INDUSTRY GUIDE FOR DEFINING THE BID SCOPE OF WORK

SUMMARY: THIS DOCUMENT CONTAINS GUIDELINES FOR DEFINING THE BID SCOPE OF WORK.

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1 SCOPE

1.1 Purpose

The purpose of this document is to provide guidance for defining the Bid Scope of Work. The Bid Scope of Work is a direct response on Armscor's Request for Bid (RFB) Scope of Work.

1.2 Application

This Guide is intended to assist the Defence Industry when defining the Bid Scope of Work. The focus is on Capital projects where limited integration development is required and Product and System Support (PSS) projects where engineering changes are implemented.

note 01: *This Guide is not comprehensive in terms of all project types and all project acquisition phases, but the principles can still be applied.*

The prospective Bidder should use this Guide in conjunction with Armscor's RFB and other relevant project documentation, company governance and related standards/guidance to compile a Statement of Work (SOW), supported by a Work Breakdown Structure (WBS), as part of the Bid documentation.

note 02: *Where any content of this Guide is in conflict with any terms or conditions incorporated in the RFB, the said terms or conditions shall take precedence. Where the conditions of any applicable document listed in the RFB conflict with the guidelines of this document, these conditions shall take precedence.*

The successful Bidder shall during the contract negotiation process, prior to contract placement, agree and finalise with Armscor the Contract Statement of Work (CSOW), including the Contract Work Breakdown Structure (CWBS). The CSOW and CWBS shall form the basis of the contract and shall serve as the Contract Baseline.

2 DOCUMENTS

2.1 Applicable Documents

There are no applicable documents required to apply this Guide.

2.2 Referenced Documents

The following documents are referred to in this document for information purposes only:

[1]	INCOSE-TP-2003-002-05	Systems Engineering Handbook - A Guide for System Life Cycle Processes and Activities (2023).
[2]	ISO/IEC/IEEE 15288:2015	Systems and Software Engineering - System Life Cycle Processes.
[3]	ISO 9001	Quality Management Systems – Requirements.
[4]	MIL-HDBK-61	Configuration Management Guidance.

[5]	MIL-HDBK-502A	DOD Handbook: Product Support Analysis.
[6]	MIL-STD-882	System Safety.
[7]	PMBOK® Guide	A Guide to the Project Management Body of Knowledge as published by the Project Management Institute.
[8]	RTCA-DO-178	Software Considerations in Airborne Systems and Equipment Certification.
[9]	RTCA-DO-254	Design Assurance Guidance for Airborne Electronic Hardware.
[10]	RTCA-DO-278	Software Integrity Assurance Considerations for Communication, Navigation, Surveillance, and Air Traffic Management (CNS/ATM) Systems.
[11]	SMC-T-007	Tailoring of EIA-649-1; SMC Tailoring, dd 15 May 2015.
[12]	TA-STD-0017	Product Support Analysis.

3 DEFINITIONS AND ABBREVIATIONS

3.1 Definitions/Terminology/Word Descriptions

Unique definitions applicable to this document are defined in the following paragraphs.

[1] Acceptance Criteria

Acceptance criteria is a set of conditions that is required to be met before deliverables are accepted. (PMBOK - referenced document 2.2[7]).

[2] Bid

A bid means a written offer in a prescribed or stipulated form in response to an invitation by Armscor for the provision of goods and services, which includes competitive bids, written price quotations and proposals.

[3] Capital Project

A Capital project is defined by the Capital acquisition process and applies to the acquisition of new or upgraded matériel.

[4] Configuration Baseline

A configuration baseline is an agreed-upon technical description of a product at a point in time which serves as a documented basis for defining changes.

[5] Configuration Control Board (CCB)

A board composed of technical and administrative representatives who approve or recommend approval or disapproval of proposed engineering changes to, and approve or recommend proposed variances (deviations and concessions) from, a

Configuration Item's current approved configuration documentation. (MIL-HDBK-61 – referenced document 2.2[4]).

Clarification: A project functions within a hierarchy of CCBs (e.g. Client CCB and Contractor CCB), where the authority of the lower level CCB is limited by the higher level CCB.

[6] Configuration Item

A Configuration Item (CI) is any hardware, software or combination of both that satisfies an end use function and is designated for separate configuration management.

[7] Contract Statement of Work

The Contract Statement of Work (CSOW) is the SOW agreed between Armscor and the Contractor and which forms part of the Order.

[8] Deliverable

A deliverable is defined as any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project. Acceptance criteria shall be clearly defined for all deliverables.

[9] Development Specification

A development specification identifies in a complete, precise, and verifiable manner the set of requirements, design, behaviour, and other expected characteristics of a CI.

[10] Enabling Processes

The enabling processes are supportive to the Armscor main acquisition processes. This Guide focuses only on the Project Management (PM) and Engineering Management (EM) enabling processes.

[11] Enabling Systems

Enabling systems are systems that support the system-of-interest during its life cycle phases but do not necessarily contribute directly to its function during operation.

[12] Engineering Change

An Engineering Change is a change to the current approved configuration documentation of a Configuration Item (CI).

An Engineering Change Proposal (ECP) is the documentation by which a proposed engineering change is described, justified, and submitted to the change control authority for approval or disapproval.

[13] Engineering Change Classification

An ECP shall be classified as a Class I change when ECPs have any combination of the following criteria:

a) A change that affects specified and approved requirements including safety, reliability supportability and quantitative requirements that result in product attributes that would be outside specified limits or specified tolerances.

b) A change that affects any approved acquisition baseline (i.e., Functional, Allocated or Product Baselines).

c) A change that affects compatibility with interfacing products (including such products as test equipment, support equipment, software, firmware and products furnished by the User/Armscor) or that affects one or more of the following:

  i) Delivered operation or servicing instructions.

  ii) Required calibration to the extent that product identification should be changed.

  iii) Interchangeability or substitutability of replaceable products, assemblies, or components.

  iv) User skills or user physical attributes.

  v) Operator or maintenance training.

  vi) Requires retrofit of delivered products (e.g. by product recall, modification kit installation, attrition, replacement during maintenance using modified spares).

  vii) Performance.

  viii) Maintainability, durability or survivability.

  ix) Weight, balance, moment of inertia.

  x) Electromagnetic characteristics.

  xi) Impact to logistical support requirements such as training, technical or operational manuals, spares, maintenance procedures or equipment, etc.

  xii) Re-qualification of the item.

  xiii) Domain certification (e.g., airworthiness, sea worthiness, etc.).

  xiv) Source (supplier of an item).

  xv) Biomedical factors or human factors engineering.

  xvi) Personnel manning.

  xvii) Corrects deficiencies.

  xviii) Adds or modifies interface or interoperability requirements.

  xix) Changes the operational capabilities or logistics supportability of the system or item and the change is significant and measurably changes the effectiveness.

  xx) Effects life cycle costs/savings.

d) A change that does not meet the above criteria but does impact cost/price/delivery to customer(s), including incentives and fees, guarantees, warranties, and contracted deliveries or milestones.

An ECP shall be classified as a Class II if the engineering change does not meet the criteria for a Class I change. (SMC-T-007 - referenced document 2.2[11]).

[14] Logistic Support

Logistic support is the management and technical activities necessary to provide material, means, facilities, transportation and personnel services for the conduct of operations and maintaining the "as delivered" baseline of a system. This includes, but is not limited to, providing personnel, training, maintaining/updating technical documentation, materials, maintenance and repair activities, packaging, handling, storage and transportation activities, maintaining system integrity, obsolescence management, etc.

[15] Main Elements

Main elements refer to process elements of the Acquisition Main Processes and are defined in respect to the different project types (Technology, Capital, PSS and Procurement projects).

[16] Material Review Board (MRB)

A board consisting of representatives of Contractor departments necessary to review, evaluate and determine or recommend disposition of nonconforming material referred to it. (MIL-STD-1520)

[17] Output

An output is a product, result or service generated by a process. (May be an input to a successor process.) (PMBOK - referenced document 2.2[7]).

[18] Phase

A phase is a part of a project which includes all the tasks required to establish a baseline; as well as the tasks needed to obtain approval to conclude such phase.

[19] Procurement Project

A Procurement project is defined by the procurement process and applies to obtain already defined matériel in support of new or existing and operational capabilities.

[20] Project Manager

Project manager means the person formally tasked to perform the Acquisition Project Manager role on a specific project.

[21] Product Specification

The product specification is a set of detail design descriptions of a CI's required characteristics, documented in a manner to facilitate its procurement or manufacture and acceptance.

[22] Product and System Support (PSS) Project

A PSS project is defined by the Product and System Support acquisition process and applies to the acquisition of matériel and services in support of existing and operational capabilities.

[23] Scope of Work

The sum of the products, services and results to be provided, defined in PMBOK as Project Scope. (see referenced document 2.2[7]).

[24] Statement of Work

A Statement of Work (SOW) is a narrative description of products, services or results to be delivered. (PMBOK - referenced document 2.2[7]).

[25] System Requirements Specification

The System Requirements Specification is a set of system requirements that identifies, in a complete, precise and verifiable manner, the requirements, design, behaviour, or other expected characteristics and constraints of a system without implementation bias.

[26] Technical Audit

A technical audit[1] is a detailed review of processes, product definition information, documented verification of compliance with requirements, and an inspection of products to confirm that products have achieved their required attributes or conform to the released product configuration definition information.

[27] Technical Baseline

A technical baseline consists of one or more configuration baselines (e.g. RBL, FBL, ABL, PBL, and MBL) and includes other relevant management information.

[28] Technical Reviews

Technical reviews are a series of systems engineering activities conducted at logical transition points in a system's life cycle, by which the progress of a project is assessed relative to its technical requirements using a mutually agreed-upon set of criteria.

[29] Technology Project

A Technology project is defined by the Technology acquisition process and applies to the establishment of a new or upgraded technology base for utilisation in acquisition of matériel.

