Support Analysis for Software

Request for Information

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Issue 1

Author: R. Somoza

ramon.somoza@software-supportability.org

Software Support Concept

Recognising the increasing importance of software in modern aircraft production, the Contractor is requested to provide sufficient information as to be able to assess the following aspects related to software maintenance and its support for the Aircraft/Weapon System, in order to:

- Evaluate the capability of the offered aircraft/weapon system equipment.
- Demonstrate the possibility of expansion and growth capacity for the different LRIs
- Verify that logistics management of software has been considered
- Ensure operational support of software and related data is properly addressed
- Assess potential options for software maintenance support in order to ensure the most cost-efficient option versus the greatest operational flexibility and turn-round times
- Consider software life-cycle costs

The following sections indicate the information to be provided by the Contractor in order to be able to assess all Software Support aspects to determine a Software Support Concept (SSC) as defined in SAE JA1006 for the operation and in-service life of the aircraft. This SSC will be performed by means of a defined process called Support Analysis for Software (SAS).

The SSC will be also used to determine the level of Software Support to be provided by the Contractor to identify any Items or additional information/documentation that has to be acquired with the Aircraft/weapon system and also to provide inputs to its planning, configuration and quality systems.

In this context , the Purchaser identifies three types of Software Support Classes, each with its own information needs.

- **Class A Software**. Applicable to all COTS SW or SW that will be used "as is", will never be modified by the Purchaser and/or the end customer, and doesn't have interfaces with any other software of a different support class. For Class A software, the information required will be just the main characteristics of the software, environment and loading information, version compatibility and configuration control aspects, number of expected releases (updates), distribution method(s) and media, as well as intended contractual arrangements for such updates. This information will be requested in all cases, in any reasonable format that the Contractor proposes.

- **Class B Software**. Applicable for software that won't have to be modified by either the Purchaser and/or the end customer but does have interfaces with software of other equipment that are either Class C or that the Purchaser has to integrate. The information to be provided will be the same as for Class A SW, adding interfaces detailed information that will be needed either to use the interfaces that are provided, or even to make new interfaces with other equipment software. This information will likely overlap existing Engineering documentation, and will be requested only in special cases.

- **Class C Software**. Applicable for software to be modified by the end customer.
  The information to be provided shall include the key SW characteristics, design environment, loading, interfaces, detailed design, equipment needed, design documentation, etc. This will be requested only as an option, and exercised only if an end customer asks for such capability.

The documentation to be provided in ALL cases where <u>equipment</u> software exists is that associated to Class A Software.

Following is a description of each one of the fields of information that may be required in order to accomplish a SAS study as well as an schematic table indicating what data is required for every software class.

1. Functional Architecture

Apart from the technical information provided elsewhere in this RFI, the Contractor is requested to provide a detailed functional description of the Aircraft/weapon system architecture, including system and subsystem down to LRU (Line Replaceable Unit) level.

1.1 Functional architecture at System/Subsystem level

The functional architectural description shall describe in detail all systems and subsystems of the Aircraft/weapon system, and shall at least cover the following aspects:

- Overall Aircraft/weapon system architecture, including all functional blocks, systems and subsystems, data buses and information flows between the different (sub) systems.
- Overall Platform Management
- Built-In Test (BIT) and Integrated Monitoring and Diagnostic System
- Flight Controls
- Displays and Controls
- Communications
- Self-protection and EW capability (when applicable)
- Navigation
- Armament Control (when applicable)
- Major Sensors (including Radar) and Sensor Fusion capabilities

1.2 Functional architecture at LRU level

Each of the major functional blocks shall be broken down to LRU level, specifying for each of the individual computers at least the following functional and physical information:

- Functional and physical description, including associated databus (es) and sensors
- Data flow(s) with other computers
- Data flow (s) from/to associated sensors
- Data flows from/to displays and controls, as well as any other type of user interaction

1.3 Functional architecture of related Ground Systems

For each of the functional blocks of computer-based Ground Systems providing service to the Aircraft/weapon system (e.g., Mission Data Preparation or Post-Flight Analysis systems, Automatic Test Equipment), a detailed description shall be provided by the Contractor, including at least the following information:

