ISMF

Institutional and Sector Modernisation Facility

ICT Standards

ICT Maintenance

Document number: ISMF-ICT/3.11
Version: 1.00

SOFTWARE AG   PLANET   NEWS PHONE

1 Document control

1.1 List of Abbreviations

Abbreviation	Description
ICT	Information and Telecommunication Technology
ISMF	Institutional and Sector Modernisation Facility
MoCT	Ministry of Communications and Technology

1.2 Purpose of this Document

The purpose of this document is to provide best practices and guidelines for scheduling and performing maintenance operations on ICT systems.

2   Introduction

This document describes the fundamental steps to build a consistent ICT maintenance system, which are as follows:

❑   Maintenance planning and contracting (implement hardware / software / data / telecommunications inventories, prioritize needs)
❑   Schedule / Monitor Maintenance Activities

Furthermore, the document presents a sample methodology for ad-hoc maintenance interventions in Annex I.

2.1   Purpose

The purpose of this document is to provide best practices and guidelines for scheduling and performing maintenance operations on ICT systems.

2.2   Audience

The primary audience consists of System Administrators, who have the responsibility to schedule and monitor ICT maintenance activities.

The secondary audience consists of System Architects/Analysts and/or Business Analysts who are involved in Requirements Specification gathering and System Design.

2.3   In Scope – Out of Scope

It is in the scope of the document to state the main elements and tasks of ICT maintenance activities, as well as to provide guidelines for their implementation.
It is out of the scope of this standard to provide:

❑   Suggestions for detailed maintenance activities (e.g. how a server or router should be maintained)
❑   Template(s) of maintenance contract(s).
❑   Describe in detail a Tracking Software Bugs/Problems/Enhancements.

2.4   Assumptions

It is assumed, throughout this document, that ICT maintenance is outsourced to external providers under one or more maintenance contracts (which is highly recommended). However, if ICT maintenance activities are to be kept in-house (i.e. they will be addressed by internal resources), similar terms, conditions, procedures and precautions apply.

2.5   Other Standards

Other related standards include "Systematic Assessment of Existing Systems".

3 Overview

3.1 General

ICT-Maintenance is considered as the set of all actions which have as an objective to retain an item (or the whole system) in, or restore to, a state in which it can perform the **required function**. The actions include the combination of all technical and related administrative, managerial, and supervisory actions such as tests, measurements, replacements, adjustments and repairs.

Notice that the term "can perform the required function" covers also fixing of problems (bugs) which may be present but not detected during the acceptance test(s), as well as adaptations to a changing environment.

Since Information tools belong to the assets of the Organization, ICT-maintenance doesn't differ in nature from other assets (e.g. machinery) maintenance and in most of the cases is (or should be) based on maintenance contracts with the ICT suppliers.

3.2 When to carry out

ICT Maintenance is distinguished as:

❑ Preventive, which aims in retaining the system's capabilities before the occurrence of any problem (e.g. system failure).
❑ Corrective, which aims in restoring the defective item(s) to the required state.
❑ Adaptive, which focus in adjusting a software product to properly interface with a changing environment.
❑ Perfective, which refers to enhancements to the product in order to either add new capabilities or modify existing functions.

Preventive and **Corrective** maintenance are both critical factors in maintaining ICT system's availability and performance. Preventive maintenance is usually done in regular time intervals (according to each item's specifications). Ad-hoc preventive maintenance is performed after new software product releases or versions, if they are recommended for bug fixing. Corrective maintenance is required after the occurrence of a problem or failure, hence the response time of the contractor or the overall availability of the system and its elements are essential indicators and terms in a maintenance contract.

Adaptive maintenance is required mostly in unstable legislative, institutional and/or technical environments. It is performed ad-hoc, in accordance with the frequency the environment changes.

Guideline 3.2
It is important to keep in mind that upgrading either the system or the application software may result to some inconsistencies within the total system. Not all applications can run effectively under any versions/releases. Furthermore, application upgrades may also require database upgrades etc. It always recommended to: ❑ Maintain a development environment, where new software releases can be tested for possible inconsistencies or malfunctions, before they are applied to the production environment. ❑ Back-up all data before proceeding to software upgrades.

Perfective maintenance is normally part of a successful system's life cycle, and refers to further extensions and improvements beyond the initial specifications. It may include the

implementation of new software modules and/or new OS and off-the-self software versions which aim in performance improvement. In some cases, additional hardware is required to improve system security and performance.