[30] Variance

A Variance is a departure from a particular requirement(s) of a product's current approved product configuration documentation for a specific number of units or a specified time period. [MIL-HDBK-61 - referenced document 2.2[4])

A variance falls into two categories, Concessions and Deviations.

a) Concession

A concession is a temporary endeavour in the form of a written authorization to accept an item or certain items which, during manufacturing or after having been submitted for inspection, are found to deviate from specifications but are nevertheless considered suitable for use in that form or after having been reworked by an approved method.

note 03: *Armscor Form K227, or an agreed upon alternative, should be used to submit critical, major or minor classified concessions.*

[1] The FCA and PCA are examples of technical audits.

b) Deviation

A Deviation is a temporary endeavour and is given prior to realisation/manufacturing for a limited quantity of product or period of time, or for a specific use. Written authorization for a deviation is given by means of a deviation permit.

note 04: *Armscor Form K228, or an agreed upon alternative, should be used to submit critical, major or minor classified deviations.*

A variance differs from an engineering change in that an approved engineering change requires corresponding revision of the product's current approved product configuration documentation, whereas a variance does not.

[31] Variance Classification

Variances are classified as Critical, Major or Minor.

a) Critical:
   - i) The variance consists of a departure involving: safety; or
   - ii) When the configuration documentation defining the requirements for the item classifies defects in requirements and the variances consist of a departure from a requirement classified as critical.

b) Major:
   - i) The variance consists of a departure involving:
     1) Performance;
     2) Interchangeability, reliability, survivability, maintainability, or durability of the item or its repair parts;
     3) Health;
     4) Effective use or operation;
     5) Weight and size;
     6) Appearance (when a factor); or
   - ii) When the configuration documentation defining the requirements for the item classifies defects in requirements and the variances consist of a departure from a requirement classified as major.

c) Minor:
   - i) The variance consists of a departure which does not involve any of the factors listed as critical or major, or
   - ii) When the configuration documentation defining the requirements for the item classifies defects in requirements and the variances consist of a departure from a requirement classified as minor.

[32] Verification and Validation

Verification and Validation are the processes of examining that a Product/Products System or service, meets specifications and that it fulfils its intended purpose. As often stated, verification is intended to ensure that the "product is built right," while validation is intended to ensure that the "right product is built."

The purpose of the verification process is to provide objective evidence that a Product/Products System or elements thereof fulfil its specified requirements and characteristics. Verification is done after design and build, making sure the designed and built system meets its requirements. The focus is on the built system and how well it meets the agreed-to requirement set that drove the design and fabrication.

The purpose of the validation process is to provide objective evidence that the Product/Products System, when in use, fulfils its mission objectives and user requirements. Validation typically occurs after system verification and makes sure the designed, built, and verified system meets its intended purpose in its operational environment. The focus is on the complete (integrated) system and how well it meets User expectations (needs).

Operational Test and Evaluation (OT&E) is conducted in the User environment under operationally realistic conditions to demonstrate, and where required, test and conceivably also any of the other verification/validation methods, compliance with user and/or system requirements. OT&E is required to demonstrate compliance to the User Requirements as part of Validation and may also be required as part of Verification to demonstrate compliance to the System Requirements. Because the accountability for Verification and Validation differs, two distinct phases are defined, namely:

a) Preliminary Operational Test and Evaluation (POT&E): The purpose of POT&E is to conduct under operational conditions, using production or production representative systems, with the assistance of the User to verify that the Product/Products System, as developed, will meet the stated system requirements. The Integrated Project team (IPT) is responsible for the planning, management and execution of POT&E with assistance from the User (System Manager and End-User). POT&E, where required, should be executed during system design & development, and shall be completed prior to the establishment of the final Product Baseline (fPBL).
b) Final Operational Test and Evaluation (FOT&E): The purpose of FOT&E is to validate that the verified Product/Products System under operational conditions, will meet the stated user requirements and that it fulfils the User's need. The User is responsible for the planning, management and execution of the FOT&E with assistance from the IPT where required. FOT&E is executed during commissioning prior to establishment of the validated Operational Baseline (vOBL).

[33] Work Breakdown Structure

A Work Breakdown Structure (WBS) is a hierarchical breakdown of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables. (PMBOK - referenced document 2.2[7]).

[34] Work Breakdown Structure Element

An entry in the work breakdown structure that can be at any level, defined in PMBOK as WBS Component. (see referenced document 2.2[7]).

[35] Work Package

A Work Package is the work defined at the lowest level of the work breakdown structure for which cost and duration are estimated and managed. (PMBOK - referenced document 2.2[7]).

3.2 Abbreviations/Acronyms

3.2.1	CCB	Configuration Control Board
3.2.2	CDR	Critical Design Review
3.2.3	CI	Configuration Item
3.2.4	CFE	Client Furnished Equipment
3.2.5	CFS	Client Furnished Services
3.2.6	CFI	Client Furnished Information
3.2.7	CFD	Client Furnished Data
3.2.8	CSOW	Contract Statement of Work
3.2.9	CWBS	Contract Work Breakdown Structure
3.2.10	ECP	Engineering Change Proposal
3.2.11	EM	Engineering Management
3.2.12	FBS	Functional Breakdown Structure
3.2.13	FCA	Functional Configuration Audit
3.2.14	FMECA	Failure Mode Effects and Criticality Analysis
3.2.15	FOT&E	Final Operational Test and Evaluation
3.2.16	fPBL	Final Product Baseline
3.2.17	FRACAS	Failure Recording Analysis and Corrective Action System (FRACAS)
3.2.18	FTA	Fault Tree Analysis
3.2.19	ILS	Integrated Logistic Support
3.2.20	IPT	Integrated Project Team
3.2.21	LCC	Life Cycle Cost
3.2.22	LCN	Logistic Support Analysis Control Number
3.2.23	LORA	Level of Repair Analysis
3.2.24	MIS	Management Information System
3.2.25	MOE	Measures of Effectiveness
3.2.26	MOP	Measures of Performance
3.2.27	MRI	Master Record Index
3.2.28	MSI	Maintenance Significant Item
3.2.29	MTBcF	Mean Time Between critical Failures
3.2.30	MTBF	Mean Time between Failure
3.2.31	MTTR	Mean Time to Repair
3.2.32	OEM	Original Equipment Manufacturer

3.2.33	OTRR	Operational Test Readiness Review
3.2.34	PBS	Physical Breakdown Structure
3.2.35	PCA	Physical Configuration Audit
3.2.36	PDR	Preliminary Design Review
3.2.37	PHS&T	Packaging, Handling, Storage and Transportation
3.2.38	PM	Project Management
3.2.39	PMP	Project Management Plan
3.2.40	PMBOK	Project Management Body of Knowledge
3.2.41	POT&E	Preliminary Operational Test and Evaluation
3.2.42	PRR	Production Readiness Review
3.2.43	PSS	Product and System Support
3.2.44	QA	Quality Assurance
3.2.45	RCM	Reliability Centred Maintenance
3.2.46	RFB	Request for Bid
3.2.47	SCM	Supply Change Management
3.2.48	SOW	Statement of Work
3.2.49	STD	Standard
3.2.50	S&TE	Support and Test Equipment
3.2.51	SVR	System Verification Review
3.2.52	TEMP	Test and Evaluation Master Plan
3.2.53	TRR	Test Readiness Review
3.2.54	vOBL	Validated Operational Baseline
3.2.55	WBS	Work Breakdown Structure

4 RESPONSIBILITIES

4.1 Process Owner

The process owner of this Guide is the Group Executive: Acquisition and SCM.

4.2 Communication

This Guide will be communicated by Corporate Communications Division to all Armscor employees via the applicable communication media.

4.3 Implementation

This Guide is applicable from the time of official approval and it is the responsibility of the Armscor Project Manager to include it as an applicable document in the appropriate RFB.

4.4 Review

This Guide shall be reviewed by the appointed review group when necessary, but at least every third year.

4.5 Data Management

The Divisional Heads of the Acquisition Department are responsible for the management and control of derived data.

5 DEFINING THE BID SCOPE OF WORK

The Bid is a written offer, in a prescribed or stipulated format, in response to Armscor's RFB invitation for the provisioning of goods and services.

The Bid Scope of Work is a direct reply to the RFB Scope of Work and should define the detail activities, tasks, outputs and deliverables to be completed, with the related costs and timescales.

The steps for generating the Bid Scope of Work are indicated in Figure 1 with clarifications in the follow-up paragraphs.

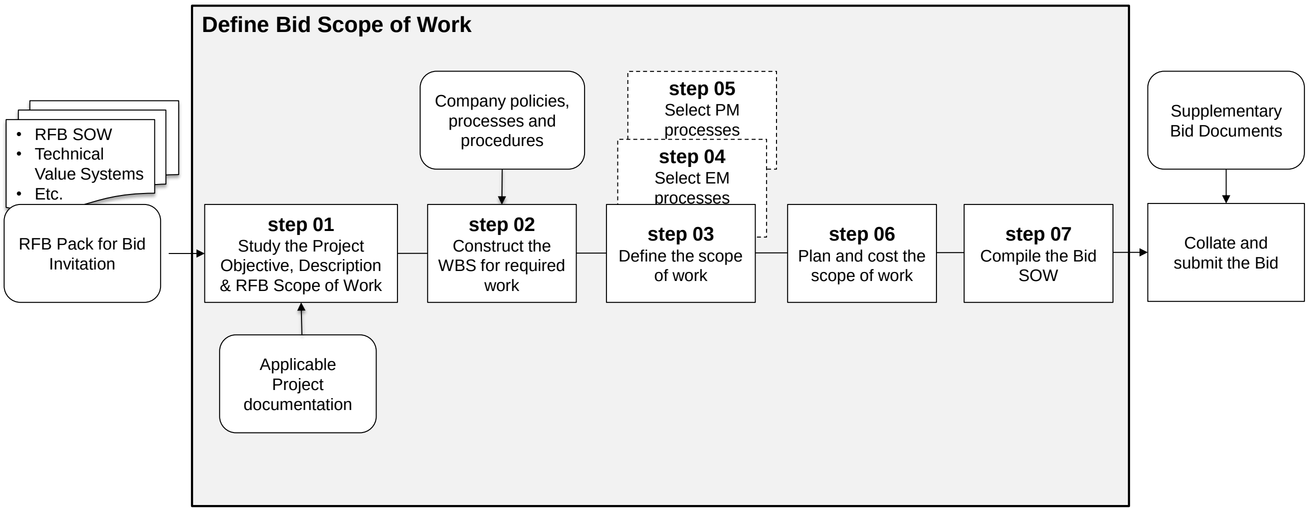

Figure 1: Steps for Generating the Bid Scope of Work

5.1 Study the Project Objective, Description and RFB Scope of Work

5.1.1 The introduction part of the RFB SOW contains the objective of the project (i.e. what the project aims to accomplish when it is complete) as well as a project description. The project description has the aim to describe the background and scope of the project and to identify project boundaries, external interfaces and dependencies, where applicable.

