovery back up sites; d) date, and version control information about all versions of the instructions; e) all contact information for the staff referenced in the plan; f) alternative course of actions and scenarios for those cases when the prerequisites stated in the instructions cannot be met.

57. *UNJSPF accepted recommendations 21 and 22 and stated it will consolidate the information for all systems and applications, and produce a reference document for business continuity and disaster recovery (BC/DR). Recommendations 21 and 22 remain open pending the consolidation of the BC/DR information system, and the issuance of a new reference document.*

INVESTMENT MANAGEMENT SERVICE

H. Information security policies and management system

58. Information security was regulated in Investment Management Service by an Information Systems Policy that also included references to a disaster recovery plan, acceptable use terms, and operational procedures. The policy defined the roles and responsibilities of the IMS Information System Services (ISS) department, end users of the Business Units and Financial Service Providers.

59. The policy did not adequately cover important areas of the security systems, such as the assessment and management of risks, provisions for security training and awareness, and the definition of consequences for information security violations. In addition, the policy

lacked some basic information concerning its date of issuance and periodic revisions.

Recommendation 23

(23) IMS/Information System Section should revise its Information Systems Policy to include provisions for the design and implementation of an information security management system based on the assessment and management of risks, security education, training and awareness. The policy should be dated, and indicate the requirements for its periodic revision, to be undertaken whenever there are any significant changes or at least annually.

60. *IMS accepted recommendation 23 and stated that it plans to revise the information security policy based on the results of external risk and vulnerability assessment. IMS expects to complete the risk and vulnerability assessment using the financial best practice framework and update the information security policy by the end of 2008. Recommendation 23 remains open pending the completion of the external network risk and vulnerability assessment, and the update of the information security policy.*

Information Classification

61. The Information Systems Policies issued by IMS included two confidentiality-related provisions:

a) Security Standards/Confidentiality, Page 1, stipulates that all information regarding trades, corporate evaluations, background checks must be kept in the strictest confidence. However all information is considered confidential on the IMS network; and

b) Appropriate Use, Paragraph 8.1, stipulates that “The IMS computing systems are considered unclassified systems”.

62. These two provisions are contradictory and allow confidential information to be processed and stored on unclassified systems, which is not in line with ST/SGB/2007/6, which requires identification of all sensitive data, assessment of risks, and deployment of mitigating controls.

Recommendation 24

(24) IMS/Information System Section should establish and implement data classification procedures in accordance with the United Nations Secretariat’s provisions issued in ST/SGB/2007/6,

**seeking relevant guidance from the United Nations
Archives and Records Management Section.**

63. *IMS accepted recommendation 24 and stated that it will seek guidance from the UN Archives and Records Management Section with regard to data classification procedures. Recommendation 24 remains open pending the implementation in IMS of the provisions established with ST/SGB/2007/6.*

I. Security of fax communications

64. IMS submitted trade orders using traditional fax machines. These machines were not located in a secured area, presenting potential security risks as faxed orders sat in plain view on shared fax machines in the open office space on the 4th floor of DHP building. OIOS notes that IMS will discontinue the use of fax machines as soon as the new real time trade order management system is deployed.

Recommendation 25

(25) IMS should ensure that, pending the implementation of the real time trade order management system, fax lines and machines dedicated to trade orders are maintained in a secure environment, with restricted access.

65. *IMS did not accept recommendation 25 and stated that trades and orders are only acceptable by brokers & Global Master Record Keeper & Custodian with two duly authorized signatures from IMS investment officers as per IMS investment manual and UN financial rules and regulations. In addition, IMS indicated that there is no physical office space to be dedicated as “secure environment” for fax machines. IMS indicated that it plans to submit a request to the UN-Information Technology Services Division to enable PIN code for all fax lines. OIOS considers the proposed establishment of PIN codes for all fax lines an additional control to mitigate the risk of unauthorized use of equipment and transmission of data. This control, however, does not address the risk of exposure of sensitive information contained in the IMS faxed orders that are left in plain view on the shared fax machines. On this basis, OIOS reiterates recommendation 25 and requests IMS to reconsider its initial response based on the additional information provided herein.*

J. Access Control

User password

66. IMS raised a requisition early 2007 for a multi-factor authentication solution for user’s authentication and remote access on the Lawson Financial System. The technical evaluation was completed later in April 2007. UN Procurement Service was in the process of performing

the final review. At the time of the audit, however, passwords typed by IMS staff traveled the internal network in clear-text (non-encrypted form). This condition exposed IMS to several security risks that are compounded by the existence of an un-protected connectivity service (telnet), enabled and used on several critical machines. OIOS was informed that the ICT services and infrastructure of IMS will be consolidated with those of the Fund Secretariat, including the implementation of a multi-factor authentication system.