3.3   How to carry out

3.3.1   Preparing

Since the Organization may possess information systems and tools purchased from different vendors in a long time period, an efficient recordkeeping of the systems in hand is essential for maintenance management; hence performing a hardware, software and telecommunications inventory is the first step of an efficient maintenance program. Appropriate maintenance of the records and transaction monitoring result to keeping the information up-to-date, which in turn allows statistical data extraction to be used as input to further consideration about system maintainability, sustainability and related costs.

For record keeping, simple techniques like spreadsheets and custom databases may be used; for efficient monitoring of complex systems an integrated Asset Management tool (as described in next section) is required.

A data preservation survey must be conducted, indicating volumes, importance and retention period of data, which in turn results to decisions about data retention periods, backups and requirements on availability and security.

Finally, simple and consistent processes must be defined for issues reporting and restoring activities. A sample process is described in Annex I.

3.3.2   Obtain a good and detailed system documentation

A well documented system (covering the entire architecture as well as all of its elements) is very important, especially for software maintenance. Furthermore, an updated documentation, reflecting the changes derived from the maintenance activities, should be provided for future purposes. Good documentation aims in providing structured instead of unstructured maintenance:

❑   **Unstructured** maintenance wades straight into the source code and makes changes based on that alone
❑   **Structured** maintenance examines and modifies the original design, and then reworks the code to match it

Clearly structured maintenance is a more reliable and (usually) a more efficient process. Unfortunately, it's not possible without detailed design documentation.

3.3.3   Prioritizing needs

Maintenance costs are a significant part of the system's total life cycle costs. Therefore, revision of the business non-functional requirements (such as availability, performance etc) for each part of the system is essential before any signing a new maintenance contract in order to keep Organization's costs within affordable barriers.

Guideline 3.3.3
In various studies, maintenance costs have been observed to consume from 50% to 80% of total life cycle costs, and typically consume 65% to 75% of total life cycle costs. Approximate proportions: ❑   Corrective 21%

Guideline 3.3.3
❏ Adaptive 25%
❏ Perfective 50%
❏ Preventive 4%
The above is just an approach aiming in providing help in calculating the total cost of ownership of the ICT systems (for budgeting / feasibility study purposes).

3.3.4 Contracting

Maintenance contracts may be signed with the ICT providers who supplied the equipment/ICT system or third parties who are in possession of the appropriate infrastructure. Increasing the number of contracts and contractors increases complexity and may cause administrative problems; hence it is advisable to review and consolidate maintenance contracts regularly, possibly achieving significant cost reductions as well.

Guideline 3.3.4
Although preventive and corrective maintenance should be part of any maintenance contract (and it is highly recommended at fixed cost per year), adaptive and perfective maintenance could be covered by separate ad-hoc contracts and/or on a time/material basis.
In each maintenance contract, consider, among others, the following parameters: ❏ Minimum stock availability of critical parts (motherboards, memory, disks etc) ❏ Possibility of system/network manager to have remote access to the computers. ❏ Support hours (days per week / hours per day) ❏ Out of office hours maintenance (e.g. remedial services) ❏ Planned outage / maintenance (frequency, days, hours) ❏ Maximum acceptable duration of unplanned outage (or total availability). ❏ Penalties for failure to meet the requirement above. Maximum acceptable duration of unplanned outage and Penalties may vary upon the criticality of the functions performed by the defective item (is it a server? Switch? PC?) Note also that the above parameters may be combined, such as: ❏ Even when support hours cover 24x7, the maximum acceptable duration of unplanned outage can be greater during the night than during working hours, etc.
Minimum stock availability: In critical environments and/or systems with very high availability requirements, it is often desirable to keep (even locally) a stock of critical system parts to minimize system downtime.
Remote access: It is important that the contractor has the possibility to access the system remotely for maintenance services provision. However this could implicate security problems.
Support hours: Answering support requests has direct impact on the costs for contractor's staff and headcount planning. Each "call-out" has a specific impact, e.g. costs. Therefore request only those support hours actually needed.
Out of office hours maintenance: System can be maintained only during working hours?
Planned outage: Although the likelihood of unplanned downtime can be significantly reduced by appropriate (expensive and complex) measures, it is impossible to guarantee no unplanned downtime. All systems, even "High Available (HA)" systems in clustered environments, need at least planned downtime (e.g. for upgrades, which in long term can not be avoided).
Maximum acceptable duration of unplanned outage: This is just one way to depict the required availability. The advantage of it is that it is easy to use. The disadvantage is that for

