

# **NATO STANDARD**

## **AAP-20**

### **NATO PROGRAMME MANAGEMENT FRAMEWORK (NATO Life Cycle Model)**

**Edition C Version 1**

**October 2015**



**NORTH ATLANTIC TREATY ORGANIZATION  
ALLIED ADMINISTRATIVE PUBLICATION**

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16 October 2015

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## RECORD OF RESERVATIONS

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# 1. OVERVIEW

## 1.1. Introduction

In order to reach their operational goals, NATO/Nations/Agencies develop strategic objectives that are realized by single or multiple capabilities. Capabilities are realized by single or multiple programmes, and programmes are realized by single or multiple projects. A programme is undertaken to develop a system, product, or a service that feeds into this framework. Ongoing organisational activities/processes are aligned to support the needs of the programme.

As described in the NATO Policy for Systems Life Cycle Management (SLCM), the aim of SLCM is to optimise defence capabilities over the life cycle of the system by taking into account performance, cost, schedule, quality, operational environments, integrated logistic support, and obsolescence. It facilitates interoperability, communication, collaboration, and cooperation, while minimising total life cycle cost. Annex 1 shows the big picture of the Life Cycle Framework.

AAP-20 is a generic guidance document which provides the standardized and tailorable approach for managing programmes that includes materiel solutions and should be used in conjunction with AAP-48 and the SLCM document Library. AAP-48 defines the NATO System Life Cycle Management processes. The SLCM document library contains procedures, templates, handbooks, and other documents. The logical NATO System Life Cycle Management Document Framework is shown in Figure 1: NATO Life Cycle Management Document Framework.

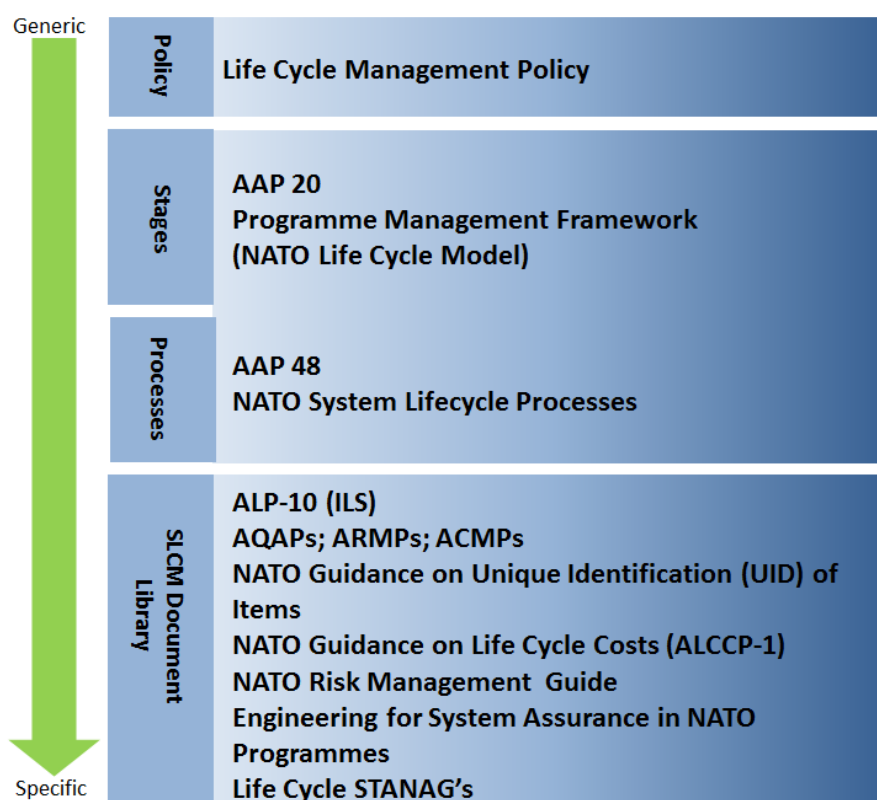


Figure 1: NATO Life Cycle Management Document Framework

## 1.2. Purpose

AAP-20 is a generic guidance document that provides the standardized and tailorable approach for managing programmes by NATO, Agencies, Groups of Nations and Nation(s). It delivers a structured approach to describe the stages and to aid decision-making at these decision points for all management levels involved in cooperative programmes.

This document focuses on the formulation of requirements based on a capability gap and the management of a programme throughout the life cycle, including accelerated fielding (rapid acquisition) and technology insertion. It provides potential pitfalls, risks, and opportunities for managing a programme based on the best practices of NATO Nations and helps clarify the roles of the National and NATO Authorities and the International Staff in the decision process.

AAP-20 expects close cooperation between operational commands, military planners, and programme managers. Stakeholder requirements will be provided by military planners to programme managers based on capability gaps and strategic objectives.

## 1.3. Applicability

Nations are encouraged to use this publication as a guide and therefore, AAP-20 intends to support and complement national acquisition policies, not replace them. The use of AAP-20 in NATO, Multinational and National Programmes as an enabling framework will lead to a more effective and efficient provision of capabilities.

With the necessity to describe interfaces and relationships to other processes and domains, it was necessary to use the NATO processes and domains to show the dependencies. Nations, Agencies, and other Users of this guideline should adjust these interfaces to their appropriate processes and domains.

## 1.4. Referenced Documents

NATO Policy for Systems Life Cycle Management	C-M-(2005)0108
Proposed General Principles and Guidelines for NATO Multinational Programmes	PFP(CNAD)D(2009)0009 dated 29 September 2009.
NATO System Life Cycle Processes	AAP-48
Guidance Manual for Cooperative Programme Arrangements	AACP-01
Guidelines on Contractual Terms for Feasibility Study Work	AACP-02
Other Allied Publications (APs) Relating to Guidance and Procedures in International Programmes	See NATO Standardisation Document Database (NSDD)
Allied Life Cycle Cost Publication	ALCCP-1
Systems and software engineering – System life cycle processes	ISO/IEC 15288

### 1.5. *Applicable Documents*

These documents are not specifically referenced in the AAP-20, but may be useful in executing a successful NATO Programme. AAP-48 contains all other related documents.

Systems and Software Engineering, Life Cycle Management, Guide to the Application of ISO/IEC 15288 (System Life Cycle Processes)	ISO/IEC TR 24748-2:2011
Systems and Software Engineering, Life Cycle Processes, Project Management	ISO/IEC 16326:2009
A Guide to the Project Management Body of Knowledge, Third Edition – PMBOK® Guide, Project Management Institute (PMI) Standards Committee	ANSI/PMI4
Interoperability Documents for Inter-Committees Coordination	C-M(2009)0145
The NATO Policy for Standardization	C-M(2010)0063
NATO Guidance on the Use of AQAP 160 Ed.1	AQAP 169
NATO Policy on an Integrated Systems Approach to Quality through the Life Cycle	AQAP 2000
NATO Guidance on the Use of the AQAP 2000 Series	AQAP 2009
NATO Project Assessment Model	AQAP 2050
NATO Mutual Government Quality Assurance (GQA) Process	AQAP 2070
NATO Requirements for Deliverable Quality Plans	AQAP 2105
NATO Quality Assurance Requirements for Design, Development and Production	AQAP 2110
NATO Quality Assurance Requirements for Production	AQAP 2120
NATO Quality Assurance Requirements for Inspection and Test	AQAP 2130
NATO Quality Assurance Requirements for Final Inspection	AQAP 2131
NATO Supplementary Software Quality Assurance Requirements to AQAP 2110	AQAP 2210
Obsolescence Management - Application guide	EN 62402:2007
Configuration Management in System Life Cycle Management	STANAG 4427
Quality Management Systems - Guidelines for Configuration Management	ISO 10007
NATO Guidance on Integrated Logistics Support for Multinational Armament Projects (ILS)	ALP-10
Product Life Cycle Support (PLCS)	STANAG 4661



**1.6. *Terms and Definitions***

A list of terms and definitions used in this document is provided in **Annex 4**.

**1.7. *Acronyms***

A list of acronyms used in this document is provided in **Annex 5**.

## 2. Introduction to Life Cycle Management

### 2.1. *Background Information*

The NATO, Nations or group of Nations need capabilities to meet their strategic objectives. The NATO objectives are documented in the Strategic Concept for the Defence and Security of the Members of the North Atlantic Treaty Organization. In order to maintain the capability to constantly satisfy these strategic objectives, it is continuously necessary to find new solutions.

The main objective of a programme is to deliver the required capabilities to fill identified gaps with a materiel solution. In order to fill these gaps, it is necessary to define a solution and build up an Operational System. This means that the System must reach a certain status of maturity in order to operate and perform the needed capability.

The integration of the necessary capability components (Doctrine, Organisation, Training, Material, Leadership Development, Personnel, Facilities, and Interoperability) is a joint effort between Nations, NATO, and collaborative work with other stakeholders utilising a wide variety of tools. A programme may be comprised of several Systems, with each System potentially being realised by one or more projects.

Basic inputs to a NATO Programme are:

- Required Military Capabilities (Stakeholder Requirements), provided by Military Planners
- Resources and decisions provided by Nations and NATO Authorities

In many cases a major building block of programmes is the materiel component in the form of one or more Systems of Interest and available Capability Packages as shown in Figure 2. To support the management and to aid decision making during the execution of the programme, a structured approach should be divided into stages. Each stage represents one essential period of the life cycle of the programme and the system.

The partitioning of the programme and system life cycle into stages is based on the practicality of doing the work in small, understandable, and timely steps. In addition, stages help to identify uncertainties and risk associated with cost, schedule, general objectives, and decision making. Each stage has a distinct purpose and contribution to the whole life cycle. The transition between stages uses decision gates and entry/exit criteria in addition to milestones within stages to ensure the programme is progressing successfully.

A programme can be managed using a variety of methods and tools, one of the most important being Project Management (see Annex 5 for additional project management considerations). Project Management can be used wherever useful within the management of each stage, as well as for definition of requirements, establishment of a programme Memorandum of Understanding (MOU), or production of a specific component within a System-of-Interest (SOI). While Project Management focuses on the overall execution of a project, systems engineering facilitates the technical aspects.

Life Cycle Management describes how a SOI and enabling systems are managed throughout its life cycle using the methods of Programme Management, Project Management.

The integration of all necessary SOI and enabling systems at the end of production stage, including Capability Packages, if applicable, result in the delivered or fielded Military Capability.

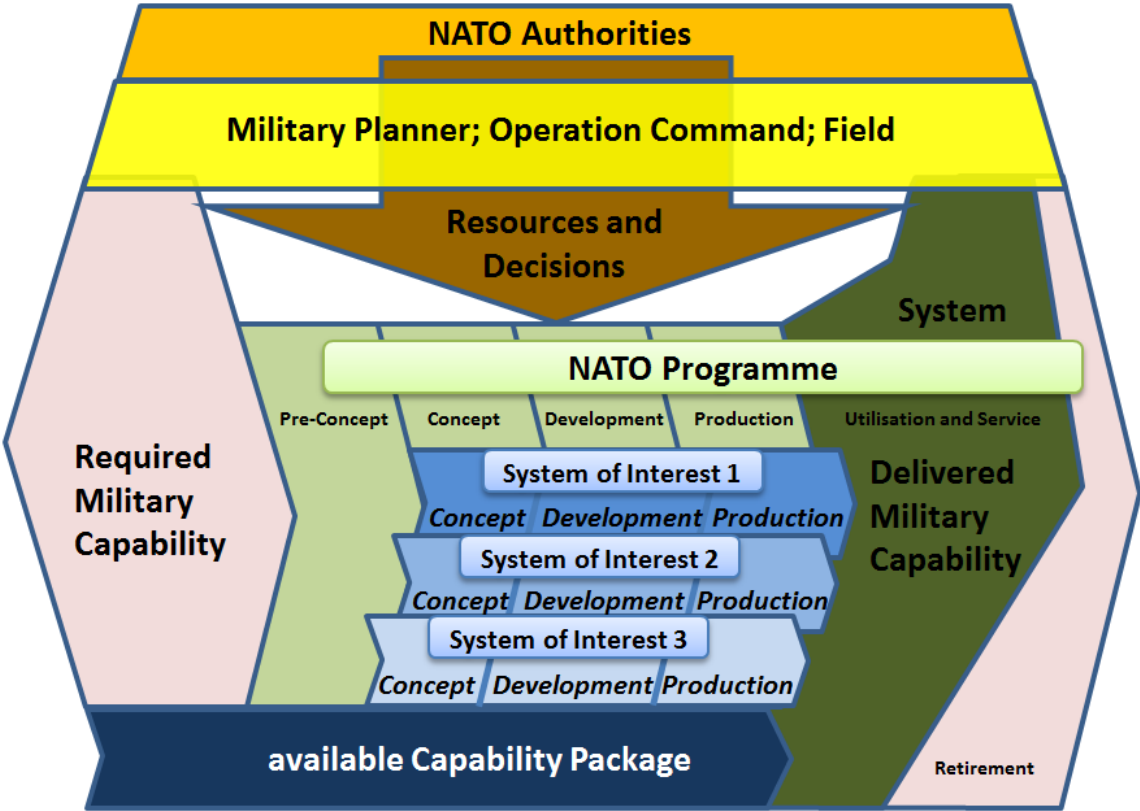


Figure 2: Relationship between NATO Programme, System-of-Interest and Military Capability