- Information from the Aircraft/weapon system prepared/processed by the ground system
- Mapping of the different Ground Systems to their related platform (sub)systems/LRUs, including the data flows, functional and physical relationships.
- Special emphasis shall be placed on the description of the following elements and their interfaces with the proposed platform:
  - Mission Planning, briefing/debriefing systems
  - Digital Map generation/conversion systems
  - EW Mission Data and Defensive Aids Data preparation System(s), including performance evaluation capability
  - Communications, Command and Control (C^3I) Systems
  - Maintenance and Diagnostic Data Ground Station

2. Expansion and Growth capability

For the assessment of the growth capability of the offered Aircraft/weapon system equipment, the Contractor shall provide at least the following information for each of the individual computers and data buses:

2.1 Expansion and growth capacity information for each LRU

At least the following information shall be provided for each individual computer:

- CPU type, number and possible expansion, CPU frequency and throughput
- CPU process capacity used (%), for each CPU, both in normal operation and in peak operation
- Global memory available/used (RAM/ROM), maximum stack/heap size, code and data size and corresponding memory allocation, if applicable
- Memory available/used local to each CPU (RAM/ROM/EPROM), if applicable, maximum stack/heap size, code and data size
- BIT log memory area size, if separate from rest of data (e.g., in Non-volatile memory)
- Available/used I/O interfaces and/or channels, including types
- Coprocessors (Math, Digital Signal Processors, Video, etc.)
- List of periodic processes, including brief description, indicating for each of them their period and maximum execution time.
- List of aperiodic processes, including brief description and maximum execution times
- % of CPU time dedicated to Built-In-Test (BIT)

2.2 Expansion of data buses

At least the following information shall be provided for each of the Aircraft/weapon system data buses:

- Type and throughput
- LRU acting as bus controller, secondary bus controller, if applicable
- Bus capacity used/available

3. Logistics Management of Software

3.1 Product information

For each software element to be delivered (e.g., Operational Flight Program, firmware component, Support Equipment Software), the Contractor shall provide at least the following information:

- CSCI identification, associated computer(s)
- Physical Transport/Delivery methods
- Frequency of updates
- Delivery medium (e.g., chip, tape, cartridge, CD-ROM) and format
- Packaging and labelling
- Associated delivery and product documentation
- Necessary resources to control, duplicate and distribute software

3.2 Procurement data

The contractor should always procure the identification and management data that will allow to identify the different SW packages to be supplied as well as their management.

3.2.1 Procurement identification data

- Real manufacturer (name, address and alphanumeric international code).
- Manufacturer's identification of the CSCI.
- Specifications or norms that have been applied.
- NATO supply code for manufacturer

3.2.2 Management Data

- Unit price
- Currency
- SW support
- Warehouse life of SW support or computer.

3.3 Process information

The Contractor shall also provide details of how the following logistic management aspects shall be covered, either organically or by specific Contractor support. The Contractor may propose several alternatives.

- Problem reporting and corrective action system
- Help desk
- System/software configuration

Estimated costs associated to such support shall be provided under Section 6 (Life-Cycle Costs).

4. Operational Support

Software and mission data impact increasingly on the operation of modern aircraft/weapon systems. While the exact descriptions of these operational tasks will be requested through the LSAR, it is considered important to assess from the beginning the impact that these advanced technologies will have on the proposed platform. For this purpose, the Contractor is requested to provide the following information:

4.1 Operational Support of Software

The operational support of software covers the loading of software loadable units, configuration aspects and the problem investigation capability.

4.1.1 Software Loadable Units

The Contractor shall identify each Software Loadable Unit (SLU), i.e., each software element that can be loaded and/or installed as a separate item on a computer. Two types of software loadable units are identified: Resident and Non-resident Loadable Units. For each SLU, at least the following information will be provided:

- Identification, Name, Type, Description
- Loading method and location (maintenance level), necessary loading equipment and required software.
- Software Installation Plan (DI-IPSC-81428) or Firmware Support Manual (DI-IPSC-81448) or equivalent, if available.
- Frequency of loading due to software updates (e.g. once a year)
- Frequency of loading due to hardware repair. This information should include the LRU MTBF (Mean Time Between Failure).
- Erasure of classified software (equipment declassification)

This information has to be provided not only for airborne software, but also for each Loadable Unit in Ground Systems.