Guideline 3.3.4
systems with respectively low MTBF (Mean Time Between Failure), this indicator does not reflect the total system's availability (and thus usage). Prefer using the **Total Availability** indicator (TA = (working hours – failure period) / working hours during a year period) to count system's availability and related penalties. Diversify the availability indicators (if necessary), according to the geographical distance (i.e. different indicators for systems located in the Organizations central data centre and those installed in other geographically distributed locations). _Note:_ If High Availability (i.e. > 99%) is desired, a special architecture (such as clustered servers) must be in place. Otherwise requesting High Availability in a maintenance contract is of no use. .
Penalties are generally defined as a percentage of the purchase or maintenance cost of the defective item. If an item fails, all other items that depend on it are also considered to be in failure. Penalties (as percentage) may increase radically when outage dramatically surpasses the acceptable duration.

4 ICT Maintenance and Asset Management tools

4.1 General

Depending on the size of the Organization and the level of the computerization, inventory maintenance tools may include:
❑ Spreadsheets
❑ Databases
❑ Dedicated (Asset Management) tools

4.2 Spreadsheets

Spreadsheets offer more functionality than word-processed reports and need not be complex. Benefits of spreadsheets include being able to sort data by different elements, for example model or location, making the research more useable for different purposes. To gain the most from this format it is essential to clearly identify what information is captured in each column and to segment it as much as possible, that is, to capture small units of information separately.

4.3 Databases

In cases where many maintenance requirements exist, or where requirements are likely to change frequently, it may be more appropriate to store information about the organisation's maintenance records into a **database**.

4.4 Dedicated tools

In many organizations because of the number of devices or products that need to be maintained or the complexity of those systems, there is a need to manage the information with software packages. These software tools aim to help engineers and technicians to increase the availability of the system and reduce costs and repair times as well as to reduce material supply times and increase material availability. That software can perform:
❑ Planning operations
❑ Managing execution of events
❑ Asset Management (Parts, tools and equipment inventories)
❑ Knowledge base data on:
    ❑ Maintenance service history
    ❑ Serial numbered parts
    ❑ Reliability data
        ▪ MTBF(Mean Time Between Failure),
        ▪ Failure Rate,
        ▪ Total Availability
    ❑ Maintenance and Repair documentation and best practices
    ❑ Warranty documents

5 Performing Inventories

5.1 Hardware Inventory

Hardware Inventory includes:
- Enterprise level servers, disk storage equipment
- Distributed servers, disk storage and network communications equipment (LAN)
- Local Desktop Devices, Laptops, Cell Phones, PDA's, etc.
- UPS, Generators, Emergency Power Systems
- Associated Maintenance Agreements
- System Documentation

A checklist of the minimum required information on hardware is available in Annex II.

Guideline 5.1
There are three main sources of information for keeping hardware inventory up-to-date: ❑ Purchase contracts ❑ Physical inspection ❑ Network Management Tools (or other information-gathering software). These sources must be cross-checked to ensure the validity of information.

5.2 Software Inventory

Software Inventory includes:
- Verification of the type of license and transferability (e.g. Master License Agreement, Academic License Agreement, etc)
- Enterprise level commercial-off-the-shelf (COTS) software licenses, installation media and documentation.
- Custom developed software, configuration management libraries & procedures, binary images, documentation and all project related material.
- Distributed COTS software licenses, installation media and documentation
  - Local COTS software licenses, installation media and documentation
  - Software and Associated Maintenance Agreements
  - Transference to New Dept or Local Entity
- System Documentation
- Version Control
- Configuration Management

A checklist of the minimum required information on hardware is available in Annex II.

Guideline 5.2
As for hardware inventory, there are the same main sources of information for keeping software inventory up-to-date: ❑ Purchase contracts ❑ Physical inspection ❑ Network, System and Application Management Tools (or other information-gathering software). These sources must be cross-checked to ensure the validity of information.