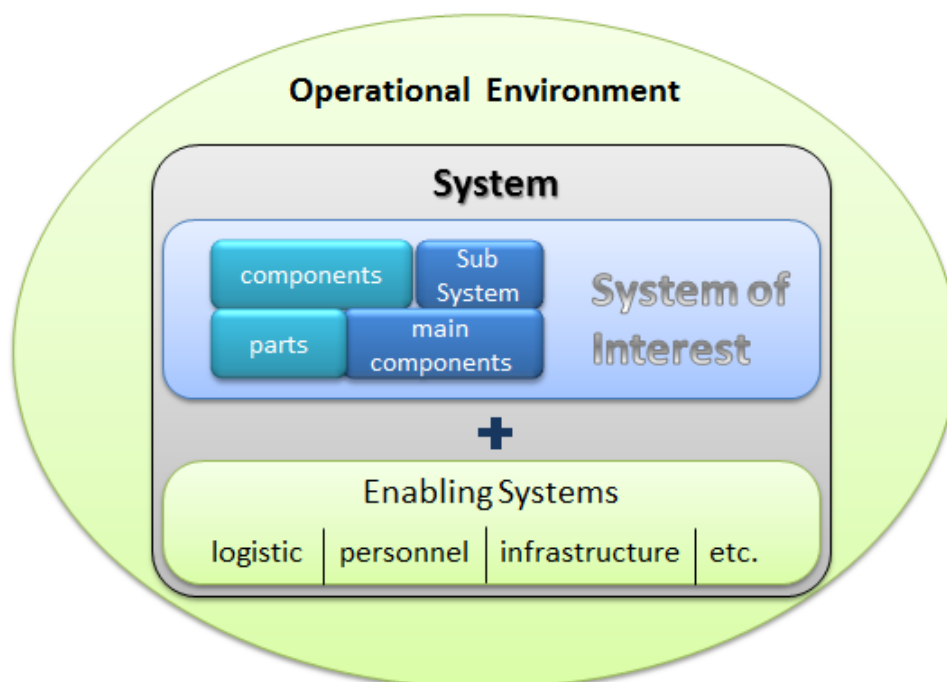
## 2.2. System Concept

The system concept for AAP-20 defines a system as a System-of-Interest (SOI) and all Enabling Systems (enablers) related to the SOI. This system concept differs from the management of the life of a product within the customer organization (asset tracking, configuration management, etc.), that is an integral part of the tasks to reach and maintain the maturity during the Systems Life Cycle.

ISO/IEC 15288 provides an additional system concept and structure with a principal view on industrial needs. This system concept must also be seen as an integral part of the system concept for AAP-20.

The System-of-Interest (SOI) consists of the sum of subsystems, main components, components (assemblies), and parts to meet a specific and defined purpose as distinguished from other systems<sup>1</sup>. Their essential properties arise from the relationships between the elements. The subsystems, components, and parts are able to be directly or indirectly dependent on each other and/or be linked and/or interact with each other.

Enabling systems support a System-of-Interest during the life cycle for the system, but it does not necessarily contribute directly to its function during operation. Examples are simulators, ground equipment, tools, and spare parts.



**Figure 3: System Concept**

During the execution of a programme, the AAP-20 System Concept considers a system upon the realisation of a solution by hardware, software, or services with all necessary elements of the system maturity and until its retirement. The target of task execution during the different stages is it to achieve and to maintain the maturity of the system.

<sup>1</sup> Subsystems, main components, components (assemblies), and parts are not defined in this document, because it is the task of each programme/project to define its own structure with this and additional elements.

### 2.3. *Maturity Concept*

The delivered or fielded Military Capability is available when the mature system has reached its defined Operational Maturity.

The Operational Maturity concept consists of the following interrelated maturity domains:

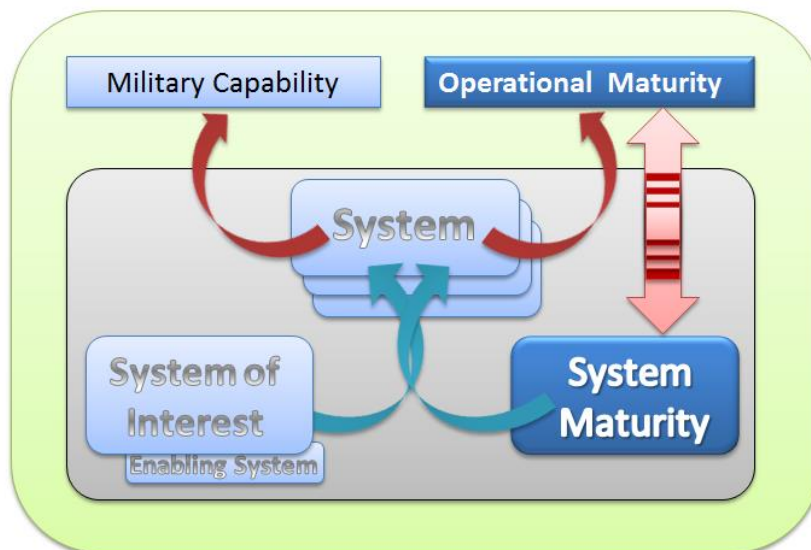
- Infrastructural (e.g. buildings, roads, airport facilities)
- Organisational (e.g. personnel, structure, processes, Information Technology)
- Training (e.g. operating manual, guidance, simulator)
- Support (e.g. materiel support, maintenance routines, technical publications)
- Further maturities as necessary, defined by the system-owner

To reach its Operational Maturity, each single domain maturity required by the system must be reached and sustained.

Note: The only possibility to break this approach is Accelerated Fielding, which follows special, especially urgent needs of an organisation to deliver a certain performance.

The Operational Maturity is linked with the Military Capability on the highest level. On the next level is system maturity linked to the system. Figure 4 shows this relationship.

System Maturity is comprised of the maturity of the SOI and the enabling systems. This means that System Maturity is dependent on key tasks and activities within the enabling systems to achieve full system maturity. Achieving and maintain system maturity is the objective of a programme.



**Figure 4: Relationship between Operational Maturity and System Maturity**

## 2.4. AAP-20 at a Glance

AAP-20 considers the following principles as stated in the SLCM Policy:

**Commitment to Systems Life Cycle Management:**

This requires commitment to an integrated approach by all parties involved and the adoption of consistent processes necessary to achieve their objectives. Systems Life Cycle Management also requires a process-oriented and process-driven organisation.

**Cooperation and Interoperability:**

Nations and NATO have the responsibility to provide systems that meet the Alliance’s capability and interoperability needs. Implementation of SLCM enables these needs to be met through cooperation and standardization.

**Efficiency:**

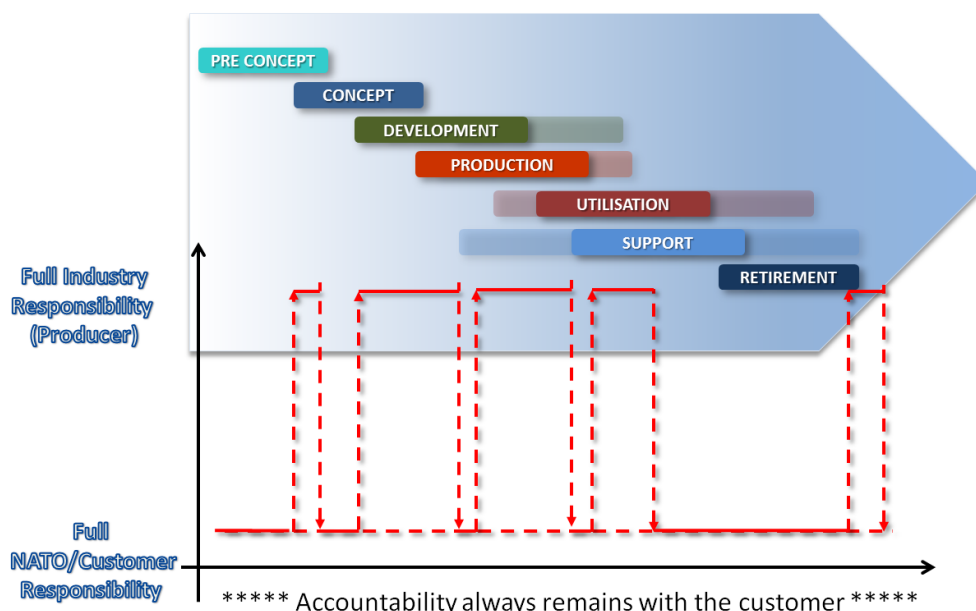
Effective and economic use of National and NATO resources is essential for the Alliance to sustain military operations. Implementation of SLCM better enables efficient acquisition, use, support, and disposal of systems.

**Collaboration with Industry:**

SLCM needs a close working relationship with Industry, maximum use of civil standards where appropriate, full exploitation of new technologies, and shared domain expertise in order to benefit from commercial best practices.

**Quality:**

The defense capability depends, to a great extent, on the quality of systems. Quality is best achieved through an integrated systems approach throughout the life cycle (AQAP 2000 – NATO Policy on an integrated system approach to Quality through the Life Cycle).



**Figure 5: Structured Approach in the Execution of a Programme**

Intrinsically tied to the partitioning of the programme and system life cycle into stages is the responsibility and accountability for the specific programme. A fundamental condition for a

programme is that the accountability always remains with the customer. Only NATO, Nation, groups of Nations have to provide a certain military capability, they are accountable for the Programme over its entire life cycle of the system. The industry takes the responsibility for the product life cycle as integrated part of the SLC on the basis of contracts with the customer. The figure 5 shows notional this structured approach. The real structure depends on the contracts in the specific programme.

In order to transition from one stage to the next, it is necessary to obtain the appropriate approval, which can come in the form of a Terms of Reference, a Memorandum of Understanding, or a Stage Approval Document. The template for a Stage Approval Document can be found in Annex 7.

### **Additional Considerations:**

The stakeholders may change during the life cycle of a system, as nations may choose not to participate further, while non-participating nations may choose to join the programme. As a programme evolves, it becomes the unique responsibility of participating nations to make all necessary decisions, while the direct Alliance involvement in the programme diminishes.

The basic building block of the realization of Programmes and Systems is the Memorandum of Understanding (MOU) or similar approval documents. (Figure 7) It is highly encouraged to use the Guidance Manual for Cooperative Programme Arrangements (AACP-01) for the development of an MOU.

During any time of the systems life cycle, contractual support may be necessary. These contracts are the responsibility of the Contracting Authority and should follow the Guidelines on Contractual Terms for Feasibility Study Work (AACP-02).

At any point in the life cycle, there may be reasons that prevent NATO or Nations from fully agreeing on military requirements, technical concepts, or preferred system configuration to meet their needs. In such a case, partially harmonised or separate projects could evolve from the same operational needs.