4.1.2 System Software configuration

The Contractor shall identify the methods and processes to be used to ensure proper hardware/software configuration within the proposed platform (i.e., that no incompatible software is loaded), as well as any embedded characteristics (e.g., internal compatibility codes, or use of a compatibility matrix in the loading equipment) that favour such configuration control.

Configuration shall also address the identification of spare LRUs that are pre-loaded with software for operational reasons.

Such configuration aspects shall also address the configuration of potentially different mission data formats, associated LRU software and the Ground Equipment preparing such mission data.

4.1.3 Problem investigation capability

The Contractor shall identify a set of capabilities to be provided to investigate confirmed or unconfirmed trouble reports related to system and/or software behaviour, including any embedded characteristics (e.g., embedded software built-in test and error logging) that favour such investigations.

4.2 Operational Support of Mission, Engineering and Diagnostic Data

The Contractor is requested to provide detailed information related to the preparation, loading, unloading and post-flight analysis of all mission, engineering and maintenance/diagnostic data that are provided to or are generated by the proposed platform. This information shall be given for each single Data Set (DS) that is prepared, loaded, unloaded or analysed as a separate item.

The information to be provided shall at least cover:

- Identification, Name, Type (e.g., mission data, diagnostic data, etc.), Description
- Loading/unloading method and location (maintenance level), necessary loading/unloading equipment and required software
- Frequency of loading due to new mission or hardware repair, detailing the cause for loading/unloading. In case the cause is hardware failure, this information should include the LRU MTBF (Mean Time Between Failure).
- Erasure of classified data (equipment declassification)
- Data generation / post-flight analysis / diagnostic ground station
- Loading Protocol

5. Software Maintenance Support

The Software Support Concept shall clearly describe the support to be established for each individual supplied software product as well as for its associated support resources. Due to the need to adapt to changing operational requirements and the need to rectify incorrect system operation, changes to system software products will be made. The need for cost-effective support while maintaining operational capability and flexibility needs to be balanced in the proposed support approach. This may imply in certain cases that an autonomous capability in this field may be required, whose scope will be defined within the Software Support Concept.

For this purpose, it is requested that the Contractor provide the following information, for each individual CSCI, included subcontracted items.

5.1 Maintenance Support initiators

For each individual CSCI, included subcontracted items, the Contractor shall provide a list of likely Maintenance Support Initiators, i.e., the potential causes and scenarios for modification of such CSCI, such as SPRs, inclusions of new weapons, or adding new or enhance existing capabilities (e.g., "*add additional menu option to pilot multi-function display using information currently available to the mission computer*"). These causes and scenarios shall include at least the following information:

- CSCI Identification, Name, Type of Initiator, Description
- Probability/frequency of such support initiators
- Criticality, potential safety and certification impact
- Expected response times for implementation of such changes
- Associated volume of change (in SLOC, as a percentage of the total SLOC, or similar)

The Contractor shall also provide a list of planned or envisaged changes, listed by CSCI, including the above information.

5.2 CSCI inherent characteristics

For each individual CSCI, including subcontracted items, the Contractor shall provide at least the following information:

- CSCI Identification, Name, Description and Fuction
- Safety risk class, required certification (RTCA/DO-178B information)
- NATO Security classification
- Applicable development/support standards (MIL-STD-498, ISO/IEC 12207, RTCA/DO-178B, etc)
- Availability of Source Code and Design Documentation, Intellectual property Rights
- Used Requirements and Design Methodologies, Analysis and design techniques
- Programming language(s), number of modules, Source Lines of Code (or Function Points)
- Associated HW/SW platform(s), operating system(s)
- Existing or expected SPRs per annum
- Required Subsystem or System level integration
- Tactical software
- Status Date containing the date for analysis or last update date
- Implementation to identify resident or non-resident SW