Recommendation 26

(26) IMS/Information System Section should ensure that user passwords are transmitted over the network in an encrypted form.

67. *IMS accepted recommendation 26 and stated that this recommendation can only be implemented by the Fund Secretariat. IMS advised that, internally, it has standardized Windows 2003 Active Directory, and LDAP based directory service, with the authentication of users via secure protocol. Recommendation 26 remains open pending the full implementation of the password encryption solution on all critical applications in use at the Fund Secretariat and IMS.*

User registration

68. In consideration of the limited number of staff, IMS managed the registration of user accounts on the basis of emails requests. These procedures were inadequate for the support of user registration and authentication, exposing IMS to the risks of malicious damages, loss of critical information, unwanted disclosure of privileged information and disruption of services. In addition, this process was not in compliance with the requirements defined by IMS Information Systems Policies.

Recommendation 27

(27) IMS/Information System Section should define and implement user registration procedures that segregate request, authorization, recording, and changes of user access to systems and applications. These procedures should comply with the requirements stipulated in IMS Information Systems Policies.

69. *IMS accepted recommendation 27 and stated that it will define and implement a user registration procedure to process all user requests. The procedure will include user access, application request, and authorization. Recommendation 27 remains open pending the definition and implementation of the IMS user registration procedure.*

Third party remote account

70. IMS provided dedicated modem lines to an external service provider (Wilshire) to support the applications Omega and Abacus (performance measurement, analysis and trade order systems), and to troubleshoot technical issues (CipherTrust). These dedicated connections were not disconnected when not in use and exposed the IMS network to the risk of unauthorized access to sensitive data and information. Since the audit work, the modem line has now been terminated with the upgrade of the Wilshire Server to Windows 2003, which provides for a more secure link.

Log analysis

71. Log reports are used by IMS to identify unauthorized access to systems and applications. OIOS, however, did not find evidence of proper and periodic analysis of these logs for the timely detection of risks associated with: i) performance inefficiencies; ii) outside network attacks; iii) intrusions; iv) proxy misuse; and v) policy violations. OIOS notes that the impending ICT consolidation with UNJSPF will result in the use of IBM's Tivoli which has already been implemented by UNJSPF for this purpose.

Recommendation 28

(28) IMS/Information System Section should establish and implement procedures for the systematic review of logs to identify potential performance inefficiencies, security breaches, unauthorized intrusion or unauthorized access. These procedures should include detailed instructions for incident handling, notification, and remedial actions.

72. *IMS accepted recommendation 28 and stated that it will establish and implement procedures for the systematic review of logs to identify potential performance inefficiencies, security breaches, unauthorized intrusion or unauthorized access. IMS advised that its staff will attend Certified Computer Security Incident Handler (CSIH) certification program and establish a management system for handling security incidents. Recommendation 28 remains open pending the establishment of the management system for handling security incidents, including the implementation of procedures for log review.*

Access control of unauthorized devices

73. Unprivileged users could connect external devices (e.g. personal laptops) to the IMS network, without any specific control to detect foreign equipment. This condition exposed IMS to the risk of someone, equipped with a laptop containing tools to exploit known vulnerabilities, connecting to the network and obtaining access to privileged information.

Recommendation 29

(29) IMS/Information System Section should establish and implement procedures to ensure that ports on the network are restricted to known (registered) devices only, and that all official devices are registered for network use before they can be connected to the IMS' network.

74. *IMS accepted recommendation 29 and stated that it plans to implement port security for all user access devices. Recommendation 29 remains open pending the complete implementation in IMS of the port security for all user devices.*

K. Firewall configuration

Firewall security policy

75. IMS network is protected through the use of firewalls that regulate and monitor the protocols and services that can flow in and out of the network. As a result of the network vulnerability tests conducted, the configuration of the perimeter firewall contained access rules that were obsolete or not required. For example, the firewall configuration file contained two active rules (number 34 and 35) which allowed a non-secure connection (telnet) related to the services DataStream that was no longer in use. Also, rule 39 allowed an unnecessary telnet connection to the Cisco router that could have been replaced and supported by the available secure connection ("ssh"). These conditions exposed IMS network to the risk of someone using a non-encrypted communication channel for transmitting sensitive data and information in an unprotected manner. In addition, the IMS network is subject to the same conclusions mentioned for the Fund Secretariat regarding the over-reliance on firewall's protection. IMS reliance in protecting critical servers from external attacks with mainly firewalls is not effective with regard to the risk of internal attacks.