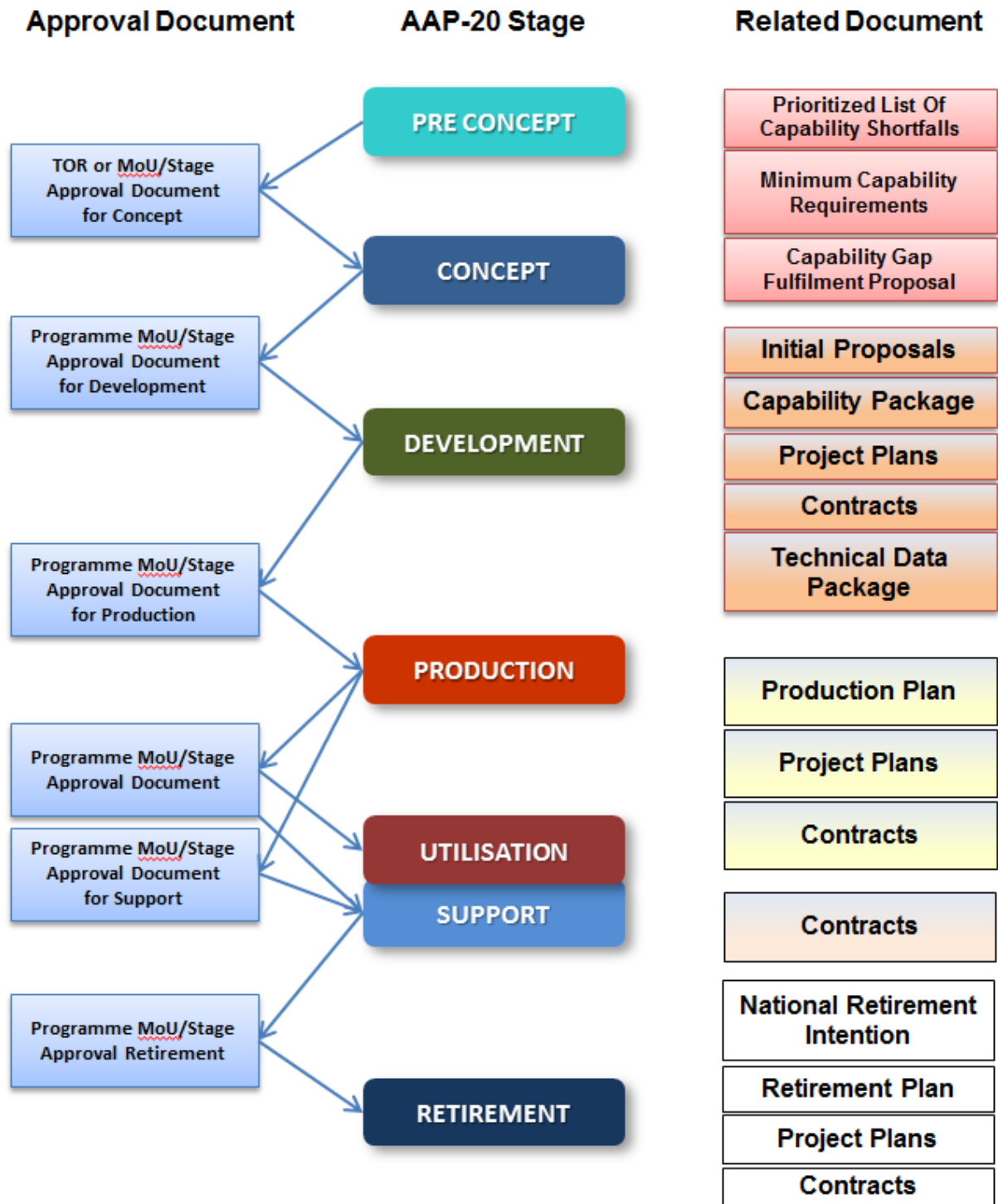


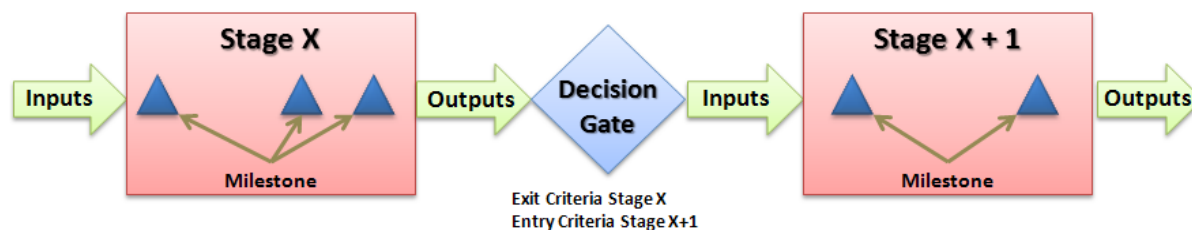
Figure 6: AAP-20 at a Glance



### 3. DESCRIPTION OF PROGRAMME STAGES

#### 3.1. General

Chapter 3 provides a description of a programme in terms of stages, decision gates, and milestones (Figure 7).



**Figure 7: Programme Stage Elements**

#### Stages:<sup>2</sup>

The stages of a typical programme are: Pre-Concept, Concept, Development, Production, Utilisation, Support, and Retirement.

This NATO life cycle model based on the system life cycle model and the explanation of life cycle stages in ISO 15288 under Life cycle concept and represents the NATO specific interpretation for NATO, Multinational and National Programmes.

Essential elements of each stage are inputs, outputs, and entry/exit criteria. Stage inputs are products that may be used during the stage for the further development towards the system. Stage outputs are work products generated in processes as a result of the execution of the stage. The stages can be executed sequentially or overlapped. The fulfillment of stage entry criteria is necessary to proceed into the stage. Stage exit criteria have to be met to terminate the stage.

The description of the specific stages is concentrated on an SOI that stands in the focus of a materiel-oriented programme. Nonetheless, in every stage of the programme, the whole programme should be considered in a coordinated way with all its relevant components (enabling systems, interfaces to other related systems, other DOTMLPFI-elements).

#### Phases:

The phases are sub elements of the stages to fulfill the exit criteria of a specific stage. The phases can be executed sequentially or overlapped.

#### Decision Gates:

The decision gates are used to transition between the stages and are the points in the Systems Life Cycle (SLC) where past work is mature and validated, future work is agreed upon, and lessons learned are captured. Decision gates may be in the form of a meeting of the decision makers and stakeholders, a written document signed by the decision makers

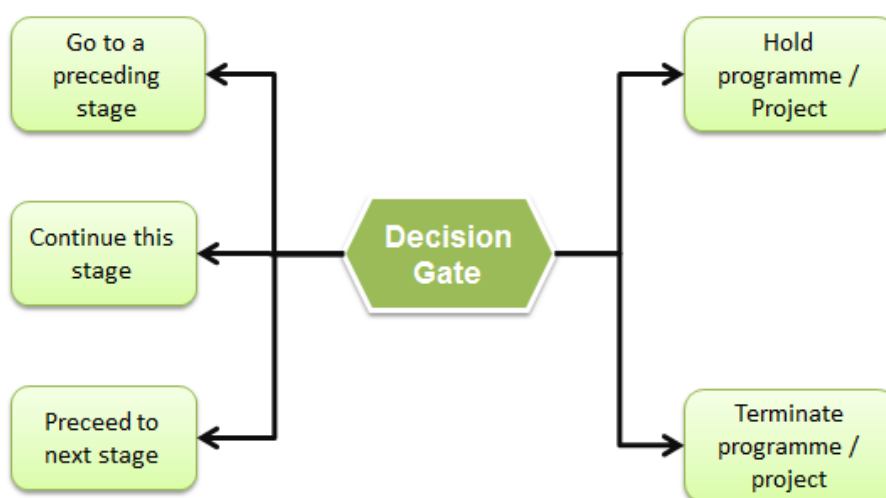
<sup>2</sup> ISO/IEC 15288 provides in chapter 5.2 additional considerations about life cycle models and life cycle stages.

formalizing the decisions made, or any other form that is deemed appropriate for the programme.

The decisions made at each of the gates may be to (see Figure 7: Programme Stage Elements):

- execute the next stage
- continue this stage
- go to a preceding stage
- terminate the programme/project (life cycle)
- hold programme/project (life cycle) activity

Decisions have to be documented.



**Figure 8: Decision Gate**

#### **Milestones:**

In addition to decision gates, milestones are used as control points to gauge progress within a stage.

#### **Entry and Exit Criteria:**

Entry and exit criteria support the decision management process at the decision gates. They provide a means to mitigate risks and uncertainty.

Figure 9 below shows three different ways entry and exit criteria can be used at a decision gate (specific models may contain any combination of these paths).

- Path 1: Moving from stage (A) to stage (B), both the exit criteria (for stage A) and the entry criteria (for stage B) may be used to control the transition.
- Path 2: Entering stage (B) the entry criteria may be used to control the transition.
- Path 3: Leaving stage (A) may be controlled by exit criteria.

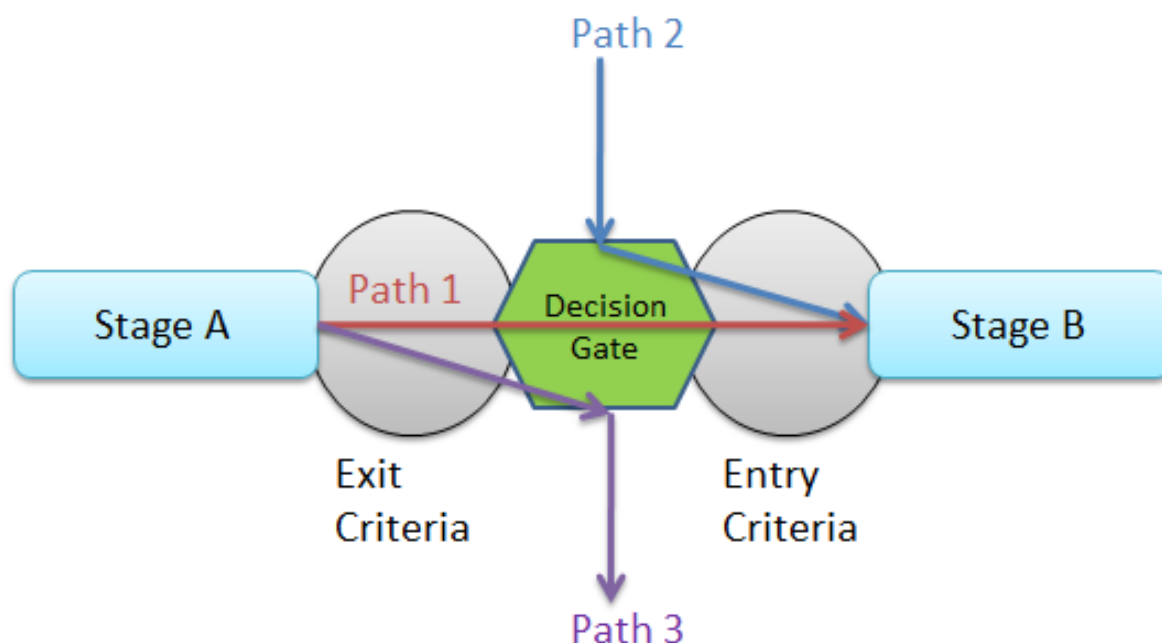


Figure 9: Use of Entry and Exit Criteria

### 3.2. Pre-Concept Stage



#### Purpose

The purpose of the Pre-Concept stage is to identify and document stakeholder requirements (e.g. Targets). Also important, is the identification of risk areas (at a high level) to the capability delivery. This provides focus for research and development capability/capacity to ensure availability of technologies to an acceptable timescale and affordable cost. The Pre-Concept stage must be seen as an interface between the NATO Defence Planning Process (NDPP) and the NATO Programme Management Framework. This could also apply for national planning processes and programme management framework.

#### Description

The aim of NATO defence planning is to provide a framework within which national and Alliance defence planning activities can be harmonised to meet agreed targets in the most effective way. It should facilitate the timely identification, development, and delivery of the necessary range of forces that are interoperable and adequately prepared, equipped, trained, and supported, as well as, the associated military and non-military capabilities to undertake the Alliance's full spectrum of missions.<sup>3</sup>NATO defence planning occurs within a structured process which must offer sufficient flexibility to ensure it remains responsive to changing circumstances and the needs of the Alliance and individual Allies. The process

<sup>3</sup> OUTLINE MODEL FOR A NATO DEFENCE PLANNING PROCESS ( PO(2009)0042)

needs to be integrated to the maximum degree possible and focus on medium and longer-term capability development, while at the same time, remaining responsive to unanticipated requirements arising from current operations. The NATO Defence Planning Process consists of the following five steps:

a. Establish Political Guidance

The intent of this step is to develop a single unified political guidance document for defence planning which sets out the overall aims and objectives to be met by the Alliance. It translates guidance from higher strategic policy documents, in sufficiently detailed direction, to guide the defence planning efforts of the various planning domains, both in nations and in NATO, towards determination of the required capabilities.

b. Determine Requirement

The Strategic Commands (SCs), taking into account any guidance deemed necessary from the Military Committee (MC) consistent with the political guidance, identify the complete set of capabilities considered necessary to meet the quantitative and qualitative ambitions set out in the political guidance for defence planning through a structured, comprehensive, transparent, and traceable process. The output of this analysis is a single set of requirements to support the planning efforts of all planning domains. The process uses, inter alia, NATO agreed intelligence, results from previous planning cycles, including responses to the NATO Capability Survey, established conceptual analyses and lessons learned, in particular from operations, as well as from exercises and other activities.

c. Apportion Requirements and Set Targets

Target setting initially apportions the overall set of Minimum Capability Requirements to nations in the form of target packages for the delivery of required capabilities and mitigation of shortfalls, while respecting the principles of fair burden sharing and reasonable challenge. It will also include the development of targets to be implemented by using common funding. This step in the process is a quadrennial effort, although the possibility for the introduction of out-of-cycle targets will be retained to remain responsive to the needs of the Alliance and individual Allies. Similarly, the option of a full revision or an update at the mid-term point will be retained to react to a change in the security environment or a change in political guidance.

d. Facilitate Implementation

This step assists national efforts and facilitates multinational and collective efforts to satisfy agreed targets and priorities with a view to the coherent and timely delivery of the capabilities sought by agreed target packages. Recognising that a number of planning domains in their regular work already support implementation of targets in their area of responsibility, the additional arrangements set out in this function are intended to complement and reinforce such efforts. They will focus on addressing the most important capability shortfalls, particularly by encouraging national implementation, facilitating and supporting multinational implementation, and executing collective (common-funded) provisioning of the capabilities required by the Alliance. Unlike other steps in the process, this step/function is continuous in nature.

e. Review Results

The NATO Capability Review scrutinises and assesses Allies' defence and financial plans as well as collective efforts with a view to providing an overall assessment of the degree to which the combined Alliance forces and capabilities are able to meet the political guidance, including the NATO Level of Ambition. In addition, the NATO Capability Review provides a key mechanism for generating feedback, any associated recommendations, and input to the

next cycle. Capability reviews will be carried out every two years to assess the degree to which individual nations and NATO bodies responsible for implementing commonly funded projects are meeting their respective NATO targets and individual nations are contributing to an equitable sharing of the roles, risks, and responsibilities.