5.1.2 The RFB Scope of Work describes the required work to be performed.

5.1.3 Each work package is identified by a unique SOW code and name and details the aim, work description, the relevant inputs/applicable standards, the foreseen outputs and deliverables as well as acceptance criteria and assumptions for the work to be performed.

step 01 *The Bidder shall study the project objective, description and RFB Scope of Work in context with the other project documentation, where applicable.*

5.2 Construct the WBS for the Required Work

step 02 *The Bidder shall expand the WBS elements as contained in the RFB SOW to construct a WBS in support of the Bid.*

note 05: *Company policies and procedures representing the organisational culture, structure, governance, processes and knowledge base should be considered as an input.*

5.2.1 The WBS elements should, where required, be decomposed into sizable portions that are manageable, controllable and executable (see Figure 2 as an example). This will enable the Bidder to effectively estimate resources, cost and duration.

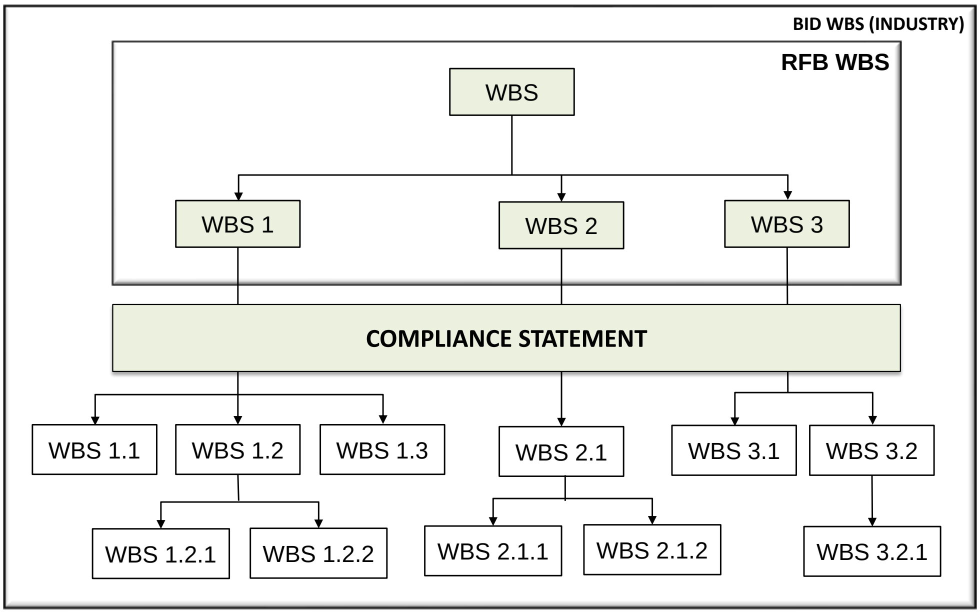

Figure 2: Bid Work Breakdown Structure

note 06: *The Bidder shall incorporate WBS elements that will be executed by sub-contractors/suppliers to address the full scope of supply.*

5.2.2 The Bidder shall complete the Technical Contract Conditions Compliance Statement received with the RFB.

5.3 Define the Scope of Work

step 03 *The Bidder shall define the scope of work based on the RFB SOW. The detail activities, tasks, outputs, deliverables as well as the acceptance criteria for each work element identified in the Industry WBS, should be defined.*

note 07: *Appendix A contains guidance for the establishment of support products.*

step 04 *The Bidder shall select the appropriate EM processes in support of the work elements and integrate them into the relevant main SOW elements, where applicable.*

note 08: *Appendix B contains guidance for engineering management processes.*

step 05 *The Bidder shall select the appropriate PM processes as indicated in the RFB SOW and tailor these processes in accordance with the appropriate strategies as well as the complexity of the task to ensure effective and efficient execution.*

note 09: *Appendix C contains guidance for PM processes.*

note 10: *Special conditions and relevant standards should be added to the work descriptions, where applicable.*

5.4 Plan and Cost the Scope of Work

step 06 *The Bidder shall plan and cost the defined scope of work.*

note 11: *The Bidder's own policies, processes and procedures as well as factors such as resource availability, employee capability, infrastructure, etc. with the related risks can* *influence the cost as well as the timeline of the project and should be carefully considered during project planning and costing.*

5.4.1 Project planning estimates the project budget and schedule against which project progress will be assessed and controlled.

5.4.2 Project planning requires coordination of the technical work across EM and PM processes, taking into consideration internal as well as external influences and risks.

5.4.3 Costing the scope of work is a quantitative assessment of the expected costs for all resources that will be charged to the project. This activity includes but is not limited to, the costing of labour, materials, equipment, services, facilities as well as special categories such as an inflation allowance, cost of financing or contingency costs.

note 12: *Costing the scope of work is usually a bottom-up approach. Cost estimates are collected from the defined work packages in accordance with the Industry WBS. The work package cost estimates are then aggregated for the higher component levels of the WBS and ultimately for the entire project.*

5.4.4 Costing is a prediction that is based on the information known at a given point in time.

note 13: *It is good practice to reserve, within the scope of work, a certain amount to provide for unforeseen work/costs, called management reserves.*

note 14: *Thorough project planning, supported by a comprehensive risk analysis is a pre-requisite for the effective costing of a project.*

5.5 Compile the Bid Statement of Work

5.5.1 The Bid SOW should provide the detailed description of activities, tasks, products, services or results in order to fulfil the requirements of the RFB.

step 07 *The Bidder shall integrate the expanded WBS, with the cost and schedule of the defined work packages, into a Bid SOW.*

5.5.2 The format of the Bid SOW should be based on the RFB SOW. The RFB SOW's unique identification codes and names are standardised and should be maintained in the Bid SOW.

APPENDIX A: GUIDANCE FOR THE ESTABLISHMENT OF SUPPORT PRODUCTS

note 15: *This Appendix is not intended to be comprehensive in terms of logistic processes for all phases of a project or all types of projects.*

1 THE GENERAL SCOPE OF INTEGRATED LOGISTIC SUPPORT

Integrated Logistic Support (ILS) is the process to assure effective and economical support of a system prior to and after fielding the system.

The basic management principle of the ILS process is to acquire, test and deploy logistic support resources (e.g. technical manuals and data, training, spares, support and test equipment, etc.) as an integral part of the acquisition and system engineering process to:

a) Integrate support considerations into system and equipment design (i.e. define the required support),
b) Develop support requirements that are related consistently to readiness objectives, to design, and to each other (i.e. design the support),
c) Acquire the required support, and
d) Provide the required support during the operational phase at minimum cost.

note 16: *The first two activities are performed during the development of the product while the third activity is the focus of this Appendix and the fourth activity is performed during utilisation.*

1.1 Support Concept

The Support Concept constitutes a series of statements and/or illustrations defining criteria covering maintenance levels, major functions accomplished at each level of maintenance, basic support policies, effectiveness factors and primary logistic support requirements.

The Support Concept which is a required input for the supportability analysis, is established early in the project and then refined/optimised throughout the project, resulting in the Support Plan.

1.2 Supportability Analysis

Supportability analysis is an iterative analytical process by which the required logistic support for a system is identified and evaluated.

A series of processes, tools and procedures exist within the logistic support process to analyse all aspects of the system to achieve the highest level of system availability. The following are the most essential sub-processes of supportability analysis:

a) Functional Breakdown Structure (FBS) and Physical Breakdown Structure (PBS) definitions.
b) Fault Tree Analysis (FTA) and reliability modelling.
c) Failure Mode, Effects and Criticality Analysis (FMECA).
d) Reliability Centred Maintenance (RCM) analysis.
e) Maintenance task analysis and logistic support resource analysis
f) Level of Repair Analysis (LORA).
g) Life Cycle Costing (LCC) analysis.

note 17: *A more comprehensive logistic effort is required for complex systems. TA-STD-0017 (referenced document 2.2[12]) and MIL-HDBK-502A (referenced document 2.2[5]) can be used as guidance in performing product support analyses as an integral part of the overall systems engineering process.*

1.3 Basic Elements of Logistic Support

Logistic support elements are support functions necessary to achieve and sustain the readiness and operational capability of a system at the time of fielding and throughout the life cycle.

The grouping and requirements for logistic support elements vary between the Arms of Service but the traditional group of logistic elements are: maintenance planning (preventive and corrective), manpower and personnel, supply support, support and test equipment, technical data and publications, training and training support, computer resources support, facilities, packaging, handling, storage, and transportation and design influence/interface.

2 GUIDANCE FOR ESTABLISHING SUPPORT PRODUCTS

The procurement of off-the-shelf systems implies that support products have been developed according to a specific support concept. These existing support products may be adapted for utilisation by the User.

2.1 Supportability Analysis for Off-the-Shelf Systems

2.1.1 Breakdown Structures

The supportability analysis process uses a Logistic Support Analysis Control Number (LCN) key field for identifying records in a database/table. The LCN may present either a functional or physical breakdown sequence of the system/equipment hardware, including support and training equipment. The following two structures are therefore essential inputs in the supportability analysis process:

a) Physical Breakdown Structure (PBS)

The system is broken down taking only the physical aspects of the system items into account. No functions are included at any level in the breakdown and all entries are related only to the physical structure and the location of the item.
The PBS as generated during the development process is then populated for the system to the level of all Maintenance Significant Items (MSIs) with the related information, which is required when performing maintenance and support tasks within the context of the Support (Maintenance) Concept. The PBS is required by the User Management Information System (MIS) for linking the actual maintenance activities and configuration management of the hardware and software.

b) Functional Breakdown Structure (FBS)

The FBS is used to group items into functional groups for the User maintenance community to use when failures are reported.

By creating a physical/functional mapping between the FBS and PBS, any data documented under a functional LCN (e.g. reliability and maintainability information, manpower requirements, etc.) can be converted from a functional to a physical view and vice versa.