Recommendation 30

(30) IMS/Information System Section should conduct a review of all firewall rules and ensure that they are appropriate for the intended controls. Furthermore, the Section should conduct periodic reviews of firewall rules to ensure they are up-to-date with newly discovered security threats, vulnerabilities, and opportunities created from emerging and obsolete technologies.

76. *IMS accepted recommendation 30 and stated that it will perform checks on firewall systems, including patch updates, firewall rules*

amendment, and vulnerabilities assessment on a monthly basis. The results will be documented and shared with the IMS senior management. Recommendation 30 remains open pending receipt from IMS of the documented vulnerability assessments and management review of firewall rules.

L. Security of the network

77. The management of network security was in accordance with established best practices and generally accepted standards. These included a) protection of mission critical systems behind firewalls; b) isolation of mail servers and internal network; and c) the installation of intrusion detection systems. OIOS conducted technical tests to verify the reliability of network controls in place and found that some critical hosts of the IMS network had routable IP addresses. As described in the similar observation made for UNJSPF in paragraph 27, these configurations made these critical servers directly accessible from the Internet and therefore exposed them to the risk of malicious activities or attacks. These configurations included some critical servers of the IMS network that, although not visible from outside the network, were assigned routable internet protocol (IP) addresses.

Recommendations 31 and 32

(31) IMS/Information System Section should develop and implement a plan for the migration of all critical servers to non-public Internet Protocol addresses.

(32) IMS/Information System Section should improve its network security with the implementation of a multi layered controls for both internal and external threats.

78. *IMS accepted recommendations 31 and 32 and stated that it has initiated the conversion of all systems/desktops to non-public IP addresses. IMS will complete this migration before the end of April, 2008. IMS indicated that it has already implemented: a) anti-virus; b) anti-spam; c) intrusion prevention system; d) firewalls; e), secure remote Virtual Private Network (VPN); and f) secure email gateway to safeguard the network infrastructure. To further improve IMS network security, IMS plans to implement multi-factor strong authentication for internal sign-on manager and external VPN remote access. Recommendations 31 and 32 remain open pending: i) the conversion of all systems/desktops to non-public IP addresses; and ii) the implementation of multi-factor strong authentication system.*

Network services with known vulnerabilities

79. OIOS conducted a sample network vulnerability test, to review the types of services active on the IMS network, and found that among the nine servers tested, the Abacus server showed vulnerability classified at Risk Factor High.

Recommendations 33 and 34

(33) IMS/Information System Section should conduct periodic tests of the network, and ensure that all detected vulnerabilities are mitigated with the installation of the latest security patches.

(34) IMS/Information System Section should define and implement formal procedures for the automatic deployment of security patches updates.

80. *IMS accepted recommendations 33 and 34 and stated that it utilizes specialized software tool (i.e. Tenable Nessus) to scan all major servers on a monthly basis. IMS plans to a) implement Microsoft Windows Server Update Service; and b) define and implement formal procedures for the automatic deployment of security patch updates to all desktops and systems. Recommendations 33 and 34 remain open pending: i) the implementation of the Windows Server Update Service; and ii) the issuance and implementation of procedures for the automatic deployment of security patches.*

M. Disaster recovery & business continuity

Disaster recovery management

81. IMS had services and procedures in place to address the need to protect systems and applications in case a disaster occurs. Two external companies provided the main services: i) Sun Guard Data System Inc. for data center disaster recovery services; and ii) Iron Mountain for the off-site storage of backup tapes.

82. A disaster recovery plan was issued in July 2007, in response to the audit of OIOS (AS2006/800/04), and included documented procedures related to disaster recovery, such as: i) tape backup; ii) tape archive and offsite storage; iii) backup system recovery; iv) data recovery; v) system network backup architecture; and vi) back-Up tape retrieval from Iron Mountain.

83. OIOS noted that IMS disaster recovery policy required bi-yearly meetings between corporate information services, business unit end users, and financial services providers, to discuss and review the procedures in place. There were no minutes of the meeting that should have followed the annual test conducted in July 2007. In addition, the summary report about the lessons learned from the July test included a

very limited amount of information. This lack of review of information would prevent IMS from taking appropriate actions when required.

Recommendations 35 and 36

(35) IMS/Information System Section should document, implement and follow-up on the decisions taken during the bi-yearly meetings of the disaster recovery team. The minutes of the meetings should be circulated to all key officers and supplemented by follow-up reviews of the actions taken.