The NDPP consequently employs a capability development approach to derive capability requirements. The NDPP encompasses all military planning domains.<sup>4</sup>

### Milestones

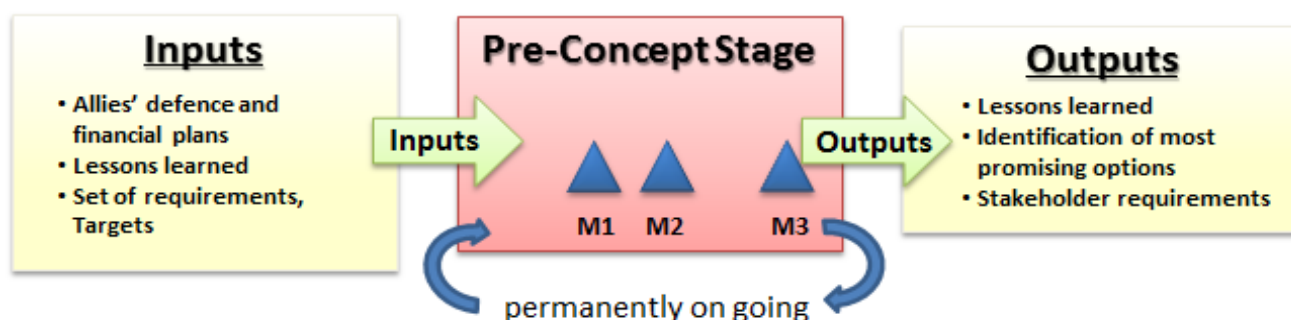
- M1.** Evaluation of the Targets
- M2.** Development of options which are in line with the requirements
- M3.** NATO Capability Review

### Entry Criteria

- Resources to execute stage work are available

### Exit Criteria

- Terms of Reference (TOR) and/or Programme MOU/Stage Approval Document for Concept Stage
- Pre-Concept Stage outputs are delivered



**Figure 10: Pre-Concept Stage**

<sup>4</sup> armaments, C3, civil emergency, force, logistics, resources and nuclear, air defence, air traffic, management, intelligence, military medical, research and technology, and standardisation

### **3.3. Concept Stage**

#### **Purpose**

Based on the Stakeholder Requirements identified and documented in the Pre-Concept Stage, it is the purpose of the Concept Stage to refine and broaden the studies, experiments, and engineering models pursued during the Pre-Concept Stage and to develop preliminary system requirements and a feasible design solution. One of the key objectives of the Concept Stage is to provide confidence that the business case is sound and the proposed solutions are achievable.

#### **Description**

The Concept Stage starts after a decision is made to fill a capability gap with a materiel solution and ends with the requirements specification for this materiel solution. The Concept Stage is divided into two phases, the Study Phase and the Programme Establishment Phase.

#### **Study Phase**

The main thrust of the Study Phase is to conduct an evaluation of alternative technical concepts for satisfying the identified capability need and to identify the most promising technical concepts for further evaluation.

The study effort is an iterative process and terminates with the recommendation of the preferred solution. The conduct of market surveys, including evaluation of the availability of off-the-shelf solutions, is an essential part of the effort. The primary task of the study efforts are to identify possible system solutions to the requirements, along with performance objectives that will guide activities beyond this phase, and to make appropriate recommendations for the follow-on phase. The methods of study will depend on the specific characteristics of each problem, how much is already known, and how much new study is necessary. As ongoing or completed national studies might provide a sufficient basis for the evaluation, this avenue should be thoroughly explored at the outset. However, if needed, other studies could be initiated - either separate national studies, joint studies, or by the NIAG in the pre – competitive stages. All nations having an interest would participate, while non-participants would still receive the resulting documentation.

The Study Phase will terminate once enough studies have been completed to permit the selection of the feasible alternative(s) studies. Activities that are typically included in the feasible alternative studies are:

- Mission/Operation/Capability need description
- Analysis of nations' or NATO's systems that may meet the need
- Alternative system solutions and technical features of these systems
- NATO-wide capabilities for the alternative systems solutions
- Time horizons of the alternatives solutions (R&D, manufacturing, procurement, inventory serving, full operation capability, milestones, and schedules)
- Economical and managerial aspects
- Risk analysis

- Logistics and standardization requirements of the alternative solutions, including infrastructure
- Evaluation criteria for the alternative solutions
- SWOT analysis of the alternative solutions

**General Principles and Guidelines for Achieving Successful NATO and Multinational Programmes**

NATO and Multinational programmes present their own challenges and a set of general principles and guidelines has been developed based on the lessons learned from multinational programmes, Table 1. The study’s phase should also give consideration to the requirement to inform the necessary agreements between nations as outlined in the guidelines.

For national purposes it is necessary to adjust the principles and guidelines with national regulations.

GUIDELINES	NATO SUPPORTING BODIES/DOCUMENTS
<p><b>PRINCIPLE 1. Agreement by all nations concerned on the <u>required capability</u></b></p>	
<p>Establish defined, understood and agreed requirement:</p> <ul style="list-style-type: none"> <li>- aligned to national/NATO doctrine</li> <li>- to meet operational needs of each nation</li> <li>- identifying interoperability targets</li> <li>- addressing the life cycle and taking account of affordability.</li> </ul> <p>Consider potential interfaces, interactions with non-participating NATO nations during programme and in-service.</p>	<p>NATO Doctrine publications (AJP series) – Military Committee Standardization Boards</p> <p>NATO Policy for Interoperability – NATO Committee for Standardization (NCS)</p> <p>NATO Policy for Systems Life Cycle Management – Conference of National Armament Directors (CNAD)</p>
<p><b>PRINCIPLE 2. Nations <u>to cooperate</u> for the common benefit and for the national benefit.</b></p>	
<p>Establish agreed, realistic milestones, assign each milestone decision authority noting national approval procedures</p>	<p>Programming guidance – AAP-20</p>
<p>Establish resourcing commitments to programme – people, facilities and budgets</p>	
<p>Focus programme and contracts on “first unit equipped” delivery</p>	

<p>Establish structured agreements for:</p> <ul style="list-style-type: none"> <li>- risk assessment and acceptance, budgeting and decision making</li> <li>- costing assessment and decision making</li> <li>- technology transfer</li> <li>- information exchange</li> <li>- industrial participation from an early stage and including penalties, incentives, intellectual property rights.</li> <li>- alignment of national approval processes</li> <li>- programme management and assignment of responsibilities</li> <li>- standards to be adopted through the life cycle, e.g. development, production, operational, and certification.</li> </ul>	<ul style="list-style-type: none"> <li>-Allied Acquisition Practices Publications - MOUs, contracting, cooperative programmes - AACP</li> <li>-Life Cycle Cost Guidance, ALCCP-1, and RTO/SAS Code of Practice guidance.</li> <li>- NATO Agreement on Communication of Technical Information for Defence Purposes</li> <li>- NATO Agreement on the Safeguarding of Secrecy of Inventions relating to Defence for which applications for patents have been made</li> </ul>
<p>Adopt SLCM approach, for example in accordance with ISO/IEC 15288</p>	<p>System Life Cycle Stages and Processes -AAP-48</p>
<p>Address SLCM through integrated project team approach</p>	
<p>Agree security of supply arrangements through life amongst participants</p>	<p>Promotion of security of supply agreements undertaken by the NATO Industrial Planning Committee – AC/143</p>
<p><b>PRINCIPLE 3. Common, understood, and agreed <u>expectations</u> for the programme.</b></p>	
<p>Agree technology readiness levels to be targeted in programme.</p>	<p>NATO Research &amp; Technology Organisation (RTO)</p>
<p>Agree quality standards and assurance methodologies.</p>	<p>Allied Quality Assurance Publications –AQAP series</p>
<p>Agree acceptable degrees of flexibility in meeting requirement, as for example through spiral development.</p>	<p>Programme Guidance – AAP-20</p>
<p>Agree intended operational use and location, including deployment environments.</p>	<p>Allied Electrical, Climatic and Mechanical Environments Publications – AECTP series</p>
<p>Agree in-service support.</p>	<p>Integrated Logistic Support for Multinational Programmes - ALP-10.</p>
<p>Lay out benefits expected by each programme participating nation.</p>	

**Table 1: General Principles and Guidelines for Success**



## Programme Establishment Phase

Up to this point, the main objective of participating nations has been to identify feasible alternatives and to select the preferred technical solution for satisfying a stated need. Beyond this point, the activity is concerned with developing the details of the selected system, so that a suitable programme can be implemented. Normally, at the beginning of this phase, the participating nations will seek establishment of a Programme, form a Steering Committee, and establish a management organization (Programme Management Office) to carry the programme to completion. Although, this may in practice be no more than transformation of a group created by the participating nations in the previous phase; it could include new members and is an important watershed in a system life cycle, since from this point on a programme is subject to control only by committed participants. The Steering Committee's main objective is to control and to approve development of further details of the complete system specification as well as initial sub-system specifications, and consider design approaches. Programme definition is the process of thoroughly exploring all aspects of the proposed programme and to examine relations between required performance, development time, and cost. The areas of technical uncertainty are examined and possible trade-offs are evolved in order to achieve a satisfactory balance between performance, development time, and cost. These trade-offs may lead to amending the operational requirements. Programme definition is devoted to the design of an optimum and complete system, including system/sub-system specifications, programme plans and others, which define the proposed design and development programme. It comes to an end with the Programme MOU/Stage Approval Document for Development Stage, which comprises the important results of this process, consolidates technical, financial and industrial agreements reached by the participants, and provides the basis for development. During this phase, all aspects of the proposed programme are explored more thoroughly. Performance characteristics and initial technical parameters are established to meet the operational requirements under optimum conditions. Personnel, logistics, training, and infrastructure requirements are finalised. The result of this phase is an agreed set of specifications and a proposed programme that can be used as the basis for entering the Development Stage.

During the Concept Stage the following activities and tasks should be performed:

- Refine stakeholder requirements
- Define concepts of operation
- Perform assessment of feasibility
- Evaluate possible life cycle models (e.g. spiral, incremental, etc...)
- Develop preliminary system requirements
- Establish/Analyse constraints - for software intensive programmes. The Concept Stage should consider architecture, integration, and possibly certification constraints.
- Develop initial Configuration Management (CM) Plan
- Develop initial Integrated Logistics Support (ILS) Plan
- Develop initial Obsolescence Management Strategy/Plan
- Outline design solutions in the form of drawings, models, prototypes, etc...
- Prepare/Update programme/project management plan
- Develop and refine life cycle cost estimates and human resource requirements

- Develop preliminary programme schedule
- Perform initial risk management activities
- Estimate Life Cycle Cost (LCC) using Allied Life Cycle Cost Publication (ALCCP-1) as a guide
- Conduct an after action review to capture lessons learned

### Milestones

Study Phase Review – To determine if the Study Phase is successfully completed in order to proceed to the Programme Establishment Phase.

### Entry Criteria

- TOR and/or MOU/Stage Approval Document for Concept Stage
- Resources to execute stage work are available

### Exit Criteria

- Programme MOU/Stage Approval Document for Development Stage
- Required stage outputs are delivered
- Decision to terminate programme

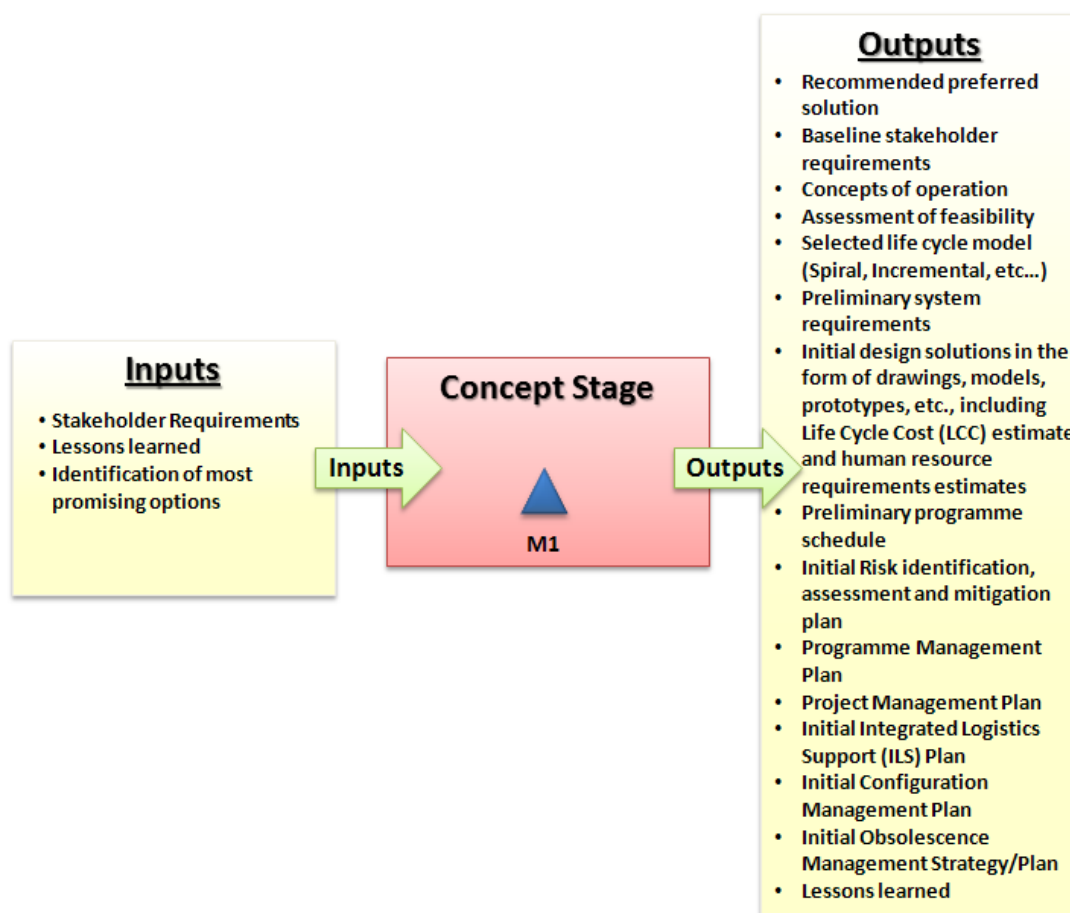


Figure 11: Concept Stage



### **3.4. *Development Stage***

#### **Purpose**

The Development Stage aims at full validation of the technical solution through design engineering work to the point where production actions can be taken. For software, the development, testing, and certification will ensure the software is ready for incorporation into new or existing hardware. The Development Stage is executed to develop a SOI that meets or exceeds the stated requirements and can be produced, tested, evaluated, operated, supported, and retired.