5.3 Data preservation

Information regarding data preservation includes:
- Description (what the content is) and Value (how critical data is for the organization) of the data
- Legal Issues (does legislation set any regulations on the preservation of data?)
- Archive and Records Retention Policies
- Ownership (who owns the data?)
- Access Required by Other Entities or Systems (does anyone outside the Organization need access to the data?)

Guideline 5.3
Data preservation is a non-functional requirement of an ICT system.   *<Refer to "Systematic assessment of existing systems" document for a discussion about the information Inventory>*
Archiving and **purging** activities, as well as **back-up** activities, are part of preventive maintenance. They may or may not be part of a maintenance contract, but in any case the appropriate tools must have been provided as part of the main (purchase) contract.

5.4 Telecommunications Inventory

Telecommunications Inventory includes:
- Network Equipment (leased, financed or owned), Maintenance Agreements and Circuits
- PBX, Switches
- Racks and Other Peripherals
- Circuits, Service Providers, Maintenance and Monitoring Contracts
- Point-to-Point Connections
- Impact on internal and external entities if services are terminated

The checklist of the minimum required information on telecommunication devices is the same as the one provided for the hardware inventory in Annex II.

5.5 System's Architecture

Since the above information is fragmented, the detailed system's architecture must be described to depict the physical residence of the hardware / software / data and telecommunications elements, as well as their interaction with the organization's environment. The integrated architecture diagram(s) proves to be very helpful in locating possible source of problems and failures.

Guideline 5.5
Refer to "System Design" document for the description of the appropriate architecture diagrams.

6 Scheduling and Monitoring Maintenance Activities

6.1   Scheduling

Maintenance activities scheduling takes place only for preventive maintenance, which is performed during planned outage periods (see section 3.2).

Preventive maintenance has the following objectives:

❑ Keeping equipment and facilities in satisfactory operating condition by providing for systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects.

❑ Maintenance, including tests, measurements, adjustments, and parts replacement, performed specifically to prevent faults from occurring.

Some examples of preventive maintenance include:

❑ Measurement of system's performance and appropriate tuning
❑ Virus scanning
❑ Active directory scanning
❑ Data volume control and compression (if applicable)
❑ Data archiving / purging
❑ Hard discs bad blocks detection and replacement
❑ Batteries replacement etc

Guideline 6.1
Build a yearly plan for preventive maintenance, indicating the responsible person for each activity. Monitor the activities as appropriate.
For safety reasons, keep important backup data in a safe place outside the building where the installation resides.

6.2   Monitoring

Maintenance Activities must be monitored. Related transaction data serve in the calculation of the penalties (if applicable), tracing of the costs etc, whereas statistical data contribute to decisions about system maintainability, sustainability or upgrade needs.

Refer to Annex II for a sample format of monitoring requirements.

7   CONCLUSION

ICT Maintenance is considered to include any post-delivery modification to an existing system. Although a preventive and corrective maintenance contract is strongly recommended for the Organization's ICT systems, adaptive and perfective maintenance contracts / agreements may be signed ad hoc.

Maintenance is considered to be a significant cost-consuming part of the systems' life cycle. Therefore maintenance needs must be prioritized and carefully planned.

Important parts of the planning activities are the hardware, software, data and telecommunication inventories.

Typical problems with maintenance include:
❑   Inadequate documentation of system design and structure
❑   Loss of "cultural" knowledge of system due to staff turnover
❑   Lack of allowance for change in original software design
❑   Inconsistencies between new software versions/releases and the existing applications/tools.

ICT systems' maintainability is enhanced by:
❑   robust initial design and understandable system/software structure
❑   comprehensive and accurate documentation (including design documents)
❑   use of standards (design, language, coding, etc.)
❑   availability of extensive test cases

Bad maintenance practices may cause significant side-effects, such as:
❑   Coding side-effects (inadvertent removal of vital code, changes in semantics of code, unexpected changes in execution path)
❑   Data side-effects (changes in data structures may render older data invalid or incomplete, changes in global constants, changes in data ranges)
❑   Documentation side-effects (forgetting to document code or data structure changes, changes not reflected in user manuals or interface)

To prevent such side-effects:
❑   Maintain a development environment where you can test new versions/releases of both system and application software before deployment.
❑   Back-up applications and data before any software deployment.
❑   Obtain upgraded system documentation after any new software version/release deployment.