(36) IMS/Information System Section should issue a periodic report to senior management, documenting findings, lessons learned and the corrective actions taken and/or required for the mitigation of risks.

84. *IMS accepted recommendations 35 and 36, and stated that it will follow OIOS recommendation to document and circulate the Disaster Recovery (DR) plan, the results of the annual test, and the meeting minutes to all key officers. IMS has a plan in place to upgrade and enhance the helpdesk system to include reporting modules and change management control during this biennium. IMS intends to log and monitor all IT-security related activities into the new helpdesk system. Recommendations 35 and 36 remain open pending: i) the enhancement of the helpdesk system; and ii) evidence of the periodic review of IT security events and lessons learnt, following the annual disaster recovery plan.*

Business continuity management

85. While IMS completed a Business Impact Analysis (BIA) in 2006, it was still in the process of developing a comprehensive Business Continuity Plan. OIOS noted the following gaps:

a) The development of a Business Continuity Plan, as planned in “next project phase” of the BIA Report issued in March 2006, was still not complete;

b) A risk assessment focusing fully on business continuity processes had not been conducted, to evaluate the existing physical and environmental security controls, and to assess their adequacy relative to potential risks;

c) There were three recommendations, one of which rated critical, from a previous Audit of Disaster Recovery and Business Continuity audit by OIOS which had not yet been implemented (AS2006/800/04);

d) A comprehensive list of critical assets, and their priority, had not been developed (there is a list but it is limited in information);

e) There was no information available on the impact that interruptions, caused by information security incidents, could have on IMS operations;

f) The financial, organizational and environmental resources to address the identified information security resources had not been identified. Information on technical resources were available but were not comprehensive. The absence of this information limits IMS' preparedness to recover in case of disaster;

g) There was no information available on how the safety of personnel, information processing facilities and organizational property could be ensured in the event of a disaster. The absence of this information limits IMS' ability to prioritize its actions in case of disaster.

Recommendation 37

(37) IMS/Information System Section should complete its Business Continuity Planning Process including the following:

a) Conduct risk analysis of all business continuity processes;

b) Implementation of the recommendations issued in OIOS audit of disaster recovery and business continuity (AS2006/800/04);

c) Create a comprehensive list of all critical assets and their priority;

d) Document the impact of interruptions caused by any security incident and the action plan to address such incidents;

e) Identify the financial, organizational and environmental resources required to address security incidents; and

f) Document the details of how the safety of personnel, information processing facilities and property will be secured in the event of a disaster.

86. *IMS accepted recommendation 37 and stated that the initial phase of its Business Continuity Plan (BCP) includes a detailed Business Impact Analysis. In this regard, IMS indicated that it has implemented most of the recommendations listed in AS2006/800/04. IMS will include*

an auditing section in their BCP to map all recommendations with the actions taken. Recommendation 37 remains open pending receipt from IMS of the Business Impact Analysis, and the consolidated document detailing the actions taken to address OIOS recommendations regarding the content of the Business Continuity Plan.

COMMON ISSUE

N. Consolidation of ICT services

87. The IT Executive Committee recently established a working group for the consolidation of the information technology services of IMS and the Fund Secretariat. From an ICT security standpoint, the consolidation of the two environments could provide an opportunity to centralize the management of IT operations, standardize security controls, and prevent potential problems arising from the existence of different environments. Specifically, with regard to email operations, IMS and UNJSPF Secretariat operated two different systems. IMS had its own email domain running on Windows exchange servers while the Fund Secretariat's email, instead, run on the Lotus Notes platform of the United Nations Secretariat.

Recommendations 38 and 39

(38) The UNJSPF IT Executive Committee should ensure that the Service Level Agreement for the IT consolidation defines clearly the roles, responsibilities, and accountabilities for the management of information security operations at UNJSPF Secretariat and Investment Management Service.

(39) UNJSPF/Information Management Systems Section and IMS/Information System Section should ensure that the standardization of ICT operations include security controls, email communications, and infrastructure for the whole Fund Secretariat and IMS.

88. *IMS indicated that recommendation 38 should be assigned to the UNJSPF Secretariat, since it is the entity responsible for the preparation of the Service Level Agreement in support of the IT consolidation. Recommendation 38 remains open pending the response from UNJSPF regarding the definition of roles, responsibilities, and accountabilities for information security in the Service Level Agreement of the IT consolidation initiative.*

89. *IMS accepted recommendation 39 and stated that it worked with the UNJSPF Secretariat in the standardization of hardware and software platform for ICT operations. IMS advised that most of the ICT*

infrastructure and security solutions have been standardized within the financial best practice framework. ICT common infrastructures that have been jointly implemented include the shared T3 Internet Service Provider; the shared off-site tape storage; and the Microsoft enterprise application licenses. Based on IMS' response, recommendation 39 has been closed.