#### **Description**

The Development Stage consists of detailed engineering and prototype fabrication, conducted to ensure full validation of the selected technical approach, including complete system integration and testing to establish technical readiness. The result of the stage will be sufficiently detailed documentation to permit production to begin.

The Development Stage is the last opportunity to give initial effect to the development of the SOI for common activities of training and logistics support, for which the relevant planning will have already been considered. Early work is likely to be limited to identification of options, with a view to sounding out national positions and avoiding unilateral decisions, which might preclude common action. Options can be refined during the period of full development of the SOI, in parallel with major progress steps which will indicate where advantages lie for best achievement of efficient and cost-effective support in the later stages of the life cycle. Information exchange between the stakeholders through the Project Manager will be important so that system engineering characteristics are finalised.

The Development Stage embraces all activities from the preparation of the development contract to the approval of the equipment as ready for introduction into service. During the course of this stage, the configuration of the equipment is gradually improved. Factory trials are carried out to evaluate the results of the development activities as far as technology and economics are concerned.

During the Development Stage, the following tasks and activities should be performed:

- Draft Programme MOU/Stage Approval Document for production
- Evaluate and refine system requirements, project budget, and schedule baselines and life cycle cost estimates
- Identify risks and mitigation actions
- Develop the SOI architecture comprised of hardware elements, software elements, humans, and their interfaces (internal and external)
- Perform system Verification and Validation
- Confirm that the SOI meets all stakeholder and system requirements and is producible, operable, supportable, capable of retirement, and is cost effective for stakeholders
- Refine and baseline requirements for the enabling systems
- Identify resources necessary for the Production Stage
- Archive relevant data

- Develop a maintenance strategy
- Develop a retirement concept
- Update Obsolescence Management Strategy/Plan
- Update ILS Plan
- Update Configuration Management Plan
- Ensure enabling products for production are identified and will be available (e.g. Software Downloader, specialist jigs and tools, etc...)
- Estimate Life Cycle Cost (LCC) using Allied Life Cycle Cost Publication (ALCCP-1) as a guide
- Conduct an After Action Review to capture lessons learned

### **Milestones**

Milestones within the Development Stage may include the following:

- M1.** Requirements Review
- M2.** Functional Review
- M3.** Design Review
- M4.** Test Readiness Review
- M5.** Configuration Audits
- M6.** Verification Review
- M7.** Validation Review
- M8.** Production Readiness Review

### **Entry Criteria**

- Programme MOU/Stage Approval Document for Development Stage
- Resources to execute stage work are available

### **Exit Criteria**

- Programme MOU/Stage Approval Document for Production Stage
- Required stage outputs are delivered
- Decision to terminate programme

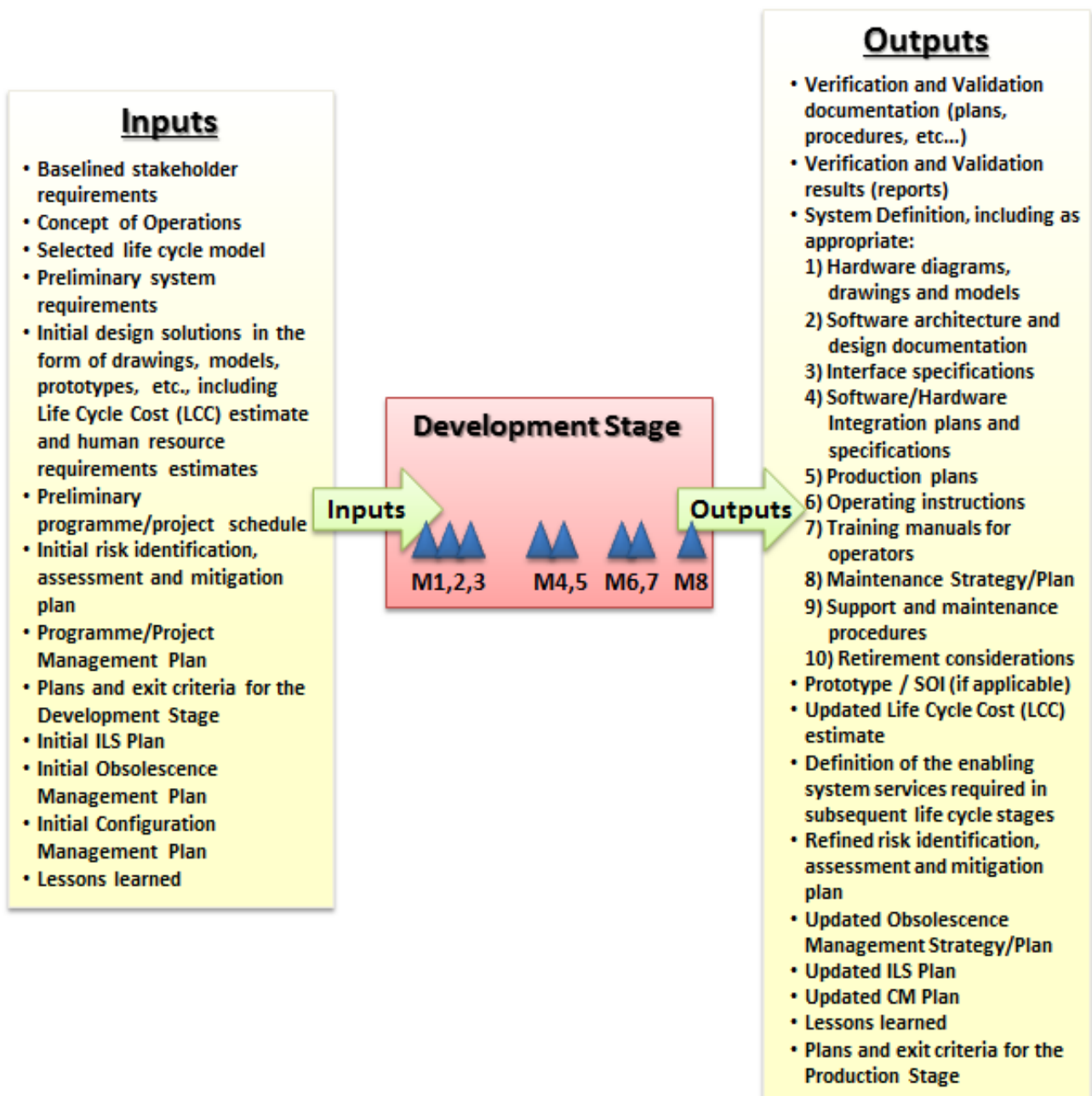


Figure 12: Development Stage

### **3.5. *Production Stage***

#### **Purpose**

The purpose of the Production Stage is to manufacture and test the SOI, and produce related support and enabling systems as needed. This materiel solution is based on the stakeholder requirements and the Programme MOU/Stage Approval Document for Production Stage.

#### **Description**

The Production Stage begins with the analysis of the input documents. Based on this analysis, required deliverables and guidance for the implementation, a detailed production plan and a quality management plan are developed and implemented. These plans are based on the relevant NATO Standardisation Agreements, Allied Publications and appropriate multinational and national regulations.

A critical path analysis will identify the essential priorities and synchronisation required to realize the SOI and to achieve efficiency. A full risk assessment will identify sub critical paths and sensitive elements.

Production is entirely a matter for the participating nations and parties in the programme. It is also possible to include nations who have not participated in the Development Stage. In such cases the financial and industrial implications of such expansion will require special consideration and agreement.

At the end of the Production Stage the produced and integrated materiel solution combined with the other necessary non-materiel DOTMLPFI elements result in the fulfilment of the defined capability need. All provisions for the sustainable Utilisation and Support Stages of the materiel solution are in place or planned and a concept for the retirement of the SOI exists.

During the Production Stage, the following tasks and activities should be performed:

- Produce the needed materiel elements of the solution
- Integrate and implement the materiel elements into the SOI for the Utilisation Stage
- Monitor and control production (technical, quality, and performance standards)
- Arrange for the implementation or modification of the non-materiel DOTMLPFI elements
- Conduct acceptance tests
- Consider appropriate standardisation
- Make provisions for the sustainable utilisation and support
- Establish Programme MOU(s)/Stage Approval Document for the Utilisation Stage and/or the Support Stage
- Maintain Programme MOU(s)/Stage Approval Document for Production
- Archive relevant data
- Update the ILS Plan
- Update the Configuration Management Plan

- Update the Obsolescence Management Strategy/Plan
- Provide inputs to update the retirement concept
- Estimate Life Cycle Cost (LCC) using Allied Life Cycle Cost Publication (ALCCP1) as a guide
- Conduct an After Action Review to capture lessons learned

### **Milestones**

Milestones within the Production Stage may include the following:

- Approved Production Plan
- Effective contract(s) date(s)
- Approved Quality Plan
- Acceptance of SOI
- Programme MOU(s)/**Stage Approval Document** for Utilisation and Support Stages

### **Entry Criteria**

- Programme MOU/**Stage Approval Document** for Production Stage
- Resources to execute stage work is available

### **Exit Criteria**

- Programme MOU/**Stage Approval Document** for Utilisation Stage
- Programme MOU/**Stage Approval Document** for Support Stage (if applicable)
- Required stage outputs are delivered
- Decision to terminate programme



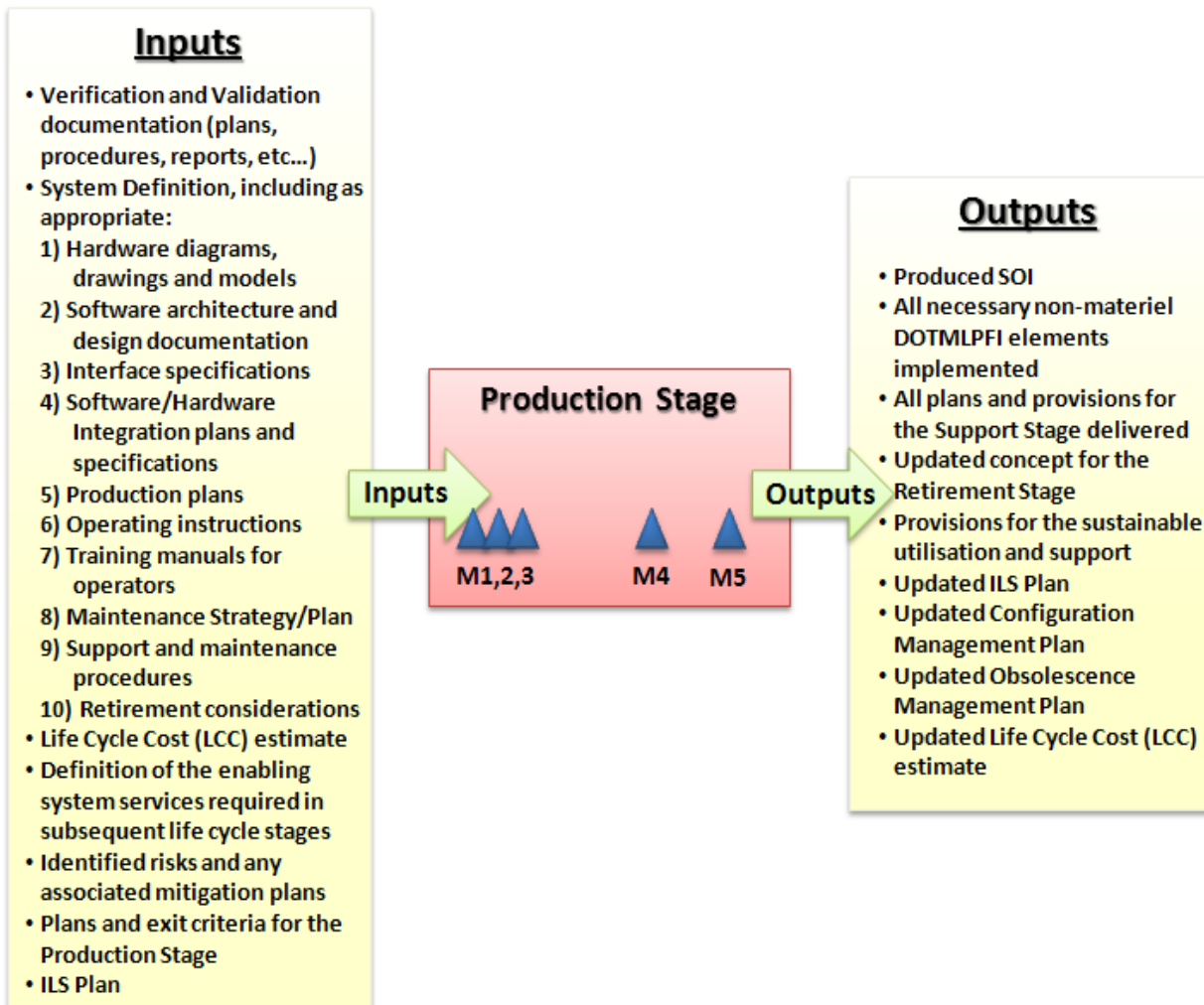


Figure 13: Production Stage

### 3.6. *Utilisation Stage*

#### **Purpose**

The Utilisation Stage is executed to operate the product at the intended operational sites, including modification and upgrades, to deliver the required services with continued operational and cost effectiveness. This stage ends when the SOI is taken out of service.