Monitoring maintenance activities is a major task of System Administration Activities, and provides significant data about overall system quality and costs. The maintenance process is owned by the IT directorate/department of the Organization, and based on predefined rules and tasks as depicted in Annex I.

APPENDIX I

8 Appendix I - Sample methodology for ad hoc Maintenance Interventions

8.1 Roles and Responsibilities

The sample methodology described bellow is based on three major roles:

- **The hardware/software system owner**, a user (in case of a PC, printer etc) or a department (in case of a software system or module) who has the right and responsibility of raising maintenance requests.
- **The hardware/software system administrator** (usually a technician), who has the right and responsibility to evaluate the request, resolve it if possible or escalate it to the maintenance contractor. In case of large scale systems with a user help desk (first level support), internal escalation (second level support) may also be possible.
- **The maintenance contractor**, who is responsible for the system maintenance, according to the terms of his contract.

The maintenance process is owned by the Organization's IT directorate/department. This should include a Help or Service desk for acquiring and evaluating the maintenance requests as well as providing first level support. According to the Organization's business rules and the type of the maintenance contract (e.g. non-fixed cost based), maintenance requests to the contractor may have to be approved by the Organization's management.

8.2 Issue Escalation

Apart from the escalation mentioned before, and according to the Organization's business rules, a severe or persisting problem must be reported to the organization's management. The rules for such an official notification may be assigned to each item as the matrix bellow:

Org. Unit ➔ Job Level ⬇	IS / IT	Help desk / Service desk	Business (indicate which department(s))
		immediate	
Level-1			
Level-2			
Level-3			
…….			
Level-n			

Instructions:
- Fill the first column with job levels as appropriate
- In each other column fill in one of following options:
  - immediate
  - After <..> [minutes | hours | days]
  - never

8.3   Methodology steps

The sample methodology steps to perform ad-hoc maintenance interventions are shown in
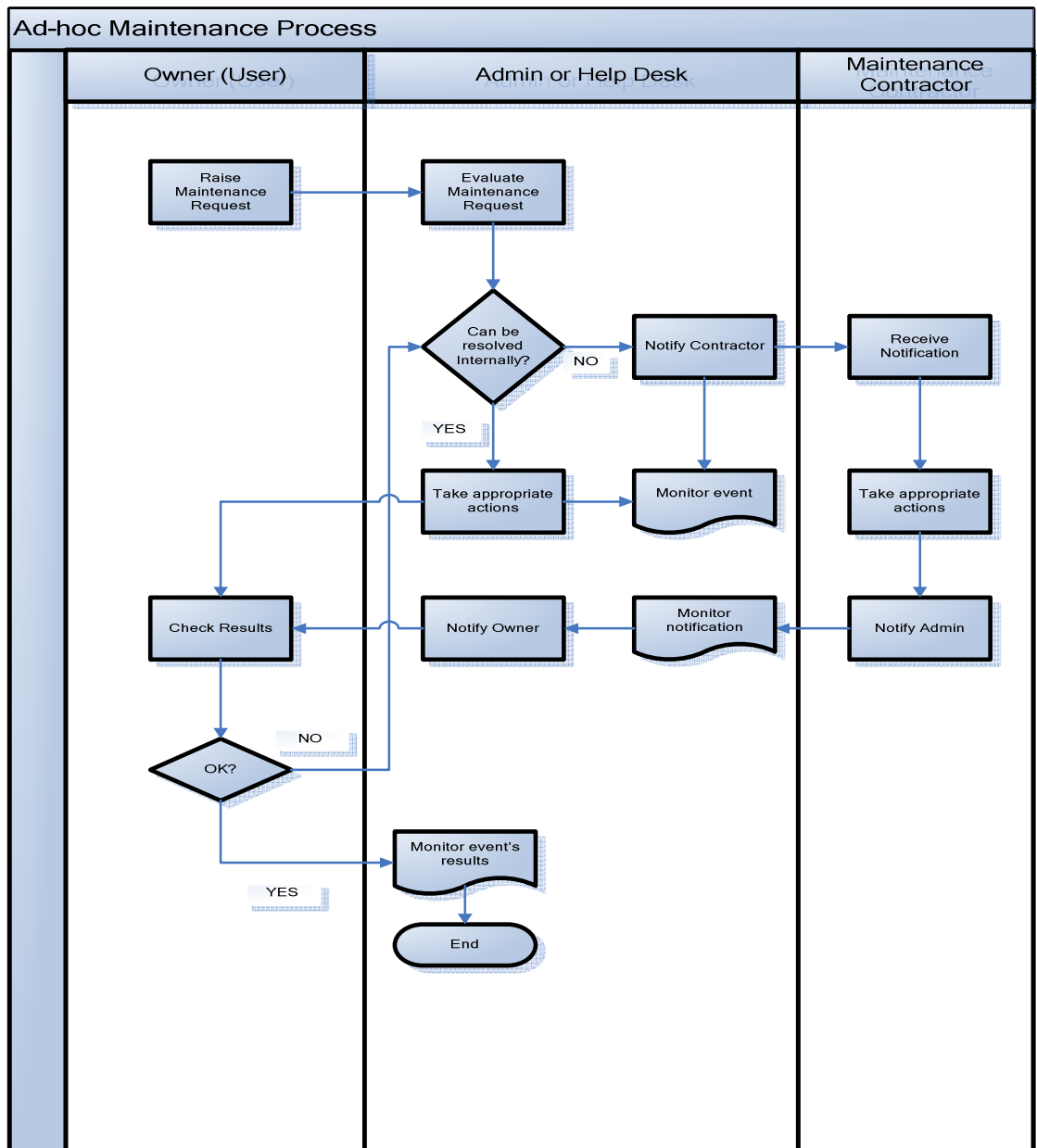*Figure 1* bellow.