5.3 CSCI Maintenance Support Resources

The Contractor is requested to identify for each CSCI, including subcontracted items, all necessary resources that would be required to carry out system/software modification. This information shall include, but not be constrained to, the following information:

- Detailed list of required CSCI design information and documentation
- Development Environment description, including at least a detailed description of:
  - Development platform(s) and operating system(s)
  - Specification, design, coding and test tools
  - Compilers, Emulators and debuggers
  - Available Documentation
  - Test scripts
  - ATE, other required hardware
- HW/SW Integration Environment description, including at least a detailed description of:
  - Functional and physical architecture
  - Platforms, operating systems and programming languages
  - Stimulation/acquisition capabilities
  - Signal Databases
  - Execution control and monitoring capabilities
  - Predefined test capability, test language, test scripts
  - Available Documentation
  - ATE, other required hardware
- Software Transition Plan (DI-IPSC-81429) or equivalent, if available
- Required facilities such as special buildings, mock-ups, explosion-proof rooms, safety glass, special power requirements or security requirements (e.g., TEMPEST shielding, vaults). Diagrams may be included as applicable.
- Technical skills and experience required, necessary training estimated number of staff.

5.4 System-Level Maintenance Support Resources

The Contractor is requested to identify for each System and Subsystem all necessary resources that would be required to carry out system modification and integration tasks. This information shall include, but not be constrained to, the following information:

- Detailed list of required System/Subsystem design information and documentation
- System Integration Environment description, including at least a detailed description of:
  - Functional and physical architecture
  - Platforms, operating systems and programming languages
  - Simulation/Stimulation/acquisition capabilities
  - Signal Databases
  - Execution control and monitoring capabilities
  - Predefined test capability, test language, test scripts
  - “Pilot” tests
  - Available Documentation
  - ATE, other required hardware, laboratory equipment
- Software Transition Plan (DI-IPSC-81429) or equivalent, if available

- Required facilities such as special buildings, mock-ups, explosion-proof rooms, safety glass, special power requirements or security requirements (e.g., TEMPEST shielding, vaults). Diagrams may be included as applicable.

Technical skills and experience required, necessary training, estimated number of staff

5.5 Proposed Maintenance Support Options

The Contractor is invited to make specific proposals for software maintenance options, for each specific CSCI, including at least the following information:

- CSCI ID, Name
- Maintenance Support Proposal Description
- Rationale and detailed Justification
- Assumptions
- Expected response times
- Estimated cost of such alternative

The Contractor shall provide all LCC data related to that proposed support option, as listed in the following section, for an independent evaluation.

It is acceptable for the Contractor to use any commercially available or proprietary software support cost estimation tool for the purpose of justifying such support option, provided such tool is provided to the purchaser for its own assessment, including all source data used for that analysis.

6. Life-Cycle Costs

In order to carry out an independent cost evaluation, the Contractor shall provide for each CSCI, including subcontracted items and Ground System software, the following cost information:

- Number of Source Lines of Code (SLOC) and/or Function points, programming language, Annual Change Traffic and frequency of updates
- Complexity of SW using Mc. Cabe-Complexity Metric or any other agreed procedure applicable
- All detailed COCOMO 81 cost model parameters, as defined in [Boehm81][1] or, alternatively, all COCOMO II cost model parameters, as defined in [USC][2].
- Acquisition cost of each of the necessary software tools, including acquisition of IPR rights if applicable and annual licensing costs
- Acquisition cost of each necessary hardware item, and annual maintenance cost
- Acquisition cost of each necessary facility, and annual maintenance costs
- Acquisition of all necessary documentation to carry out this software maintenance, including that of third parties and/or subcontractors.

[1] [Boehm81], Barry W. Boehm, *Software Engineering Economics*, Prentice-Hall, 1981, ISBN 0-13-822122-7
[2] [USC], University of Southern California, COCOMO II Home Page, *http://sunset.usc/edu/COCOMOII*

- Cost of necessary training courses
- Any assumptions that may impact the cost assessment
- Offered Contractor Support Costs, including full description of what those services include and exclude.