#### **Description**

The Utilisation Stage begins when the SOI is activated in its intended operational environment and becomes entirely the responsibility of the user. Once the SOI is activated and is being used, its performance should be monitored and anomalies, deficiencies, and failures should be properly recorded, identified, and resolved. Resolutions come in the forms of maintenance, minor modification (low cost/temporary), major modification (permanent), and SOI life extensions. During the Utilisation Stage, the SOI and its services can evolve and may give rise to different configurations, all of which must be documented and maintained per Configuration Management Plan. It is presumed that the organisation has the available operational infrastructure, to include facilities, equipment, trained personnel, and instruction manuals and procedures, which would most likely be developed or acquired in previous stages. Activities of the Utilisation Stage are closely related and many times overlap with those of the Support Stage.

During the Utilisation Stage, the following tasks and activities should be performed:

- Obtain enabling products and services
- Assign trained and qualified operators
- Activate the system in its intended operational environment
- Monitor operation to ensure that the system is operated in accordance with the operations' plans, occupational safety and environmental protection regulations, and the international humanitarian law
- Monitor the system operation by collecting data to confirm that service performance is within acceptable parameters, to include reliability, maintainability, and availability
- Perform failure identification actions when non-compliance has occurred in the delivered services
- Determine corrective course of action, if applicable
- Update operating procedures as necessary
- Solicit users' feedback
- Request for corrective design change, if applicable
- Address life-extension considerations
- Review and implement engineering changes through a staged AAP-20 approach
- Estimate Life Cycle Cost (LCC) using Allied Life Cycle Cost Publication (ALCCP1) as a guide
- Conduct an After Action Review to capture lessons learned

## Milestones

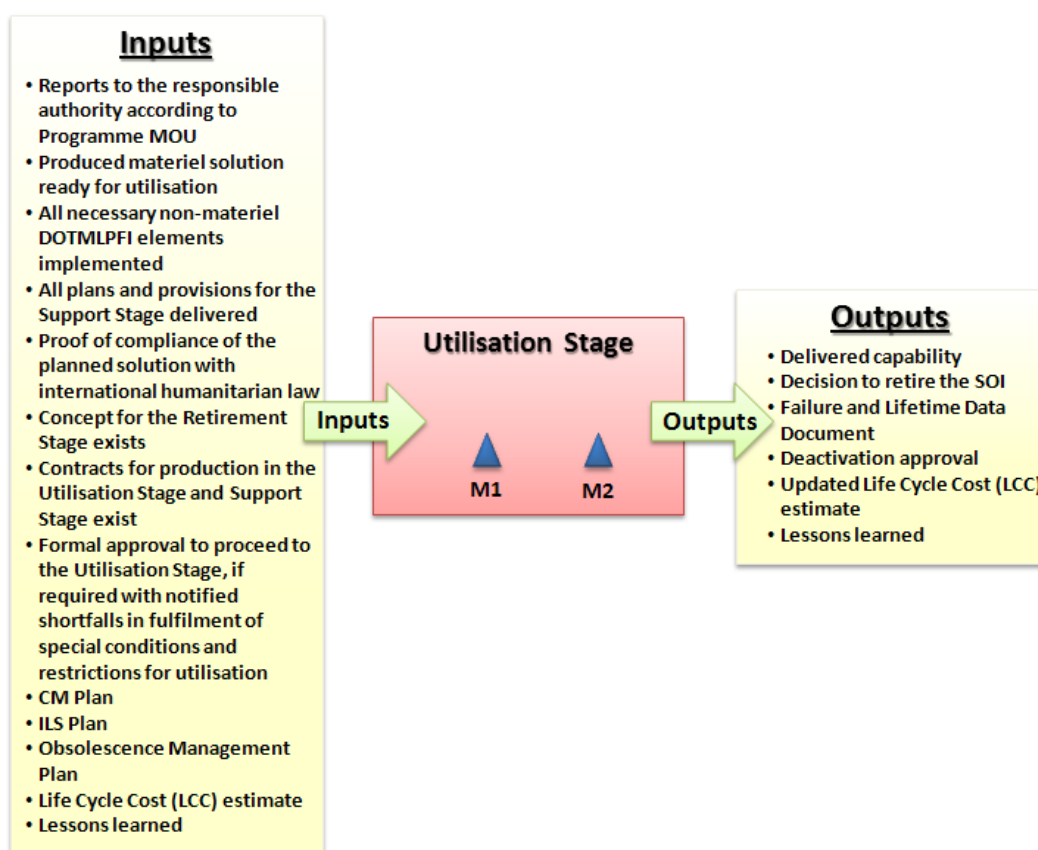
- M1.** In-Service Review
- M2.** Planned major maintenance events

## Entry Criteria

- Programme MOU/**Stage Approval Document** for Utilisation Stage
- Resources to execute stage work are available

## Exit Criteria

- Programme MOU/**Stage Approval Document** for Retirement Stage
- Required stage outputs are delivered
- Decision to terminate programme



**Figure 14: Utilisation Stage**

### 3.7. *Support Stage*

#### Purpose

The Support Stage is executed to provide logistics, maintenance, and support services that enable continued SOI operation and sustainable service. The Support Stage is completed with the retirement of the SOI and termination of support services.

## Description

The Support Stage begins with the provision of maintenance, logistics, and other support for the SOI's operation and use. The Support Stage consists of all activities that provide support services to the users of the SOI. This includes monitoring of the performance of the enabling system and services, identification, classification, reporting of anomalies, deficiencies and failures of the enabling systems and services, and the resolution of those anomalies, deficiencies and failures. Resolutions come in the form of maintenance, minor system or services modification, major system or services modification, or end-of-life retirement.

During the Support Stage, the following tasks and activities should be performed:

- Implement the maintenance strategy/plan
- Obtain the enabling systems, system elements, and services to be used during maintenance of the system
- Implement the ILS Plan
- Explore the possible areas of mutual logistic support
- Monitor the system's capability to deliver service and record problems for analysis
- Take corrective, adaptive, perfective, and preventive actions and confirm restored capability
- Maintain a history of problem reports, corrective actions, and trends to inform operations and maintenance personnel, and other projects that are creating or utilizing similar system elements
- Provide consumables
- Address obsolescence management
- Conduct an After Action Review to capture lessons learned

## Milestones

- M1.** First unit fielded
- M2.** In-Service Review
- M3.** Planned major maintenance event(s)

## Entry Criteria

- Programme MOU/**Stage Approval Document** for Support Stage
- Resources to execute stage work are available

## Exit Criteria

- Programme MOU/**Stage Approval Document** for Retirement Stage
- Required stage outputs are delivered
- Decision to terminate programme

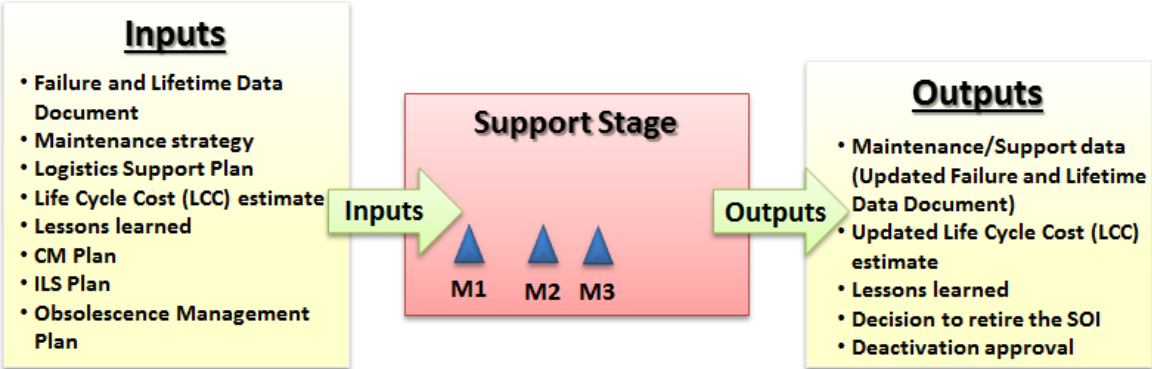


Figure 15: Support Stage

### **3.8. Retirement Stage**

#### **Purpose**

The purpose of the Retirement Stage is to demilitarize and dispose of the SOI at the end of its useful life and to remove related operational and support services. Demilitarization and retirement requirements are addressed in the preceding stages. Disposal should be carried out in a way that is in accordance with all legal and regulatory requirements relating to safety, security, and the environment. Environmental considerations are particularly critical during retirement, as there may be international treaties or other legal considerations requiring intensive management of the system's demilitarization and retirement.

The Retirement Stage will result in:

- Consolidation of redundant programmes
- Reduction of operating and maintenance costs
- Obtaining maximum benefit from disposal
- Obtaining usable spare parts from retired SOI

#### **Description**

The Retirement Stage begins with the decision to take the SOI out of service, but the planning for the stage starts in the preceding stages.

The user nation(s) determines when and how to withdraw existing SOI from its inventory. Decisions will depend upon a balance of factors, including age and operational effectiveness, impact on environment, cost of maintenance, repair and midlife improvements, nature of threat, national role and commitment within NATO, availability and cost of successor, phasing of action to suit opportunities for standardisation through collaboration, national staff requirements, and the views of major NATO commanders. Joint programmes, by their nature, require decisions taken in common.

The Retirement Stage is divided into two phases, the Disengagement Phase and the Liquidation Phase.

#### **Disengagement Phase:**

The objective of the Disengagement Phase is to remove the SOI and the enabling systems from service and to define the liquidation strategy, which is documented in the Programme Liquidation Strategy and is the basis for the milestone Disengagement Phase Review. The outcome of the milestone is the approval of the Programme Liquidation Strategy.

#### **Liquidation Phase:**

The Liquidation Phase begins when the Programme Liquidation Strategy is approved. The objective of the Liquidation Phase is to dispose of the SOI and related enabling systems in accordance with the approved Programme Liquidation Strategy.

During the Retirement Stage, the following tasks and activities should be performed:

- Identify redundant programme(s)
- Define a retirement strategy to include number of SOIs, retirement schedule, order of retiring SOIs from operation, and others
- Acquire the enabling systems or services to be used during retirement of SOI

- Deactivate the SOI to prepare it for removal from operation
- Withdraw operating staff from the programme
- Remove the SOI from the operational environment
- Disassemble the SOI into manageable elements to facilitate its removal for reuse, recycling, reconditioning, overhaul, archiving, destruction, donate, return, or sell.
- Specify containment facilities, storage locations, inspection criteria and storage periods, if the SOI is to be stored
- Destroy the SOI, as necessary, to reduce the amount of waste treatment or to make the waste easier to handle
- Confirm that no detrimental health, safety, security, and environmental factors exist following retirement
- Archive information gathered through the lifetime of the programme to permit audits and reviews in the event of long-term hazards to health, safety, security, and the environment
- Calculate the Life Cycle Cost (LCC) using Allied Life Cycle Cost Publication (ALCCP-1) as a guide
- Conduct an After Action Review to capture lessons learned

### **Milestones**

**M1:** First unit retired

**M2:** Disengagement Phase Review:

- Review, assess and approve the Programme Liquidation Strategy.
- Analyze results and effects of the removal of the SOI from service.

### **Entry Criteria**

- Concept for retirement
- Maintenance/Support data (Updated Failure and Lifetime Data Document)
- Lessons learned

## Exit Criteria

- Plans and procedures for transferring the provision of services to the new programme (if applicable)
- Programme Liquidation Strategy
- Lessons learned

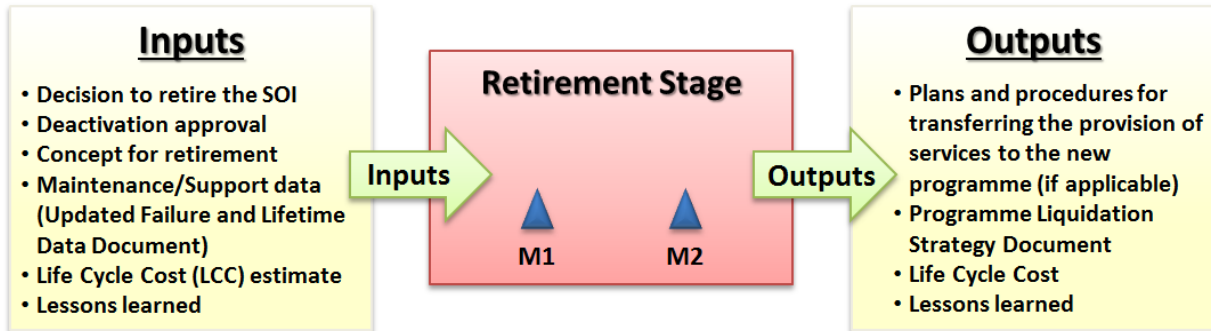


Figure 16: Retirement Stage



## 4. ACCELERATED FIELDING

The evolution of a programme, as described in Section 3, is a straightforward, yet flexible, approach to provide the materiel element of capability needs. However, to cope with 21<sup>st</sup> century scenarios, the “regular” way to fulfil capability gaps needs to be adjusted to speed up the process to optimise the delivery schedule. Accelerated Fielding should only be pursued to meet urgent or immediate operational requirements and save time over the AAP-20 approach, defined in Section 3. Accelerated Fielding may not yield a 100% solution, but due to the urgency of the requirement, a less than optimum solution may be acceptable. In addition, executing Accelerated Fielding significantly increases programme risks, albeit with the aim of reducing risks for the end user.