2.1.2 Maintenance Task Identification and Level of Repair Analysis

The User's Support (Maintenance) Concept is an essential input for the logistic support definition of the system.

Maintenance tasks related to the MSIs need to be identified and captured in a task list.

The Level of Repair Analysis (LORA) with the cost analysis determine and select the optimum level at which identified maintenance tasks should be conducted, ensuring the achievement of operational readiness.

2.1.3 Life Cycle Costing (LCC) Analysis

LCC is an essential input for the logistic support definition of the system and is a tool to assess the impact of design operation and support decisions. LCC is used to identify cost drivers in support trade-offs.

2.1.4 Resources Allocation

This activity includes all activities of planning and resource allocation to ensure that the maintenance of the system is executed timeously, at the correct maintenance level, in the shortest possible time.

This activity is essential as it drives the requirement for support resources such as tools, test equipment, spares & quantities, training aids, publication, etc.

2.2 Engineering Data

Existing engineering data of the off-the-shelf systems (e.g. Mean Time between Failure (MTBF), Mean Time Between critical Failures (MTBcF), Mean Time to Repair (MTTR) as well as other related support information is required for logistic support planning and optimisation (i.e. manpower/labour utilisation, equipment utilisation and spare part calculations).

note 18: *The detail requirements for engineering data and support information may differ between the Arms of Service and would be included in the Requirement Specification or RFB SOW.*

The engineering data and support information are to be captured in a database/tables as specified by the User.

2.3 Support Products

Support products are required for operating and maintaining the system. The ideal is to use the existing support products of the Original Equipment Manufacturer (OEM). These products should be reviewed for compliance with the supportability analysis results. Non-compliances should be addressed and amended where required.

note 19: *The detail requirements for support products may differ between the Arms of Service and would be included in the Requirement Specification or RFB SOW.*

The following are the most essential required support products for operating and maintaining systems effectively:

2.3.1 Provisioning and Support Products

These products include all the spare parts, service packages, consumables, etc. required by the User personnel to operate and maintain the system.

2.3.2 Support and Test Equipment (S&TE) Products

These products include all electronic, electrical, mechanical tools and equipment required by the User personnel to align, tune, calibrate, service and maintain the system.

2.3.3 Packaging, Handling Storage and Transportation (PHS&T) Products

These products include all those resources, procedures and methods to ensure that all system equipment and items of supply are packed, handled, stored and transported properly.

2.3.4 User Publications

These products include the operator and technical instructions/procedures that illustrate the procedural instructions for the safe and efficient operating, maintenance and training to maintain and support the system during its intended deployments and operations.

These publications will be acquired with the equipment or adapted to comply with the specified requirements.

2.3.5 Training and Training Support Products

The training element consists of personnel, equipment, facilities, data/documentation and associated resources necessary for the training of operational and maintenance personnel.

Training support products include training equipment (e.g. simulators, mock-ups, special devices), training manuals (e.g. curriculum, facilitator guide, learner/student guide, etc.) and computer resources (software) required for training.

These training materials and training aids will be acquired off-the-shelf with the equipment or adapted to comply with the specified requirements.

3 ASSURANCE PROCESSES

It is the responsibility of Industry to ensure that logistic data is correctly captured, managed and implemented for enabling the system to achieve the defined operational readiness throughout the system’s operational life.

note 20: *Logistic verification should be part of the system verification and validation processes.*

APPENDIX B: GUIDANCE FOR ENGINEERING MANAGEMENT PROCESSES

This Appendix encompasses extracts from the international standard and handbook of the relevant engineering management (EM) processes regarding main activities and elaborates on specific activities for limited integration development (Capital projects) and engineering changes on operational systems (PSS projects).

1 ARCHITECTURE DEFINITION

1.1 Aim

To generate system architecture alternatives, to select one or more alternative(s) that frame stakeholder concerns and meet system requirements and to express this in a set of consistent views.

1.2 Process Description

The architecture definition process is used to create and establish alternative architectures through several views and models, to assess the properties of these alternatives (supported by the system analysis process), and to select appropriate technological or technical system elements that compose the system.

note 21: *Architecture definition activities include optimisation to obtain a balance among architectural characteristics and acceptable risks.*

1.3 Main Activities

1.3.1 The main activities of the Architecture Definition process are:

a) Prepare for architecture definition.
b) Develop architecture viewpoints.
c) Develop models and views of candidate architectures.
d) Relate the architecture to design.
e) Assess architecture candidates.
f) Manage the selected architecture.

1.3.2 As a result of the successful implementation of the Architecture Definition process:

a) Identified stakeholder concerns are addressed by the architecture.
b) Architecture viewpoints are developed.
c) Context, boundaries, and external interfaces of the system are defined.
d) Architecture views and models of the system are developed.
e) Concepts, properties, characteristics, behaviours, functions, or constraints that are significant to architecture decisions of the system are allocated to architectural entities.
f) System elements and their interfaces are identified.
g) Architecture candidates are assessed.
h) An architectural basis for processes throughout the life cycle is achieved.
i) Alignment of the architecture with requirements and design characteristics is achieved.
j) Any enabling systems or services needed for architecture definition are available.

k) Traceability of architecture elements to stakeholder and system requirements is developed.

1.4 Specific Activities

1.4.1 The Contractor shall apply an architecture definition process (consider alternatives) to design/select Configuration Items (CIs) that provide an optimised integrated system solution.

1.4.2 When contracted for the Definition Phase, the Contractor shall conduct a Preliminary Design Review (PDR) to determine if the preliminary design for the system is sufficiently mature and ready to proceed with the detailed design at an acceptable risk.

note 22: *Interfaces are an important aspect to consider when defining the architecture of a system.*

note 23: *Modelling, simulation and prototyping are methods and techniques used during architecture definition/selection of CIs.*

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.4.4 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.5.4 (referenced document 2.2[1]).*

2 DESIGN DEFINITION

2.1 Aim

To provide sufficient detailed data and information about the system and its elements to enable the implementation consistent with architectural entities as defined in models and views of the system architecture.

2.2 Process Description

System architecture deals with high-level principles, concepts, and characteristics represented by general views or models excluding details. Design is the process of developing, expressing, documenting, and communicating the realization of the architecture of the system through a complete set of design characteristics described in a form suitable for implementation. As a result, the design definition process provides the description of the design characteristics (solution) and design enablers necessary for implementation.

note 24: *Design characteristics include dimensions, shapes, materials, and data processing structures. Design enablers include formal expressions or equations, drawings, diagrams, tables of metrics with their values and margins, patterns, algorithms, and heuristics.*

2.3 Main Activities

2.3.1 The main activities of the Design Definition process are:

a) Prepare for design definition.
b) Establish design characteristics and design enablers related to each system element.
c) Assess alternatives for obtaining system elements.
d) Manage the design.

2.3.2 As a result of the successful implementation of the Design Definition process:

a) Design characteristics of each system element are defined.
b) System requirements are allocated to system elements.
c) Design enablers necessary for design definition are selected or defined.
d) Interfaces between system elements composing the system are defined or refined.
e) Design alternatives for system elements are assessed.
f) Design artefacts are developed.
g) Any enabling systems or services needed for design definition are available.
h) Traceability of the design characteristics to the architectural entities of the system architecture is established.

2.4 Specific Activities

2.4.1 The Contractor shall apply a design process (hardware and software) to realise a design that satisfies system requirements.

2.4.2 The Contractor shall compile and maintain the detail design descriptions (i.e. product/process/material specification(s), drawings, diagrams, etc.) and consolidate them into a system data pack.

note 25: *The system data pack should have sufficient information to procure, modify, manufacture, integrate and realise the system solution.*

2.4.3 The Contractor shall perform requirements traceability to ensure that all requirements are tracked and traced and the status of each requirement is maintained on a Requirements Traceability Matrix.

2.4.4 The Contractor shall perform a Critical Design Review (CDR) to determine if the design for the integrated system is adequate to proceed with fabrication, integration and verification at an acceptable risk.

2.4.5 The Contractor shall design/adapt the manufacturing process(es) to support the scope of modifications/integration, where industrialisation is relevant.

note 26: *The design definition process is driven by specified requirements, the selected architecture and more detailed analysis of performance and feasibility. (Design provides the "how" or "implement-to" level of the definition.)*

note 27: *The Design Definition process is used in conjunction with the Configuration Management process.*

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.4.5 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.5.5 (referenced document 2.2[1]).*

3 SYSTEM ANALYSIS

3.1 Aim

To provide a rigorous basis of data and information for technical understanding to aid decision-making across the life cycle.

3.2 Process Description

The System Analysis process performs quantitative assessments and estimations that are based on analyses such as cost analysis, affordability analysis, technical risk analysis, feasibility analysis, effectiveness analysis, and other critical quality characteristics. Those analyses use mainly quantitative modelling techniques, analytical models, and associated simulations, which are applied at varying levels of rigor and complexity depending on the level of fidelity needed. In some cases, it may be necessary to employ a variety of analytic functions or experimentation to obtain the necessary insight. The results serve as inputs into various technical decisions, providing confidence in the adequacy and integrity of the system definition toward achieving the appropriate system balance.

note 28: *This process is often used in conjunction with the Decision Management process. (The results of analyses and estimations, as data, information, and arguments, are provided to the decision management process for selecting the most efficient alternative or candidate.)*

3.3 Main Activities

3.3.1 The main activities of the System Analysis process are:

a) Prepare for system analysis.
b) Perform system analysis.
c) Manage system analysis.

3.3.2 As a result of the successful implementation of the System Analysis process:

a) System analyses needed are identified.
b) System analysis assumptions and results are validated.
c) System analysis results are provided for decisions.
d) Any enabling systems or services needed for system analysis are available.
e) Traceability of the system analysis results is established.

3.4 Specific Activities

note 29: *System analysis provides a rigorous approach to technical decision making (e.g. for performance evaluations, cost analysis, technical risk analysis, supportability analysis, etc.).*

note 30: *Various types of models and modelling techniques can be used in the context of system analysis.*

3.4.1 The Contractor shall perform system analysis to achieve the appropriate system balance based on quantitative assessments and estimations, (e.g. cost analysis, affordability analysis, technical risk analysis, safety analysis, feasibility analysis, effectiveness analysis, and other critical quality characteristics, etc.).