7. Safety impact

Identifies how the CSCI affects operation or performance in the aircraft/weapon system.

- Safety in flight
  Level of safety impact on systems and equipment. Any restriction to flight safety should be identified as well as the procedures associated.

- Safety on the ground
  Level of safety impact on ground equipment SW. When software failure in an AGE may become a potential danger for the crew or the aircraft, appropriate safety steps should be identified and defined.

8. Documentation required.

All documents where the information required to accomplish Support Analysis for Software reside, should be provided and have to be available for the SAS analyst. The most important documents to be obtained are the following:

- Based on MIL-STD-498 normative:

  - Software transition plan DI-IPSC-81429
  - Software Input/Output Manual DI-IPSC-81445
  - Computer Operation Manual DI-IPSC-81446
  - Software Installation Plan DI-IPSC-81428

- Based on DOD-STD-2167 or similar:

  - Software development plan
  - Software test plan
  - Software Requirements specification
  - Version description document
  - Top level design
  - Detailed design
  - Firmware support manual
  - CRISD

Appendix I

Cross Reference Table

Cross reference table of data usage.

Information data	Class A SW	Class B SW	Class C SW
Functional architecture at System/Subsystem level			
Overall Aircraft/weapon system architecture		X	X
Overall Platform Management		X	X
Built-In Test (BIT) and Integrated Monitoring and Diagnostic System		X	X
Flight Controls			X
Displays and Controls			X
Communications			X
Self-protection and EW capability (when applicable)			X
Navigation			X
Armament Control (when applicable)			X
Major Sensors (including Radar) and Sensor Fusion capabilities			X
Functional architecture at LRU level			
Functional and physical description, including associated databus (es) and sensors		X	X
Data flow(s) with other computers		X	X
Data flow(s) from/to associated sensors		X	X
Data flows from/to displays and controls, as well as any other type of user interaction		X	X
Functional architecture of related Ground Systems			
Information from the Aircraft/weapon system prepared/processed by the ground system		X	X
Mapping of the different Ground Systems to their related platform (sub) systems/LRUs, including the data flows, functional and physical relationships.		X	X
Description of the following elements and their interfaces with the proposed platform: ▪ Mission Planning, briefing/debriefing systems ▪ Digital Map generation/conversion systems ▪ EW Mission Data and Defensive Aids Data preparation System(s), including performance evaluation capability ▪ Communications, Command and Control (C^3I) Systems ▪ Maintenance and Diagnostic Data Ground Station		X	X
Expansion and growth capacity information for each LRU			
CPU type, number and possible expansion, CPU frequency and throughput	X	X	X
CPU process capacity used (%), for each CPU, both in normal operation and in peak operation	X	X	X
Global memory available/used (RAM/ROM), maximum stack/heap size, code and data size and corresponding memory allocation, if applicable	X	X	X
Memory available/used local to each CPU (RAM/ROM/EPROM), if applicable, maximum stack/heap size, code and data size	X	X	X
BIT log memory area size, if separate from rest of data (e.g., in Non-volatile memory)		X	X
Available/used I/O interfaces and/or channels, including types		X	X
Coprocessors (Math, Digital Signal Processors, Video, etc.)	X	X	X