Accelerated Fielding:

- Must consider all functional elements of a capability – DOTMLPFI
- Includes some development and integration activities related to operational circumstances and life cycle considerations
- Must fulfill operational imperative and have high level support and commitment.
- Will have impact on limited resources
- Requires close coordination of all stakeholders from the beginning (i.e. requirements definition), utilizing the Integrated Project Team (IPT) philosophy

Accelerated Fielding can be achieved by taking into consideration:

- Fast Tracking
- Multi-Stage Decisions
- Off-the-Shelf Products
- Technology Insertion

### ***4.1. Fast Tracking***

Fast Tracking involves following the AAP-20 steps of capability requirement definition, system development, procurement, delivery, integration, and testing - with some or all of these steps “fast tracked”. The Project Manager should tailor the set of processes and activities to match the specific project requirements. The tailoring may include:

- Reducing documentation
- Delaying publication of documentation
- Reducing/eliminating testing
- Parallel activities
- Deletion of processes
- Deletion of tasks

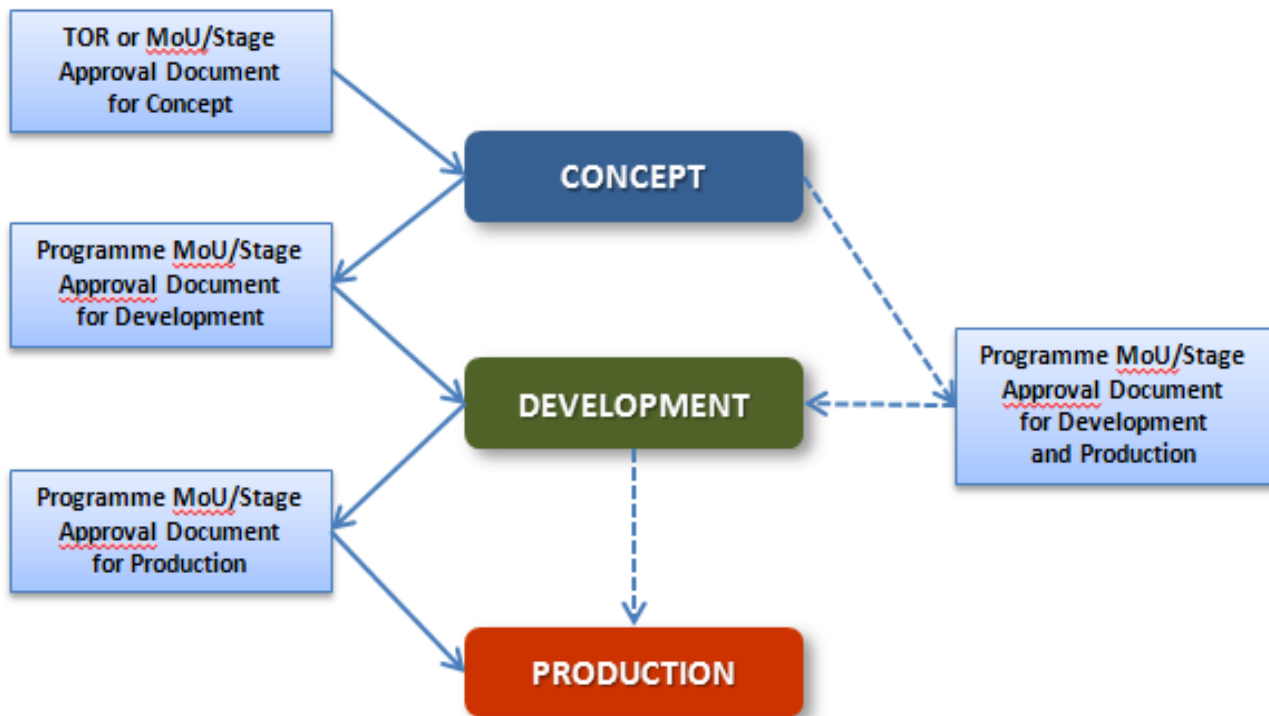
The associated risks with Fast Tracking are:

- Unforeseen system performance due to lack of testing
- Cost growth later in the SLC
- System sustainment problems

- Reliability issues

#### 4.2. Multi-Stage Decisions

Multi-Stage decisions can significantly reduce the time of acquiring MOUs/Stage Approval Documents and accelerate fielding by simultaneously obtaining approvals for multiple stages. In Figure 17 below, the solid lines represent the AAP-20 process that can be accelerated by following the dotted lines. An example of a multi-stage decision is obtaining a single Programme MOU/Stage Approval Document for the Development and Production Stages.



**Figure 17: Multi-Stage Decisions**

Associated risks of multi-stage decisions can include:

- Unpredictability due to extended decision horizon
- Programme termination
- Lost resources
- Implementation of an immature design
- Production of unusable parts

#### 4.3. Off-The-Shelf Products

Although the use of off-the-shelf products is one of the approaches for Accelerated Fielding, it is also an option in the AAP-20 process, described in Section 3.

In many instances, the tendency is to spend valuable resources designing and developing products that already exist and meet the necessary system requirements. It is in these cases that off-the-shelf products, which are products that have already been designed, developed, and produced, may be beneficial as stand-alone solutions or as components in complex systems. The use of these products usually reduces the system's development cost and

schedule, while providing the required capabilities. However, some off-the-shelf products may not meet all requirements, but may be accepted for a quicker solution.

“Off-the-shelf” procurement is comprised of Commercial-off-the-shelf (COTS), Government-off-the-shelf (GOTS) and Military-off-the-shelf (MOTS). Although they share the basic idea of that approach, specific characteristics of those variants have to be considered in the decision process.

All programmes should go through the decision making process (Figure 18) to determine if an off-the-shelf product is a viable solution.

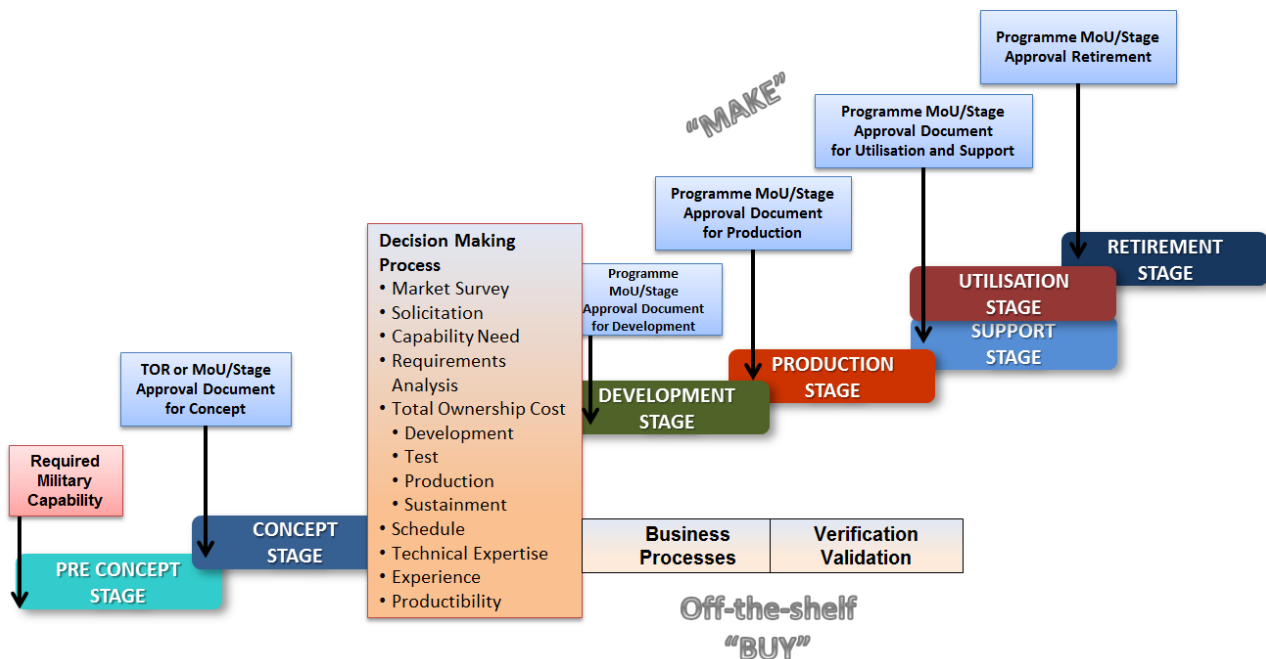


Figure 18: AAP-20 Process versus Off-the-shelf

A market survey should be performed to obtain a list of potential off-the-shelf parts/sub-systems/systems that may meet the requirements generated by the Programme. When evaluating the available alternatives, considerations must be made in regards to:

- **Capability Need:** Does the product satisfy all aspects of the capability need that the programme is looking to achieve?
- **Stakeholder requirements:** Does the product still meet all stakeholder requirements? If certain requirements currently cannot be met, is the product either customizable, or are there upgrades planned? If the requirement cannot be achieved, how does it affect the performance of the entire system? A tradeoff analysis should be completed with the assistance of the user.
- **Estimated Total Ownership Cost:** What are the possible savings/losses when performing Total Ownership Cost calculations, comparing AAP-20 Process (development, production, support and retirement) and off-the-shelf products acquisition (purchase price, support and retirement)?

- **Schedule:** Is there a significant time savings between obtaining an off-the-shelf product and developing the product?
- **Technical Expertise/Experience:** Does the programme have access to the technical expertise required to develop and produce the necessary product?
- **Availability:** Are the number of products required available to meet the timetable?
- **Supportability:** Is the required support available during the planned Utilisation Stage?
- **Acceptance:** Is enough information available for qualification, acceptance, and certification purposes?
- **Traceability:** Will the off-the-shelf product meet all requirements? If all requirements are not met, is there full requirements traceability?

If the off-the-shelf product is selected as the most beneficial for the programme, it then needs to be obtained following the acquisition process. Once the product is received, the verification and validation processes must be conducted to ensure the system meets specifications and functions as expected. After the product is successfully verified and validated it may enter the Utilisation Stage.

Associated risks with off-the-shelf products are:

- **Lack of commonality with other products** - It is possible that using an off-the-shelf product commits the user to proprietary interfaces and solutions that are not common with any other product, component, or system. This will result in integration and interoperability difficulties.
- **Long-term maintenance issues** - Considering the expected lifetime of a typical system, the constant fluctuations in off-the-shelf products and technology will result in a state of constant change for any system employing them. Without interface standards, changes in the marketplace can impose unanticipated and unpredictable changes to systems dependent on closed commercial products.
- **Vendors' schedules** - Whether the capabilities needed for a system will be available is subject to market forces and vendors' objectives in the market. The capability the programme may require may not be highest priority for the vendor.
- **Vendors' license agreements** - License agreements can have a tremendous impact on a system's architecture and other key features. The ability to accommodate programme needs will depend on the ability to negotiate successfully with the vendor and the vendor's cooperation.
- **Product discontinuation** - Market place dynamics such as vendors discontinuing a product, going out of business, mergers leading to the abandonment of a former line of business, can result in discontinuation of a product on which the programme depends.
- **Difficulty obtaining certifications** – Necessary certifications (e.g. Safety, environment, etc...) may not be obtained due to lack of information about the product.