3.4.2 Speciality Engineering

The Contractor shall, where required, apply/tailor speciality engineering activities in relation to the context, scope and complexity of the project and system requirements. The engineering approach, speciality engineering activities and analysis processes shall be documented in the relevant plan(s).

3.4.2.1 The Contractor shall perform reliability engineering analyses / failure analyses by executing the appropriate tasks, (e.g., Failure Mode and Effects Analysis (FMEA), Fault Tree Analysis (FTA), systems modelling and simulation, root cause failure analysis, etc.).

3.4.2.2 The Contractor shall perform logistic support analysis by executing the appropriate tasks, (e.g., Task identification and task analysis, Level of Repair Analysis (LORA), Resource allocation, Life Cycle Costing (LCC) analysis, etc.).

3.4.2.3 The Contractor shall perform safety analysis by executing the appropriate tasks, (e.g. Preliminary Hazard Analysis (PHA), Functional Hazard Analysis (FHA), Operations and Support Hazard Analysis (O&SHA), Health Hazard Analysis (HHA), etc.).

3.4.2.4 The Contractor shall perform production engineering analysis to ensure optimum and cost-effective manufacturing methods and processes, (e.g. process qualification, process optimization, process control, etc.).

3.4.2.5 The Contractor shall perform speciality engineering analysis (i.e. EMC/EMI and other speciality engineering requirements as specified in the Requirement Specification) to ensure that the design solution as integrated, including CFE, is not adversely affected by the engineering speciality being analysed

note 31: *The analyses results should be audited to ensure data integrity.*

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.4.6 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.5.6 (referenced document 2.2[1]).*

4 IMPLEMENTATION

4.1 Aim

To establish specific technologies (if applicable) and to realise a system, CI or process.

4.2 Process Description

The Implementation process transforms requirements, architecture, and design, including interfaces, into actions that create a CI or system element conforming to that item/element's detailed description. The element is constructed employing appropriate technology and Industry practices.

note 32: *The implementation process can support either the creation (fabrication or development) or adaptation of system elements. For system elements that are reused or acquired, such as off-the-shelf systems, the implementation process allows for adaption of the elements to satisfy the needs of the system of interest.*

4.3 Main Activities

4.3.1 The main activities of the Implementation process are:

a) Prepare for implementation.
b) Perform implementation.
c) Manage results of implementation.

4.3.2 As a result of the successful implementation of the Implementation process:

a) Implementation constraints that influence the requirements, architecture, or design are identified.
b) A system element is realized.

c) A system element is packaged or stored.
d) Any enabling systems or services needed for implementation are available.
e) Traceability is established.

4.4 Specific Activities

note 33: *The implementation process typically focuses on the following system elements:*

- *Hardware: Output is fabricated or adapted hardware (i.e. a physical element).*
- *Software: Output is software code and executable images.*
- *Operational resources: Output includes procedures and training.*
- *Services: Output includes specified services.*

4.4.1 The Contractor shall apply processes to obtain/fabricate hardware and obtain/modify software that conforms to detail design descriptions (i.e., product specifications).

4.4.2 The Contractor shall obtain/develop logistic support products and management information system data to operate and maintain the system (e.g. Provisioning and Support, Support and Test Equipment (S&TE), Packaging, Handling Storage and Transportation (PHS&T), User Publications, Training and Training Support)

4.4.3 The Contractor shall establish and implement manufacturing processes to produce the system/product.

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.4.7 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.5.7 (referenced document 2.2[1]).*

5 INTEGRATION

5.1 Aim

To synthesize a set of CIs into a realised system (product or service) that satisfies system requirements, architecture, and design.

5.2 Process Description

Integration consists of progressively assembling the implemented system elements (hardware, software, and operational resources) that compose the system of interest as defined and verifying the correctness of the static and dynamic aspects of interfaces between the implemented system elements.

note 34: *The Integration process works closely with the Verification and Validation processes.*

5.3 Main activities

5.3.1 The main activities of the Integration process are:

a) Prepare for integration.
b) Perform integration (Successively integrate system element configurations until the complete system is synthesized.)
c) Manage results of integration.

5.3.2 As a result of the successful implementation of the Integration process:

a) Integration constraints that influence system requirements, architecture, or design, including interfaces, are identified.

b) Approach and checkpoints for the correct operation of the assembled interfaces and system functions are defined.
c) Any enabling systems or services needed for integration are available.
d) A system composed of implemented system elements is integrated.
e) The interfaces between the implemented system elements that compose the system are checked.
f) The interfaces between the system and the external environment are checked.
g) Integration results and anomalies are identified.
h) Traceability of the integrated system elements is established.

5.4 Specific Activities

note 35: *The physical integration of a system is based on several implemented system elements and their physical interfaces (system elements and connectors). There should be a strong focus on interfaces to ensure that the intended operation of the system elements and interoperation with other systems is achieved.*

5.4.1 The Contractor shall progressively assemble the realised CIs (hardware, software) according to the system architecture into a system or sub-system for verification .

note 36: *The associated logistic support products (spare parts, service packages, support and test equipment, PHS&T, user publications, training and training support products and data) are all system elements to be integrated.*

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.4.8 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.5.8 (referenced document 2.2[1]).*

6 VERIFICATION

6.1 Aim

To provide objective evidence that a system or CI fulfils its specified requirements and characteristics.

6.2 Process Description

The Verification process identifies the anomalies (errors, defects, or faults) in any information item (e.g. system requirements or architecture description), implemented system elements or life cycle processes using appropriate methods, techniques, standards or rules. Verification provides the necessary information to determine resolution of identified anomalies.

note 37: *The Verification process determines that the "product is built right". The Validation process determines that the "right product is built".*

6.3 Main activities

6.3.1 The main activities of the Verification process are:

a) Prepare for verification.
b) Perform verification.
c) Manage results of verification.

6.3.2 As a result of the successful implementation of the Verification process:

a) Constraints of verification that influence the requirements, architecture, or design are identified.

b) Any enabling systems or services needed for verification are available.
c) The system or system element is verified.
d) Data providing information for corrective actions is reported.
e) Objective evidence that the realized system fulfils the requirements, architecture and design is provided.
f) Verification results and anomalies are identified.
g) Traceability of the verified system elements is established.

6.4 Specific Activities

6.4.1 The Contractor shall establish a plan for verification, (e.g. Test and Evaluation Master Plan (TEMP), Verification Cross Reference Matrix, etc.)

6.4.2 The Contractor shall define or use specified verification procedures to confirm compliance with requirements, (e.g. Acceptance Test Procedures (ATP), Factory Acceptance Test (FAT) procedures, Test Instructions (TIs), etc.).

6.4.3 The Contractor shall perform a Test Readiness Review (TRR) to confirm readiness for verification, (e.g. verification procedures approved, test articles and test equipment available, safety procedures and resources are identified, etc.).

6.4.4 The Contractor shall verify (qualify) the production processes prior to commencement of production.

6.4.5 The Contractor shall capture all verification results in formal reports.

6.4.6 The Contractor shall perform technical audits and reviews in support of the Verification process. The following technical audits and reviews maybe applicable:

a) Functional Configuration Audit (FCA) to ascertain that the systems' actual performance meets the stated system requirements.
b) System Verification Review (SVR) to ensure that the as-verified system meets the system requirements and is ready to proceed into initial production and/or industrialisation with acceptable risk.
c) Production Readiness Review (PRR) to ascertain that the system is ready to proceed into initial production with acceptable risk and that adequate production planning has been accomplished.
d) Physical Configuration Audit (PCA) to determine conformance of the as-built configuration of a verified CI with its detail design description ("built-to").

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.4.9 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.5.9 (referenced document 2.2[1]).*

7 TRANSITION

7.1 Aim

To establish a capability for a system to provide services specified by stakeholder requirements in the operational environment.

7.2 Process Description

The Transition process moves the system in an orderly, planned manner into the operational status, such that the system is functional, operable and compatible with other operational systems. It installs a verified system, together with relevant enabling systems, e.g. planning system, support system, operator training system, user training system, as defined in agreements.

note 38: *The Transition process is primarily a User responsibility. The Industry provides only support, if required.*

7.3 Main Activities

7.3.1 The main activities of the Transition process are:

a) Prepare for the transition.
b) Perform the transition.
c) Manage results of transition.

7.3.2 As a result of the successful implementation of the Transition process:

a) Transition constraints that influence system requirements, architecture, or design are identified.
b) Any enabling systems or services needed for transition are available.
c) The site is prepared.
d) The system installed in its operational location is capable of delivering its specified functions.
e) Operators, users and other stakeholders necessary to the system utilization and support are trained.
f) Transition results and anomalies are identified.
g) The installed system is activated and ready for operation.
h) Traceability of the transitioned elements is established.

7.4 Specific Activities

7.4.1 The Contractor shall support the User with the planning and preparation of Final Operational Test and Evaluation (FOT&E).

note 39: *An Operational Test Readiness Review (OTRR) is conducted to determine the readiness of the system and the User environment to commence with FOT&E (i.e. validation).*

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.4.10 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.5.10 (referenced document 2.22.2[1]).*

8 VALIDATION

8.1 Aim

To provide objective evidence that the system, when in use, fulfils its mission objectives and stakeholder requirements, achieving its intended use in its intended operational environment.

8.2 Process Description

The Validation process is applied to a system of interest, or any system or system element that composes it, at the appropriate points in the life cycle stages to provide confidence that the right system (or system element) has been built. Thus, the Validation process is performed to help ensure that the system or any system element meets the need of its stakeholder in the life cycle.

8.3 Main Activities

8.3.1 The main activities of the Validation process are:

a) Prepare for the validation.
b) Perform the validation.
c) Manage results of validation.

8.3.2 As a result of the successful implementation of the Validation process:

a) Validation criteria for stakeholder requirements are defined.
b) The availability of services required by stakeholders is confirmed.
c) Constraints of validation that influence the requirements, architecture, or design are identified.
d) The system or system element is validated.
e) Any enabling systems or services needed for validation are available.
f) Validation results and anomalies are identified.
g) Objective evidence that the realized system or system element satisfies stakeholder needs is provided.
h) Traceability of the validated system elements is established.