Information data	Class A SW	Class B SW	Class C SW
List of periodic processes, including brief description, indicating for each of them their period and maximum execution time.			X
List of aperiodic processes, including brief description and maximum execution times			X
% of CPU time dedicated to Built-In-Test (BIT)		X	X
Expansion of data buses			
Type and throughput			X
LRU acting as bus controller, secondary bus controller, if applicable			X
Bus capacity used/available		X	X
Product information			
CSCI identification, associated computer(s)	X	X	X
Physical Transport/Delivery methods	X	X	X
Frequency of updates	X	X	X
Delivery medium (e.g., chip, tape, cartridge, CD-ROM) and format	X	X	X
Packaging and labelling	X	X	X
Associated delivery and product documentation	X	X	X
Necessary resources to control, duplicate and distribute software			X
Identification data			
Real manufacturer (name, address and alphanumeric international code).	X	X	X
Manufacturer's identification of the item.	X	X	X
Specifications or norms that have been applied.	X	X	X
Status Date	X	X	X
Implementation (CSCI or LLCSCI)	X	X	X
NATO Supply Code for Manufacturer	X	X	X
Management Data			
Unit price	X	X	X
Currency	X	X	X
SW support	X	X	X
Warehouse life of SW in computer	X	X	X
Warehouse life of SW support	X	X	X
Process information			
Problem reporting and corrective action system	X	X	X
Help desk	X	X	X
System/software configuration		X	X
Software Loadable Units			
Identification, Name, Type, Description	X	X	X
Loading method and location (maintenance level), necessary loading equipment and required software.	X	X	X
Software Installation Plan (DI-IPSC-81428) or Firmware Support Manual (DI-IPSC-81448) or equivalent, if available.	X	X	X
Frequency of loading due to software updates (e.g. once a year)	X	X	X
Frequency of loading due to hardware repair. This information should include the LRU MTBF (Mean Time Between Failure).	X	X	X
Erasure of classified software (equipment declassification)		X	X
Problem investigation capability			
The Contractor shall identify a set of capabilities to be provided		X	X

Information data	Class A SW	Class B SW	Class C SW
to investigate confirmed or unconfirmed trouble reports related to system and/or software behaviour, including any embedded characteristics (e.g., embedded software built-in test and error logging) that favour such investigations.			
Operational Support of Mission, Engineering and Diagnostic Data			
Identification, Name, Type (e.g., mission data, diagnostic data, etc.), Description	X	X	X
Loading/unloading method and location (maintenance level), necessary loading/unloading equipment and required software	X	X	X
Frequency of loading due to new mission or hardware repair, detailing the cause for loading/unloading. In case the cause is hardware failure, this information should include the LRU MTBF (Mean Time Between Failure).	X	X	X
Erasure of classified data (equipment declassification)	X	X	X
Data generation / post-flight analysis / diagnostic ground station	X	X	X
Loading Protocol		X	X
Maintenance Support initiators			
CSCI Identification, Name, Type of Initiator, Description		X	X
Probability/frequency of such support initiators		X	X
Criticality, potential safety and certification impact		X	X
Expected response times for implementation of such changes			X
Associated volume of change (in SLOC, as a percentage of the total SLOC, or similar)			X
CSCI inherent characteristics			
CSCI Identification, Name, Description and Function	X	X	X
Safety risk class, required certification (RTCA/DO-178B information)	X	X	X
NATO Security classification	X	X	X
Applicable development/support standards (MIL-STD-498, ISO/IEC 12207, RTCA/DO-178B, etc)	X	X	X
Availability of Source Code and Design Documentation, Intellectual property Rights	X	X	X
Used Requirements and Design Methodologies, Analysis and design techniques	X	X	X
Programming language(s), number of modules, Source Lines of Code (or Function Points)	X	X	X
Associated HW/SW platform(s), operating system(s)	X	X	X
Existing or expected SPRs per annum		X	X
Required Subsystem or System level integration		X	X
Tactical software	X	X	X
CSCI Maintenance Support Resources			
Detailed list of required CSCI design information and documentation			X
Development Environment description, including at least a detailed description of: ▪ Development platform(s) and operating system(s) ▪ Specification, design, coding and test tools ▪ Compilers, Emulators and debuggers ▪ Available Documentation ▪ Test scripts ▪ ATE, other required hardware		X	X