Figure 1: Ad – hoc Maintenance process

APPENDIX II

9 Appendix II - Inventory and Maintenance Data

9.1 Hardware Inventory Information

This section describes the minimum information required in performing hardware inventory.

9.1.1 Identification Data

Identification Code

Assign an Identification Code to the Equipment

Guideline 9.1.1A
Prefer assigning a code with no semantic meaning. Stick a paper with the ID on each piece of equipment.

Type of equipment

Identify the type of the equipment (e.g. data base server, web server, PC, printer etc)

Guideline 9.1.1B
If a database system is used, first create a look-up table with all equipment types available in the Organization. This helps in avoiding spelling errors or duplicate definitions.

Manufacturer

Enter the name of the Manufacturer (e.g. IBM, SUN, etc)

Guideline 9.1.1C
If a database system is used, first create a look-up table with all manufacturers of the Organization's equipment. This helps in avoiding spelling errors or duplicate definitions.

Model

Enter the model (brand name) of the equipment

Part number

Enter the part number of the equipment

Guideline 9.1.1D
If a piece of equipment consists of a main unit (e.g. a server) and numerous smaller parts (e.g. RAM memory sticks, hard disks), which have their own part numbers, the part number of the main unit should be noted along with adequate information about its parts.
Part numbers are useful for spare parts ordering.

Serial number

Enter the serial number of the equipment.

Guideline 9.1.1E
Serial numbers must be part of delivering documents. The comparison with the associated contract/delivering documents helps in maintaining inventory data consistent.

9.1.2 Administrative data

Usage

Describe the usage of the equipment (e.g. for a PC describe if it is used mostly for office automation applications or as client to n-tier applications).

Guideline 9.1.2A
Information on usage aims in understanding how critical each piece of equipment is, and thus helping to decide the most appropriate maintenance policy.

Location

Enter location/building/floor/office where the equipment resides.

Guideline 9.1.2B
The information above aims in locating the equipment both for maintenance provision purposes and audit activities.

Owner

Enter the name of the person who is responsible for the equipment's daily operation.

Guideline 9.1.2C
The same person is responsible for reporting any equipment-related malfunctions for corrective maintenance.

Administrator

Enter the name of the technician who is responsible for the proper function of the equipment.

Guideline 9.1.2D
The same person is responsible for receiving any issues on related malfunctions raised by the "owner".
If a database system is used, first create a look-up table with all responsible technicians. This helps in avoiding spelling errors or duplicate definitions.

9.1.3 Technical / Functional characteristics

CPU

Enter number, type, clock rate etc of the main CPU components.

Guideline 9.1.3A
Although all systems include processors, this information is optional in case of peripheral devices such as printers, scanners, routers etc

Main memory

Enter size and type of the main memory.

Storage

Enter size, type, interface and other technical characteristics of the storage system.