8.4 Specific Activities

note 40: *Validation occurs after system verification and makes sure the designed, built, and verified system meets its intended purpose in its operational environment.*

note 41: *Validation is a User responsibility. The Industry provides only support, if required.*

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.4.11 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.5.11 (referenced document 2.2[1]).*

9 OPERATIONAL SUPPORT

9.1 Aim

To sustain the capability of the system by monitoring the system's capability to deliver services, recording problems for analysis, taking corrective and preventive actions and confirming restored performance. It monitors the performance of the system and services through analyses of operational problems in relation to user requirements, organisational constraints and contractual agreements.

9.2 Process Description

This process establishes requirements for and assigns personnel to operate the system, and monitors the services and operator-system performance. In order to sustain services it identifies and analyses operational anomalies in relation to agreements, stakeholder requirements and organizational constraints.

9.3 Main Activities

9.3.1 The main activities of the Operational Support process are:

a) Prepare for operation.
b) Perform the operation.
c) Manage results of operation.
d) Support the client.

9.3.2 As a result of the successful implementation of the Operational Support process:

a) Operation constraints that influence system requirements, architecture, or design are identified.
b) Any enabling systems, services, and material needed for operation are available.
c) Trained, qualified operators are available.
d) System services that meet stakeholder requirements are delivered.
e) System performance during operation is monitored.
f) Support to the client is provided.

9.4 Specific Activities

9.4.1 The Contractor shall provide interim support as contracted.

note 42: *Logistic support analysis is required for the design of engineering changes on operational systems.*

note 43: *Where equipment is accompanied by log books which include maintenance records, these records shall be scrupulously updated.*

note 44: *History records shall be kept for preventive and corrective maintenance tasks. Where history records are available from the User, it shall be updated and maintained on all tasks and equipment. If the log book makes provision for the entry of such information, it shall be recorded in the log book.*

note 45: *Data recorded during the maintenance must be captured to serve as an input for equipment improvement programmes.*

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.4.12 (referenced document 2.2[2]) and the INCOSE Handbook, paragraphs 2.3.5.12 & 2.3.5.13 (referenced document 2.2[1]).*

APPENDIX C: GUIDANCE FOR PROJECT MANAGEMENT PROCESSES

This Appendix encompasses extracts from the international standard and handbook of the relevant project management (PM) processes regarding main activities and elaborates on specific activities for limited integration development (Capital projects) and engineering changes on operational systems (PSS projects).

1 PROJECT PLANNING

1.1 Aim

To produce and coordinate effective and workable project plans.

1.2 Process Description

Project Planning starts with the identification of a new potential project and continues after the authorization and activation of the project until its termination. Project Planning provides a structure for managing and executing the technical effort of a project, estimates the project budget and schedule and serves as the framework against which project progress is assessed and controlled.

The Project Planning process addresses the scope of the project management and technical activities, identifies process outputs, tasks and deliverables, establishes schedules for conducting tasks, including achievement criteria, and required resources to accomplish tasks. This is an on-going process that should be maintained throughout the project, with regular revisions.

1.3 Main Activities

1.3.1 The main activities of the Project Planning process are:

a) Define the project.
b) Plan the project and technical management.
c) Activate the project.

1.3.2 As a result of the successful implementation of the Project Planning process:

a) Objectives and plans are defined.
b) Roles, responsibilities, accountabilities, authorities are defined.
c) Resources and services necessary to achieve the objectives are formally requested and committed.
d) Plans for the execution of the project are activated

1.4 Specific Activities

1.4.1 The Contractor shall establish, prior to commencement of work, a PM infrastructure and organisation. This shall be maintained for the duration of the project.

1.4.2 The Contractor shall identify, scope and schedule activities and determine the required resources for the successful execution of the project.

1.4.3 The Contractor shall identify the project’s critical success parameters and risk areas and establish appropriate control measures.

1.4.4 The Contractor shall document the project planning in the Project Management Plan (PMP) and maintain the Master Schedule current for the duration of the project.

1.4.5 Where Client Furnished Equipment (CFE) is applicable, the Contractor shall ensure that a list of the items, with valid configuration status, especially those to be used for integration purposes, is provided. CFE could include Client Furnished Services (CFS), Client Furnished Information (CFI), and Client Furnished Data (CFD).

1.4.6 The Contractor shall ensure that all aspects regarding CFE (i.e. status, supply, certification, maintenance, storage, return, etc.) are clarified by means of a CFE Management Matrix/CFE Plan.

note 46: *Project Planning requires the coordination of the technical work of each work element identified in the WBS across EM and PM processes, taking in consideration internal as well as external influences and risks.*

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.3.1 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.4.1 (referenced document 2.22.2[1]).*

2 PROJECT MONITORING AND CONTROL

2.1 Aim

To determine the status of projects by evaluating, periodically and at technical reviews, the progress and achievements against plans and to provide direction to projects.

2.2 Process Description

This process evaluates, periodically and at major events, the progress and achievements against requirements, plans and overall business objectives. Information is provided for management action when significant variances are detected. The process also includes redirecting the project activities and tasks, as appropriate, to correct identified deviations and variations from other technical management or technical processes. Redirection may include re-planning as appropriate.

2.3 Main Activities

2.3.1 The main activities of the Project Monitoring and Control process are:

a) Plan for project assessment and control.
b) Assess the project.
c) Control the project.

2.3.2 As a result of the successful implementation of the Project Monitoring and Control process:

a) Performance measures or assessment results are available.
b) Adequacy of roles, responsibilities, accountabilities, and authorities is assessed.
c) Adequacy of resources is assessed.
d) Technical progress reviews are performed.
e) Deviations in project performance from plans are investigated and analysed.
f) Affected stakeholders are informed of project status.

g) Corrective action is defined and directed, when project achievement is not meeting targets.
h) Project re-planning is initiated, as necessary.
i) Project action to progress (or not) from one scheduled milestone or event to the next is authorized.
j) Project objectives are achieved.

2.4 Specific Activities

2.4.1 The Contractor shall assess the project's progress and achievement (technical, cost and schedule) on a continuous basis against the project scope and planning.

2.4.2 The Contractor shall submit a formal report on a monthly basis, or as contracted, on the following aspects as a minimum:

a) Progress against planning and achievements, addressing cost, schedule and technical performance, as well as estimates to completion to the level of the WBS elements and lower to manage risks and delays;
b) Quality conformance (system and process);
c) Major problems and corrective action planning; and
d) Risk management, including reporting on risk registers .

note 47: *The Project Monitoring and Control process interfaces with most of the technical and PM processes. Data and information are critical elements for the monitoring and control of a project.*

note 48: *The rigor of the Project Monitoring and Control process is directly dependent on the complexity of the system/project.*

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.3.2 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.4.2 (referenced document 2.2[1]).*

3 DECISION MANAGEMENT

3.1 Aim

To select the most beneficial course of action where alternatives exist.

3.2 Process Description

The Decision Management process is used to resolve technical or project issues and respond to requests for decisions encountered during the system life cycle, in order to identify the alternative(s) that provides the preferred outcomes for the situation. The methods most frequently used for Decision Management are the trade study and engineering analysis. Each of the alternatives is assessed against the decision criteria (e.g. cost impact, schedule impact, programmatic constraints, regulatory implications, technical performance characteristics, critical quality characteristics, and risk). Results of these comparisons are ranked, via a suitable selection model, and are then used to decide on an optimal solution. Key study data, (e.g., assumptions and decision rationale) are typically maintained to inform decision-makers, and support future decision-making.

3.3 Main Activities

3.3.1 The main activities of the Decision Management process are:

a) Prepare for decisions.
b) Analyse the decision information.
c) Make and manage decisions.

3.3.2 As a result of the successful implementation of the Decision Management process:

a) Decisions requiring alternative analysis are identified.
b) Alternative courses of action are identified and evaluated.
c) A preferred course of action is selected.
d) The resolution, decision rationale and assumptions are identified.

3.4 Specific Activities

3.4.1 The Contractor shall appoint capable and skilled personnel to committees, boards and work groups to enable effective decision making during the day-to-day activities of project execution.

note 49: *The Decision Management process interfaces with most of the technical- and project management processes. Qualified data and information are critical elements for decision making, especially for decisions regarding configuration changes, failure reviews and economical repair.*

note 50: *Decision analysis techniques and subject matter experts may contribute to the quality of the Decision Management process.*

Guideline: *For detail regarding the Decision Management Process refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.3.3 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.4.3 (referenced document 2.2[1]).*

4 RISK MANAGEMENT

4.1 Aim

To identify, analyse, mitigate and monitor the risks continuously throughout the life cycle of a project.

4.2 Process Description

The Risk Management process is a continual process for systematically addressing risk throughout the life cycle of a system product or service. It can be applied to risks related to the acquisition, development, maintenance or operation of a system.

4.3 Main Activities

4.3.1 The main activities of the Risk Management process are:

a) Plan risk management.
b) Manage the risk profile.
c) Analyse risks.
d) Treat risks.
e) Monitor risks.

4.3.2 As a result of the successful implementation of the Risk Management process:

a) Risks are identified.
b) Risks are analysed.
c) Risk treatment options are identified, prioritized, and selected.

d) Appropriate treatment is implemented.

e) Risks are evaluated to assess changes in status and progress in treatment.

4.4 Specific Activities

4.4.1 The Contractor shall formalise a process to manage risks.

note 51: *Risk items are categorised in terms of their technical, schedule and financial effects.*

note 52: *Project risks will mainly originate due to technical problems that may result in schedule and financial risks. Schedule risks may originate due to availability of resources and may result in financial risks. External influences with control outside the scope of the project, may result in any of the three categories of risks.*

note 53: *Level of risk depends upon both likelihood/probability and consequences. The consequence of the event is expressed in terms that depend on the nature of the event (e.g. inadequate performance). The combination of low likelihood/probability and low undesirable consequences gives low risk, while high risk is produced by high likelihood and highly undesirable consequences.*

4.4.2 The Contractor shall maintain a risk register by providing a risk description, classification (priority), mitigation, responsibility and status for each risk item.

note 54: *Expert judgments are extremely important to the overall accuracy of the risk management effort.*

4.4.3 The Contractor shall establish risk mitigation plans for high risks and other risks as deemed necessary.

Guideline: *For detail regarding the Risk Management process refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.3.4 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.4.4 (referenced document 2.2[1]).*

5 CONFIGURATION MANAGEMENT

5.1 Aim

To establish and maintain the integrity of all identified outputs of a project or process throughout the entire life cycle.