Information data	Class A SW	Class B SW	Class C SW
HW/SW Integration Environment description, including at least a detailed description of: ▪ Functional and physical architecture ▪ Platforms, operating systems and programming languages ▪ Stimulation/acquisition capabilities ▪ Signal Databases ▪ Execution control and monitoring capabilities ▪ Predefined test capability, test language, test scripts ▪ Available Documentation ▪ ATE, other required hardware		X	X
Software Transition Plan (DI-IPSC-81429) or equivalent, if available	X	X	X
Required facilities such as special buildings, mock-ups, explosion-proof rooms, safety glass, special power requirements or security requirements (e.g., TEMPEST shielding, vaults). Diagrams may be included as applicable.		X	X
Technical skills and experience required, necessary training, estimated number of staff.			X
System-Level Maintenance Support Resources			
Detailed list of required System/Subsystem design information and documentation			X
System Integration Environment description, including at least a detailed description of: ▪ Functional and physical architecture ▪ Platforms, operating systems and programming languages ▪ Simulation/Stimulation/acquisition capabilities ▪ Signal Databases ▪ Execution control and monitoring capabilities ▪ Predefined test capability, test language, test scripts ▪ "Pilot" tests ▪ Available Documentation ▪ ATE, other required hardware, laboratory equipment			X
Software Transition Plan (DI-IPSC-81429) or equivalent, if available			X
Required facilities such as special buildings, mock-ups, explosion-proof rooms, safety glass, special power requirements or security requirements (e.g., TEMPEST shielding, vaults). Diagrams may be included as applicable.			X
Technical skills and experience required, necessary training and estimated number of staff.			X
Proposed Maintenance Support Options			
CSCI/System ID, Name			X
Maintenance Support Proposal Description			X
Rationale and detailed Justification			X
Assumptions			X
Expected response times			X
Estimated cost of such alternative			X
Life-Cycle Costs			
Number of Source Lines of Code (SLOC) and/or Function points, programming language, Annual Change Traffic and frequency of updates.	X	X	X

Information data	**Class A SW**	**Class B SW**	**Class C SW**
Complexity of Software	X	X	X
All detailed COCOMO 81 cost model parameters, as defined in [Boehm81][3] or, alternatively, all COCOMO II cost model parameters, as defined in [USC][4].		X	X
Acquisition cost of each necessary facility, and annual maintenance costs		X	X
Acquisition of all necessary documentation to carry out this software maintenance, including that of third parties and/or subcontractors.		X	X
Cost of necessary training courses		X	X
Any assumptions that may impact the cost assessment		X	X
Offered Contractor Support Costs, including full description of what those services include and exclude.		X	X
Security impact			
Security in flight	X	X	X
Security on land	X	X	X
Minimum Documentation required.			
Based on MIL-STD-498 normative: ▪ Software transition plan DI-IPSC-81429 ▪ Software Input/Output Manual DI-IPSC-81445 ▪ Computer Operation Manual DI-IPSC-81446 ▪ Software Installation Plan DI-IPSC-81428	X	X	X
Based on DOD-STD-2167 or similar: ▪ Software development plan ▪ Software test plan ▪ Software Requirements specification ▪ Version description document ▪ Top level design ▪ Detailed design ▪ Firmware support manual ▪ CRISD	X	X	X

[3] [Boehm81], Barry W. Boehm, *Software Engineering Economics*, Prentice-Hall, 1981, ISBN 0-13-822122-7
[4] [USC], University of Southern California, COCOMO II Home Page, *http://sunset.usc/edu/COCOMOII*

Appendix II

ACRONYMS

AGE	Aerospace Ground Equipment
ATE	Automated Test Equipment
BIT	Built In Test
CD-ROM	Compact Disk Read Only Memory
CPU	Central Processing Unit
CRISD	Computer Resources Integrated Support Document
CSCI	Computer Software Configuration Item
EPROM	Electric Programmable Read Only Memory
HW	Hardware
ID	Identification
IPR	Intellectual Property Rights
LCC	Life Cycle Cost
LRI	Line Replaceable Item
LRU	Line Replaceable Unit
LSAR	Logistic Support Analysis Report
MTBF	Mean Time Between Failures
NATO	North Atlantic Treaty Organisation
RAM	Read and Write Memory
RFI	Request for Information
ROM	Read Only Memory
SAE	Society of Automotive Engineer
SAS	Support Analysis for Software
SLOC	Source Lines of Code
SLU	Software Loadable Unit
SPR	System Problem Report
SSC	Software Support Concept
SW	Software