V. ACKNOWLEDGEMENT

90. We wish to express our appreciation to the Management and staff of UNSPF and IMS for the assistance and cooperation extended to the auditors during this assignment.

STATUS OF AUDIT RECOMMENDATIONS

Recom. no.	C/O ¹	Actions needed to close recommendation	Implementation date ²
1 & 2		Submission to OIOS of documentation showing the measures taken to conduct yearly reviews of UNJSPF information security policies and standards.	May 2008
3 & 4		Preparation of: i) Data dictionary; ii) Data inventory; and iii) Data security classification and controls.	May 2008
5		Preparation of: i) list of ICT assets included in the scope of the ISMS; ii) definition of the ISMS boundaries; iii) evidence of the controls implemented; iv) risk management framework; and v) information risk assessment and ratings.	December 2009
6		Segregation of functions pertaining to ICT security, network administration and user registration.	December 2010
7		Completion of the fail-over tests and preparation of a detailed Service Level Agreement with the building-authorized company.	December 2008
8		Issuance of the security awareness documentation.	June 2008
9		Installation of Hard Disk encryption software on all laptops in use at the Fund.	September 2008
10		i) Removal of unneeded network services; ii) encryption of traffic on all critical systems; iii) review of known vulnerabilities; iv) implementation of the network access control solution; v) documentation of monitoring procedure of systems operations and database administrators; vi) validation of all data output from application systems, with reference to user's status and privileges, and the classification of information.	December 2010
11		Removal of all Telnet services;	September 2008
12		i) Installation of encryption layer protection on all relevant applications; ii) removal of all unnecessary network services; and iii) installation of secure applications for the replacement of those network services deemed necessary.	May 2009
13		Completion of the update and patching of all systems with the PatchLink software.	October 2008
14		Installation of the link encryption software for the network connection between New York and Geneva.	May 2009
15		Implementation of the password encryption solution on all UNJSPF legacy systems.	September 2008
16		Implementation of the UNJSPF password standard.	July 2008
17		Installation and configuration of the Network Access Control Solution.	September 2008
18		Establishment and implementation of procedures for the formal review and authorization of requests for third party remote access.	December 2008
19		Installation and configuration of the Network Access Control Solution (NAC).	September 2008
20		Completion of a periodic vulnerability assessment cycle.	December 2008

Recom. no.	C/O ¹	Actions needed to close recommendation	Implementation date ²
21 & 22		Consolidation of the BC/DR information system, and issuance of a new reference document.	December 2008
23		Completion of the external network risk and vulnerability assessment, and update of the information security policy.	12/31/08
24		Implementation of the provisions established with ST/SGB/2007/6.	07/31/09
25		Installation of the fax lines and machines dedicated to trade orders in a secure environment, with restricted access.	Not provided
26		Implementation of the password encryption solution on all critical applications in use at the Fund Secretariat and IMS.	07/31/08
27		Definition and implementation of the IMS user registration procedure.	05/31/08
28		Establishment of the management system for handling security incidents, including the implementation of the procedures for log review.	12/31/08
29		Implementation of the port security for all user devices.	08/31/08
30		Preparation of documented vulnerability assessments and management review of firewall rules.	05/31/08
31		Conversion of all systems/desktops to non-public IP addresses	04/30/08
32		Implementation of multi-factor strong authentication system.	07/31/09
33		Implementation of the Windows Server Update Service	05/31/08
34		Issuance and implementation of procedures for the automatic deployment of security patches	07/31/08
35		Enhancement of the helpdesk system.	10/31/08
36		Submission to OIOS of documentation showing the measures taken to conduct periodic review of IT security events and lessons learnt, following the annual disaster recovery plan.	07/31/09
37		Completion of the Business Impact Analysis, and issuance of the consolidated document detailing the actions taken to address OIOS recommendations regarding the content of the Business Continuity Plan.	09/30/08
38		Definition of roles, responsibilities, and accountabilities for information security in the Service Level Agreement of the IT consolidation initiative.	Not Provided. Pending Reply from UNJSPF
39		Action completed.	Implemented

1. C = closed, O = open

2. Date provided by UNJSPF and IMS in response to recommendations.