5.2 Process Description

The objective of the Configuration Management process is to manage and control system elements and configurations over the life cycle. Configuration management also manages consistency between a product and its associated configuration definition. Fundamental to this objective is the establishment, control and maintenance of software and hardware baselines.

Configuration management ensures that product functional, performance, and physical characteristics are properly identified, documented, validated and verified to establish product integrity, that changes to these product characteristics are properly identified, reviewed, approved, documented and implemented and that the products produced against a given set of documentation are known.

note 55: *Configuration management includes the safekeeping of Intellectual Property records associated with projects.*

5.3 Main Activities

5.3.1 The main activities of the Configuration Management process are:

a) Plan configuration management.
b) Perform configuration identification.
c) Perform configuration change management.
d) Perform configuration status accounting.
e) Perform configuration evaluation.
f) Perform release control.

5.3.2 As a result of the successful implementation of the Configuration Management process:

a) Items requiring configuration management are identified and managed.
b) Configuration baselines are established.
c) Changes to items under configuration management are controlled.
d) Configuration status information is available.
e) Required configuration audits are completed.
f) System releases and deliveries are controlled and approved.

5.4 Specific Activities

5.4.1 The Contractor shall establish and maintain a Configuration Management (CM) process to maintain the configuration baseline for the system and the system elements.

5.4.2 The Contractor shall document the CM processes in a Configuration Management Plan (CMP) and keep it current for the duration of the project.

note 56: *As an alternative to the CMP, CM processes can be included in the PMP.*

5.4.3 The Contractor shall implement a numbering system for the identification of CIs and their corresponding documentation and shall ensure configuration traceability.

5.4.4 The Contractor shall control changes to approved baseline documents and configurations, including hardware, software, and firmware.

note 57: *Class I changes normally require customer approval prior to being implemented. A Class II change is a minor change that often affects documentation errors or internal design details. Refer to paragraph 3.1[12] for the classification of engineering changes.*

note 58: *Armscor Form K217 or an agreed upon alternative (with sufficient supporting documentation), should be used to submit Class I engineering change proposals for consideration and decision-making and Class II changes for concurrence of classification.*

note 59: *Armscor Forms K227 and K228, or an agreed upon alternative, should be used to submit critical, major or minor variances (deviations and concessions). Refer to paragraph 3.1[30] for the classification of variances.*

note 60: *Unless unusual circumstances exist, critical variances and variances which would affect service operation, logistic interoperability, or maintenance (e.g. repair parts, operation or maintenance procedures, or compatibility with trainers or test sets) shall not be requested or approved.*

5.4.5 The Contractor shall implement a Configuration Control Board (CCB) to coordinate, review and evaluate the change impact of all engineering changes, concessions (waivers) and deviations and authorise changes where the document control authority is with the Contractor or recommend change proposals to the higher level CCB for decision making.

note 61: *The Contractor's CCB shall be properly constituted and shall comprise qualified personnel from the relevant functional disciplines.*

5.4.6 The Contractor shall establish review forums (e.g. Failure Review Board (FRB), Material Review Board (MRB)), composed of qualified technical personnel to address failures, non-conforming material, etc.

note 62: *The MRB is normally chaired by a representative of the Contractor's Quality organisation and includes other disciplines as required to determine appropriate disposal of nonconforming material.*

5.4.7 The Contractor shall compile and maintain a Master Record Index (MRI) to ensure configuration status accounting.

note 63: *An MRI is a controlled index identifying the hierarchy and structure of information items (identification number, description, title and issue status) of technical baselines and related information items.*

note 64: *The Technical Baseline Definition (usually part of the Project Management Plan) defines the required information items for each technical baseline.*

note 65: *Configuration verification is an important element in the Verification process. Refer to Appendix D for the relevant technical reviews and audits in support of the Armscor Acquisition Process technical baselines.*

5.4.8 The Contractor shall maintain configuration records and reports to sustain a complete configuration trail for baseline documentation, data and configurations.

Guideline: *For detail regarding the Configuration Management Process refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.3.5 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.4.5 (referenced document 2.2[1]). Additional guidance can be found in ISO 10007 (2003), IEEE/STD 828 and ANSI/EIA 649.*

6 INFORMATION MANAGEMENT

6.1 Aim

To ensure relevant, timely, complete and valid information.

6.2 Process Description

Information management plans, executes, and controls the provision of information that is unambiguous, complete, verifiable, consistent, modifiable, traceable, and presentable. Information includes technical, project, organizational, agreement, and user information to designated stakeholders. Information is often derived from data records of the organization, system, process, or project.

Information management needs to provide relevant, timely, complete, valid, and if required, confidential information to designed parties during and as appropriate, after the system life cycle. It manages designed information, including technical, project, organisational, agreement, and user information. It further ensures that information is properly stored, maintained, secured, and accessible to those who need it, thereby establishing/maintaining integrity of relevant system life cycle artefacts.

6.3 Main Activities

6.3.1 The main activities of the Information Management process are:

a) Prepare for information management.
b) Perform information management.

6.3.2 As a result of the successful implementation of the Information Management process:

a) Information to be managed is identified.
b) Information representations are defined.
c) Information is obtained, developed, transformed, stored, validated, presented, and disposed of.
d) The status of information is identified.
e) Information is available to designated stakeholders.

6.4 Specific Activities

6.4.1 The Contractor shall, in conjunction with Armscor, identify system-relevant information to be collected, retained, secured and distributed.

6.4.2 The Contractor shall collect, retain, secure and distribute information as agreed with Armscor.

note 66: *The type of information required for the project, as well as the frequency, shall be incorporated in the Project Planning process.*

6.4.3 The Contractor shall, when necessary, implement a FRACAS[2] to ensure that any latent defects and problems with Products/ Product System design and integration be identified while the Products/Product System is still in the Acquisition Phase.

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.3.6 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.4.6 (referenced document 2.2[1]).*

7 PERFORMANCE MEASUREMENT

7.1 Aim

To collect, analyse, and report on information relating to processes implemented to support effective management of the project and to objectively demonstrate the quality of the products and services delivered.

7.2 Process Description

The Performance measurement process defines key performance indicators and perform measurement to support effective management and demonstrate the quality of the products, services and processes.

7.3 Main Activities

7.3.1 The main activities of the Performance Management process are:

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[2] Failure Recording Analysis and Corrective Action System (FRACAS) is a closed loop system that ensures that failures and faults of both hardware and software are formally reported, analysis is performed to the extent that the failure cause is understood, and positive corrective actions are identified, implemented and verified to prevent further recurrence of the failure.

a) Prepare for measurement.
b) Perform measurement.

7.3.2 As a result of the successful implementation of the Performance Management process:

a) Information needs are identified.
b) An appropriate set of measures, based on the information needs are identified or developed.
c) Required data is collected, verified, and stored.
d) The data is analysed and the results interpreted.
e) Information items provide objective information that support decisions.

7.4 Specific Activities

7.4.1 The Contractor shall include process-orientated as well as product-orientated measures in the project's performance measurement planning.

note 67: *Examples of process-orientated measures are cost, schedule and quality and examples of product-orientated measures are Measures of Effectiveness (MOE) and Measures of Performance (MOP).*

7.4.2 The Contractor shall incorporate the project's measurement planning in the Project Planning process and shall present the performance measurement results as part of the Information Management process.

note 68: *Line graphs and control charts are two of the more frequently used methods used for performance measurement.*

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.3.7 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.4.7 (referenced document 2.2[1]).*

8 QUALITY ASSURANCE

8.1 Aim

To help ensure the effective application of the organisation's Quality Management process to the project.

8.2 Process Description

Quality Assurance (QA) focuses on providing confidence that quality requirements will be fulfilled. Proactive analysis of the project life cycle processes and outputs is performed to assure that the product being produced will be of the desired quality and that organization and project policies and procedures are followed.

note 69: *The term "quality assurance" is often used interchangeably with the term "quality control." However, the focus of QA is during development activities (pro-active), while "quality control" is typically associated with "inspection" after development activities (re-active).*

8.3 Main Activities

8.3.1 The main activities of the Quality Assurance process are:

a) Prepare for quality assurance.
b) Perform product or service evaluations.
c) Perform process evaluations.

d) Manage QA records and reports.
e) Treat incidents and problems.

8.3.2 As a result of the successful implementation of the Quality Assurance process:

a) Project quality assurance procedures are defined and implemented.
b) Criteria and methods for quality assurance evaluations are defined.
c) Evaluations of the project's products, services, and processes are performed, consistent with quality management policies, procedures, and requirements.
d) Results of evaluations are provided to relevant stakeholders.
e) Incidents are resolved.
f) Prioritized problems are treated.

8.4 Specific Activities

8.4.1 The Contractor shall establish and maintain a Quality Assurance process to ensure that project outcomes meet requirements and that processes are performed accurately, precisely and consistently.

note 70: *Existing agreements and applicable quality certifications or registrations (e.g., ISO 9001), together with the organisation's overarching quality management policy should provide essential guidance for QA approaches in fulfilling the requirements of the project.*

8.4.2 The Contractor shall document the quality assurance processes in a Quality Assurance Plan (QAP) and keep it current for the duration of the project.

note 71: *As an alternative to the QAP, Quality processes can be included in the PMP.*

8.4.3 The Contractor shall execute QA activities in accordance with approved processes and procedures as a means of building quality into products or services.

note 72: *The Contractor shall notify Armscor of acceptance/formal verification dates at least five (5) working days or such periods agreed prior to the date of such acceptance/formal test and/or evaluation.*

8.4.4 The Contractor shall ensure and demonstrate the adequacy of inspection, measuring and test equipment used to verify conformance to specified requirements.

note 73: *Traceability to national calibration standards should be maintained and on request, be demonstrated.*

note 74: *QA personnel play a key role during the verification activities themselves. The presence of independent QA personnel during verification activities provides an unbiased perspective on the integrity of verification procedures and the appropriate calibration of verification equipment and facilities.*

8.4.5 The Contractor shall establish and maintain a quarantine process.

note 75: *Any material found not conforming to specified requirements, shall be placed in quarantine and shall be marked or labelled accordingly. Items placed in quarantine shall only be released for use when a concession (waiver) request has been authorised. Items, for which application for a concession (waiver) has been refused, shall be released from quarantine for disposal or rework purposes only. Adequate records of all items placed in and removed from quarantine shall be kept by the Contractor and shall be available to Armscor on request.*

8.4.6 The Contractor shall establish and maintain a corrective action process and shall act promptly on corrective action requests issued.