Guideline 9.1.3B
This information is not applicable in many types of peripheral equipment

Communication port(s)
Enter number, type and other technical characteristics of the communication port(s).

Display device(s)
Enter number, type, size and other technical characteristics of the display device(s).

Guideline 9.1.3C
The related information is optional in case of integrated display devices (small LCD screens etc)
If the manufacturer of the display device is different from the one of the integrated equipment, add manufacturer/model information.

OS system and version
Enter Operating System name and version (if applicable).

Documentation
Enter information about the existing documentation (e.g. User manuals, technical manuals etc).

Other
Enter other relevant technical characteristics (e.g. black-white/color, pages/minute for printers etc).

Guideline 9.1.3D
In case of telecommunications equipment, enter, among others, protocol(s) used

9.1.4 Financial data

Month/Year purchased
Enter the month/year of equipment's purchase.

Guideline 9.1.4A
This information is useful for deciding maintenance/replacement activities and amortizing costs.

Purchase contract no
Enter the number/year of the purchase contract.

Guideline 9.1.4B
This information is useful for retrieving any guarantee data.
If a database system is used, first create a look-up table with all the Organization's ICT related purchase contracts. This helps in avoiding spelling errors or duplicate definitions.

Maintenance contract no
Enter the number/year of the maintenance contract.

Guideline 9.1.4C
This information is useful for retrieving any data related to the current maintenance status.
If a database system is used, first create a look-up table with all the Organization's ICT related maintenance contracts. This helps in avoiding spelling errors or duplicate

Guideline 9.1.4C
definitions.

Yearly maintenance scheduled cost

Enter a forecast for the maintenance cost for the current year.

Guideline 9.1.4D
This information is useful for budget calculations for the ICT department(s) costs.
If a fixed cost maintenance contract is applicable, enter the estimated cost for the current item. The sum of the estimated costs for all items covered by the maintenance contract must equal the contract's budget.

Yearly maintenance actual cost

Enter the effective maintenance cost for the current year.

Guideline 9.1.4E
This information is useful for budget calculations for the ICT department(s) costs. Consider a report indicating differences between foreseen costs and actual ones to improve forecasting capabilities.
If a fixed cost maintenance contract is applicable, this amount is usually the same as the scheduled one, except in cases where incidents non-covered by the maintenance contract happened.

Remarks

Enter any other useful information (free text).

9.2   Software Inventory Data

This section describes the minimum information required in performing software inventory.

9.2.1   Identification Data

Identification Code

Assign an Identification Code to the Equipment.

Guideline 9.2.1A
Prefer assigning a code with no semantic meaning.

Type of software

Identify the type of the equipment (e.g. OS, RDBMS, NMS etc)

Guideline 9.2.1B
If a database system is used, first create a look-up table with all software types available in the Organization. This helps in avoiding spelling errors or duplicate definitions

Manufacturer

Enter the name of the Manufacturer (e.g. Microsoft, Oracle, SUN etc).

Guideline 9.2.1C
If a database system is used, first create a look-up table with all manufacturers of the Organization's software. This helps in avoiding spelling errors or duplicate definitions

Brand Name

Enter the brand name of the software (e.g. MS-Windows 2000 etc).

Part number (order number)

Enter the part (order) number of the software.

Guideline 9.2.1D
Part (order) numbers may not be applicable for custom software.

License type

Enter the type of the license (e.g. site license, 4-processor license, 50-user license etc).

License number

Enter the license number.

Guideline 9.2.1E
License numbers must be part of delivering documents. The comparison with the associated contract/delivering documents helps in maintaining inventory data consistent.

9.2.2   Administrative Data

Equipment

Enter equipment ID where the software resides.

Guideline 9.2.2A
The information above is mandatory in cases of servers or other important equipment. For other cases (e.g. Operating Systems or Office Automation Software on PCs), just be sure to cover the legislative framework requirements.

Owner

Enter the name of the person who is responsible for the software's daily operation.

Guideline 9.2.2B
The same person is responsible for reporting any software-related malfunctions for corrective maintenance.

Administrator

Enter the name of the technician who is responsible for the proper function of the software.

Guideline 9.2.2C
The same person is responsible for receiving any issues on related malfunctions raised by the "owner".
If a database system is used, first create a look-up table with all responsible technicians. This helps in avoiding spelling errors or duplicate definitions.