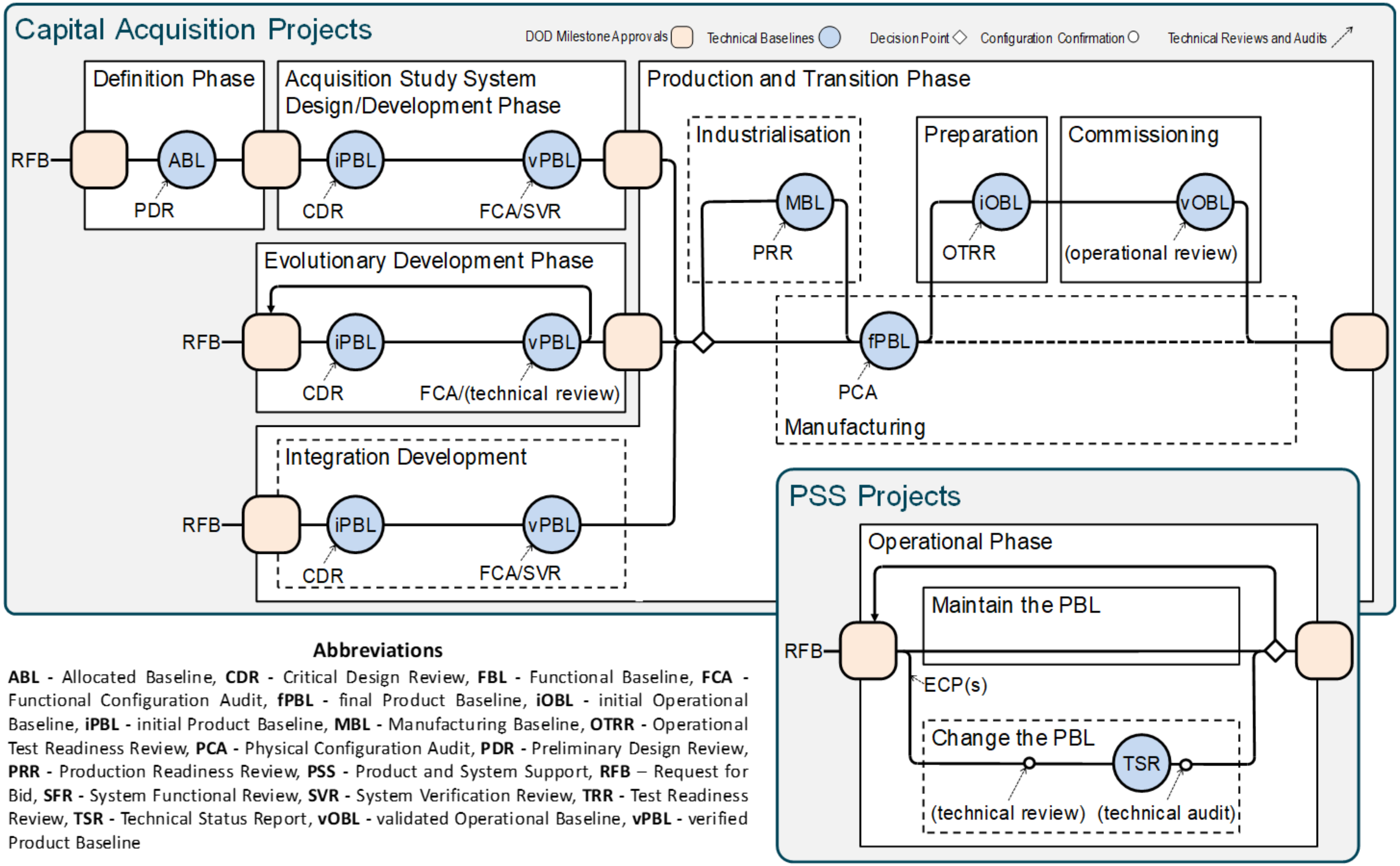
8.4.7 The Contractor shall establish and maintain a quality record process to demonstrate conformance to specified requirements and the effective operation of EM and PM processes. Pertinent quality records of sub-contractors shall be an element of this data.

note 76: *Quality records should be configured by means of the Configuration Management process with feedback to role players.*

Guideline: *For detail refer to ISO/IEC/IEEE 15288: 2015, paragraph 6.3.8 (referenced document 2.2[2]) and the INCOSE Handbook, paragraph 2.3.4.8 (referenced document 2.2[1])*

APPENDIX D: ARMSCOR ACQUISITION PROCESS MODEL

The diagram below is an abridged version of the Armscor Acquisition Process Model. The purpose of this Appendix (diagram with the related clarifications) is to provide context for the use of the Guide.



Abbreviations

ABL - Allocated Baseline, **CDR** - Critical Design Review, **FBL** - Functional Baseline, **FCA** - Functional Configuration Audit, **fPBL** - final Product Baseline, **iOBL** - initial Operational Baseline, **iPBL** - initial Product Baseline, **MBL** - Manufacturing Baseline, **OTRR** - Operational Test Readiness Review, **PCA** - Physical Configuration Audit, **PDR** - Preliminary Design Review, **PRR** - Production Readiness Review, **PSS** - Product and System Support, **RFB** – Request for Bid, **SFR** - System Functional Review, **SVR** - System Verification Review, **TRR** - Test Readiness Review, **TSR** - Technical Status Report, **vOBL** - validated Operational Baseline, **vPBL** - verified Product Baseline

[1] Allocated Baseline (ABL)

The ABL is a configuration baseline that defines the configuration items making up a system, and then how system function and performance requirements are allocated across lower-level configuration items. The performance of each Configuration Item (CI) in the Allocated Baseline is described in its development specification as are the tests necessary to verify and validate CI performance.

[2] Critical Design Review (CDR)

The CDR is conducted to determine if the detailed design for the system under review is adequate to proceed with fabrication[3], integration and verification at an acceptable risk. The successful completion of the CDR is a pre-requisite for establishing the initial Product Baseline (iPBL).

[3] Functional Baseline (FBL)

The FBL is a configuration baseline that defines the required system functionality, describing functional and interface characteristics of the overall system, and the verification required to demonstrate the achievement of those specified functional characteristics.

[4] Functional Configuration Audit (FCA)

The FCA is conducted to ascertain that a CI's actual performance meets the requirements stated in the functional and allocated baselines. The successful completion of the FCA is a pre-requisite for conducting the System Verification Review (SVR).

[5] Final Product Baseline (fPBL)

See Appendix D, paragraph [13] Product Baseline (PBL).

[6] Initial Operational Baseline (iOBL)

See Appendix D, paragraph [9] Operational Baseline (OBL).

[7] Initial Product Baseline (iPBL)

See Appendix D, paragraph [13] Product Baseline (PBL).

[8] Manufacturing Baseline (MBL)

The MBL is a configuration baseline that describes the manufacturing processes required to manufacture configuration items.

[9] Operational Baseline (OBL)

The OBL is a configuration baseline consisting of all documents and information required to operate and support the system throughout its life cycle. The status of the OBL has an "initial" status (iOBL) when the system is ready to commence with commissioning. A vOBL is established on completion of the commissioning (validation) of the User System.

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[3] Fabrication is the realisation of the design in a physical article and/or software code for verification purposes.

[10] Operational Test Readiness Review (OTRR)

The OTRR is conducted to determine the readiness of the system and the user environment to commence with commissioning. The successful completion of the OTRR is a pre-requisite for establishing the initial Operational Baseline (iOBL).

[11] Physical Configuration Audit (PCA)

The PCA is conducted to determine conformance of the as-built configuration of a verified CI with its detail design description (“built-to”). The successful completion of the PCA is a pre-requisite for establishing the final Product Baseline (fPBL).

[12] Preliminary Design Review (PDR)

The PDR is conducted to determine if the preliminary design for the system under review is sufficiently mature and ready to proceed with the detailed design at an acceptable risk. The successful completion of the PDR is a pre-requisite for establishing the ABL.

[13] Product Baseline (PBL)

The PBL is a configuration baseline that describes all of the necessary functional and physical characteristics of a system solution; the selected characteristics designated for manufacturing acceptance testing; and procedures necessary for deployment, operation, support, training, and disposal. The status of the PBL progresses from “initial” (iPBL) - when the design is complete but before manufacturing for verification, “verified” (vPBL) - when compliance to the system requirements has been verified, to “final” (fPBL) - when physical compliance against the as-built configuration has been confirmed.

[14] Production Readiness Review (PRR)

The PRR ascertains that the system design is ready for production and that the supplier has accomplished adequate production planning.

[15] Product and System Support (PSS)

See main document, paragraph 3.1 [22] for the definition of a PSS project.

[16] System Functional Review (SFR)

The SFR is conducted to ensure that the set of system requirements of the preferred system concept are sufficiently complete to proceed into the next acquisition phase at an acceptable risk. The successful completion of the SFR is a pre-requisite for establishing the FBL.

[17] System Verification Review (SVR)

The SVR[4] is conducted to ensure that the as-verified system meets the system requirements and is ready to proceed into initial production and/or industrialisation with acceptable risk. The successful completion of the SVR is a pre-requisite for establishing the vPBL.

[4] The SVR may be held concurrently with the system-level FCA.

[18] Test Readiness Review (TRR)

The Test Readiness Review (TRR) assesses test objectives, test methods and procedures, test scope, safety, readiness for acquirer and supplier Development Test and Evaluation, and whether test resources are identified and obtained.

[19] Technical Status Report (TSR)

A Technical Status Report (TSR) is a report that details the progress and achievements of a project against planning.

[20] Validated Operational Baseline (vOBL)

See Appendix D, paragraph [9] Operational Baseline (OBL).

[21] Verified Product Baseline (vPBL)

See Appendix D, paragraph [13] Product Baseline (PBL).