9.2.3 Technical / Functional characteristics

Functionality

Enter the main function(s) of the software system (free text).

Guideline 9.2.3
In case of multi-module system describe the functionality of each module and their interconnection.

Development tools and operation environment

Enter the operation environment (i.e. OS, RDBMS) & the tools used to develop the software(e.g. VB6, Oracle Developer etc).

Communication connection and capabilities

Enter the build-in software system communication(s) with other system(s), as well as communication protocol(s) supported (e.g. XML, HL7 etc).

Documentation

Enter information about the existing documentation (e.g. User manuals, technical manuals, workflow diagrams, source code etc).

Other

Enter other relevant technical characteristics.

9.2.4 Financial Data

Month/Year purchased

Enter the month/year of the software's purchase.

Guideline 9.2.4A
This information is useful for deciding maintenance/replacement activities and amortizing costs

Purchase contract no

Enter the number/year of the purchase contract.

Guideline 9.2.4B
This information is useful for retrieving any guarantee data.
If a database system is used, first create a look-up table with all the Organization's ICT related purchase contracts. This helps in avoiding spelling errors or duplicate definitions.

Maintenance contract no

Enter the number/year of the maintenance contract.

Guideline 9.2.4C
This information is useful for retrieving any data related to the current maintenance status.
If a database system is used, first create a look-up table with all the Organization's ICT related maintenance contracts. This helps in avoiding spelling errors or duplicate definitions.

Yearly maintenance scheduled cost
Enter a forecast for the maintenance cost for the current year.

Guideline 9.2.4D
This information is useful for budget calculations for the ICT department(s) costs.
If a fixed cost maintenance contract is applicable, enter the estimated cost for the current item. The sum of the estimated costs for all the items covered by the maintenance contract must equal the contract's budget.

Yearly maintenance actual cost
Enter the effective maintenance cost for the current year.

Guideline 9.2.4E
This information is useful for budget calculations for the ICT department(s) costs. Consider a report indicating differences between foreseen costs and actual ones to improve forecasting capabilities.
If a fixed cost maintenance contract is applicable, this amount is usually the same as the scheduled one, except in cases where incidents non-covered by the maintenance contract happened.

Remarks
Enter any other useful information (free text).

9.3   Maintenance Monitoring Data

This section describes the minimum information required for monitoring maintenance activities.

9.3.1   Identification Data

Event code
Assign an Identification Code to the maintenance event

Hardware / Software Identification Code
Enter the ID code of the item to be maintained.

Guideline 9.3.1A
If a database system is used, perform a look up in the related tables

Type of the equipment/software
Enter the type of the item to be maintained.

Guideline 9.3.1B
If a database system is used, this information is optional, since it is derived from the item's code.

Type of maintenance
Enter "preventive", "corrective", "adaptive" or "perfective".

9.3.2 Administrative Data

Maintenance Request description
Enter a description of the maintenance request (free text).

Maintenance Request raised by
Enter the name of the person (usually the "owner" of the system) who raised the maintenance request.

Guideline 9.3.2A
The information above is optional in case of preventive maintenance

Maintenance Request Date/Time
Enter date/time when the "owner" of the system raised the maintenance request

Guideline 9.3.2B
The information above is optional in case of preventive maintenance

Maintenance Request evaluated by
Enter the name of the person (usually the "admin" of the system, or the help desk, if any) who evaluated the maintenance request.

Guideline 9.3.2C
The information above is optional in case of preventive maintenance.
The administrator may resolve the problem internally or notify the maintenance contractor.

Maintenance Request Evaluation Date/Time
Enter date/time when the "admin" of the system evaluated the maintenance request.

Guideline 9.3.2D
The information above is optional in case of preventive maintenance

Contractor Notification Person
Enter the name of the person of the maintenance contractor who is notified about the maintenance request.

Guideline 9.3.2E
The information above is not applicable in case of either preventive maintenance or problems resolved internally in the Organization.

Contractor Notification date/time
Enter the date/time of the notification of the maintenance contractor.

Guideline 9.3.2F
The information above is not applicable in case of either preventive maintenance or problems resolved internally in the Organization.

Maintenance completion date/time
Enter date/time of maintenance completion.

9.3.3 Technical data

Maintenance actions taken
Describe the actions taken to successfully complete the maintenance activities.

Remarks
Enter any remarks on the event (free text).