#### **4.4. *Technology Insertion (TI)***

Technology Insertion is usually known as a viable way to maintain or improve the performance of products already in use through obsolescence management and service life extension, but can also be used to support accelerated fielding, since the time and resources

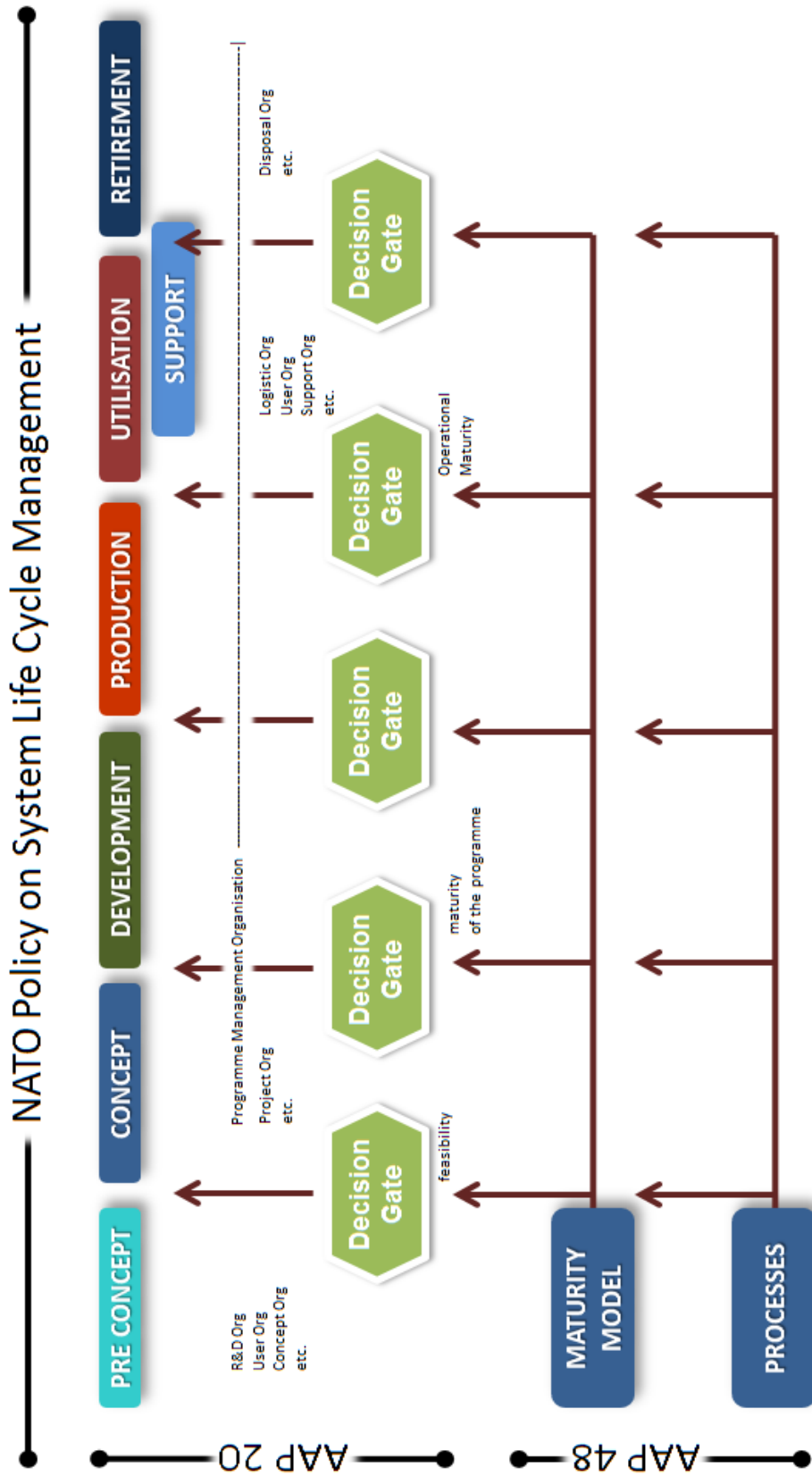
required to integrate a piece of technology into a system should be less than developing the technology from scratch.

Planning for technology insertion is the most important step to ensure that TI is successful and supports, not hinders, Accelerated Fielding. Assuming that the technology is already identified, the programme must analyze the TI's impact in the areas of system functionality, performance, reliability, cost, availability, interoperability, producibility, and supportability. Most of these analyses are already part of sound system engineering principles and will not require extra effort or time. All of these analyses should be used as risk mitigation for technology insertion. As with off-the-shelf products, technology insertion may not meet all requirements, but may be accepted for a quicker solution.

Associated risks with technology insertion are:

- Integration
- Unforeseen negative side effects on system performance
- Supportability
- Obsolescence

# ANNEX 1: Big Picture of the Life Cycle Framework



The big picture of the life cycle framework shows the relationship and dependencies between the documents and major elements of the system life cycle concept. The NATO Policy on Life Cycle Management provides the frame over all SLC elements and linked these with the industrial life cycle framework described in ISO 15288.

The AAP 20 defines, based on the ISO 15288 system definition and its general life cycle model, the customer (NATO, Agencies, Nation or Groups of Nations) system concept and the necessary skeleton (stages) for the life cycle. The appropriate decision gates mark milestones and the steps from one stage into the next.

The AAP 48 defines, also based on ISO 15288, the set of processes to fulfil the skeleton of stages with the appropriate activities and tasks to reach necessary outputs. Only for the case a certain output of an activity or task is reach and this output provide the required results in terms of maturity, the decision can be made to go ahead through the system life cycle.

The object of observation within the maturity model depends on the required output for the specific decision gate and changed over the life cycle of the system with the general aim to reach and sustain operational maturity. The customer organisation may also change during the life cycle of a system, depend upon NATO, multinational or national structures to execute programmes.

## ANNEX 2: Primary Stakeholders for NATO Programmes

This annex should be used as an example not as an exclusive list.



### 1) NATO Bodies

#### Conference of National Armaments Directors (CNAD):

The CNAD is the senior North Atlantic Council (NAC) body responsible for the promotion of Armaments Cooperation.

- CNAD coordinates planning of the financial and other impacts of national and co-operative projects.
- CNAD consists of National Armaments Directors (NAD), who validates or provides a reassessment of their national positions.

#### Allied Command Transformation (ACT):

ACT is the lead NATO Military Authority responsible for identifying NATO capability requirements and advising the Military Committee (MC) and other senior NATO bodies on near, medium and longer term capability needs.

#### Science & Technology Organisation (STO):

The STO conducts co-operative research and information exchange to the benefit of NATO and its Member Nations and provides advice to all elements of NATO on research and technology issues.



## **2) NATO Organisations**

### **NATO Production and Logistics Organisation (NPLO)**

An NPLO is a subsidiary body created within the framework of NATO for the implementation of tasks arising out of the Treaty, and to which the North Atlantic Council (NAC) grants organizational, administrative, and financial independence. The NPLO is established with a view to meeting, to the best advantage, the collective requirements of participating nations in relevant fields of design and development, production, operational logistic support and management under the conditions agreed in its Charter.

### **The NATO Support Organisation (NSPO)**

It provides logistics, operational and systems support and services to the Allies, the NMAs and partner nations, individually and collectively, in times of peace, crisis and war and, where required, maximises the ability and flexibility of their armed forces, contingents, and other relevant organisations within the guidance provided by the NAC, to execute their core missions. The NSPO includes an Agency Supervisory Board (ASB) comprised of a representative of each NATO nation and an Executive Body, which is the NATO Support Agency (NSPA).

### **NATO Communications and Information Organisation (NCIO):**

The intention of the organisation is to meet, to best advantage, the collective requirements of some or all NATO nations in the fields of capability, delivery, and service provision related to Consultation, Command and Control as well as Communications, Information and Cyber Defence functions.

### **The NATO Procurement Organisation (NPO)**

The NATO Procurement Organisation (NPO) is the NATO provider for multinational armament procurement programmes delivering capabilities to NATO, Allies and other customers by providing the framework for future and ongoing programmes.

### **Logistics Committee (LC):**

It is a joint civil/military body responsible for the assessment of Alliance consumer logistics requirements and for ensuring adequate logistic support for NATO operations. The LC has the primary responsibility, on behalf of the Council, for the coordination of issues across the whole logistics spectrum with other NATO logistics bodies.

### **Resource Policy and Planning Board (RPPB):**

The Resource Policy and Planning Board (RPPB) is the senior advisory body to the North Atlantic Council on the management of all NATO resources. It has responsibility for the overall management of NATO's civil and military budgets, as well as the NATO Security Investment Programme (NSIP) and manpower.

### **NATO Industrial Advisory Group (NIAG):**

The NIAG, working to the CNAD, provides NATO with pre-competitive industrial advice related to technical, economic, management, civil market, and other related aspects of research, development, and production of armament equipments within the Alliance.

### **3) Programme Offices / Agencies**

#### **NATO Alliance Ground Surveillance Management Agency (NAGSMA)**

NATO Alliance Ground Surveillance Management Agency is responsible for procuring the NATO AGS core

#### **NATO Helicopter Design and Development Production and Logistics Management Agency (NAHEMA)**

Consolidation of member Nations' (customers) common requirements by hosting various forums on these issues. Discussion of Nations specific requirements, thus managing the execution of the whole NH90 programme covering the design, development, production, and logistics for the participating nations and adjoin nations which have also ordered the NH90.

#### **NATO Medium Extended Air Defence System Design and Development, Production and Logistics Management Agency (NAMEADSMA)**

The Agency provides direction, coordination and execution and inter alia oversee and manage all phases of the Medium Extended Air Defence System (MEADS).

#### **NATO Airborne Early Warning and Control Programme Management Agency (NAPMA)**

The Agency plans, acquires and delivers improvements to the NATO AEW&C capabilities following the guidance of the NAPMO Nations.

#### **NATO Support Agency (NSPA)**

The NATO Support Agency (NSPA) is NATO's Integrated Logistics and Services Provider Agency, combining the former NATO Maintenance and Supply Agency (NAMSA), the Central Europe Pipeline Management Agency (CEPMA) and the NATO Airlift Management Agency (NAMA).

#### **NATO Communication and Information Agency (NCI Agency)**

The NATO Communications and Information (NCI) Agency connects forces, NATO and Nations, where and when required by providing interoperable Communications and Information Systems and services.

#### **NATO Procurement Agency (NPA)**

The NPA will be the executive body of the NPO. A possible merger of the procurement and support agencies is currently under investigation

#### **NATO Standardization Office (NSO)**

The NSO mission is to initiate, coordinate, support and administer standardization activities conducted under the authority of the Committee for Standardization (CS). The NSO is also the Military Committee's lead agent for the development, coordination and assessment of operational standardization.

**OCCAR**

OCCAR is an international organisation whose core-business is the through life management of collaborative defence equipment programmes.

**4) Programmes/Projects with NATO Nations**

All Programmes and Projects with NATO – Nations and other Nation involved.

**5) Programmes / Projects****Programme Steering Committee:**

A body composed of National Representatives established by an inter-governmental agreement between two or more nations in order to coordinate, execute, and supervise an equipment procurement programme.

**Programme Management Office:**

Office established to manage multiple ongoing, interdependent projects that support a Programme.

**Programme Manager:**

The Programme Manager is a designated individual with responsibility for and authority to accomplish programme objectives for development, production, support, and retirement to meet the user's operational needs. The Programme Manager shall be accountable for the programme cost, schedule, and performance.

**Project Manager:**

The Project Manager must permanently keep control of the fulfilment of stakeholder requirements, the required deliverables, milestones, responsibilities, budget requirements, risks, and constraints. Provide status reports as necessary to the appropriate stakeholders.

### ANNEX 3: Modification and upgrade procedure within the utilisation and support stages

#### 1) PURPOSE

The purpose of the Modification and Upgrade Procedure within the Utilisation and Support Stages is to provide a systematic framework for promoting alterations of an existing System-of-Interest (SOI) during the Utilisation and Support stages, on the basis of an identified need for system modifications and upgrades. This procedure should be tailored to meet the specific needs and address the complexity of the SOI in order to deliver outcomes effectively and efficiently.

#### 2) DESCRIPTION

The Modification and Upgrade Procedure, within the Utilisation and Support Stages, focuses on system modifications and upgrades, starting from the identification of the need, up to a point of approval, and further to the implementation and through-life support of the modification/upgrade. The output of this process is typically an alteration to the physical or functional characteristics of the configuration baseline of a SOI and is subject to configuration control in accordance with appropriate configuration management processes.

System modifications and upgrades are required to deliver capability enhancements, improvements or adaptations. It can also be used to solve deficiencies and failures. System modifications and upgrades may also arise from the need to adapt an existing SOI to a different operational environment, improve Reliability, Availability, Maintainability, Supportability, or Testability (RAMST) or ensure ongoing supportability (e.g. curing obsolescence, etc). The system modifications and upgrades process follows an independent life cycle embedded within the System lifecycle. The diagram below illustrates where this process occurs and how it interacts with the primary System life cycle.

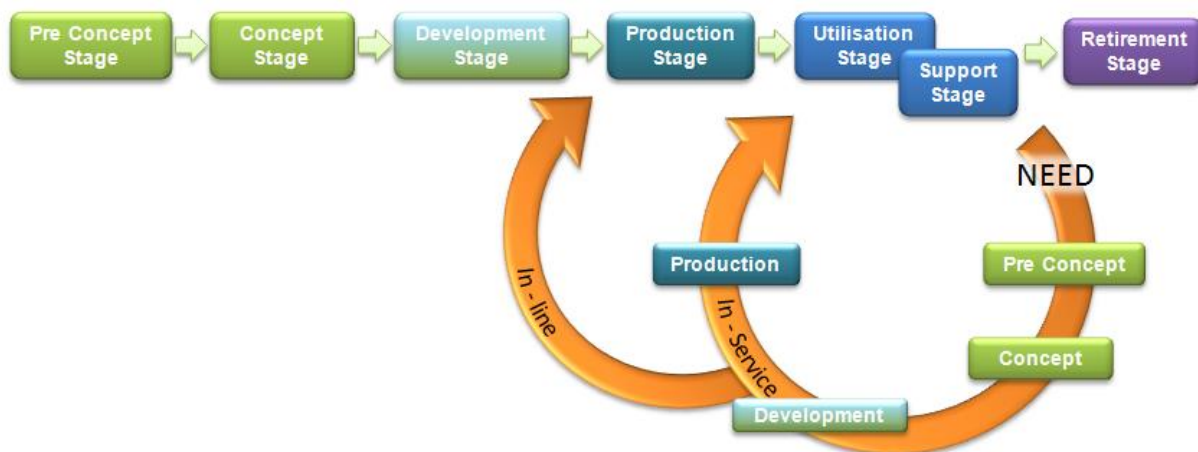


Figure 19: Modification and Upgrade Procedure

### 3) PROCEDURE OVERVIEW

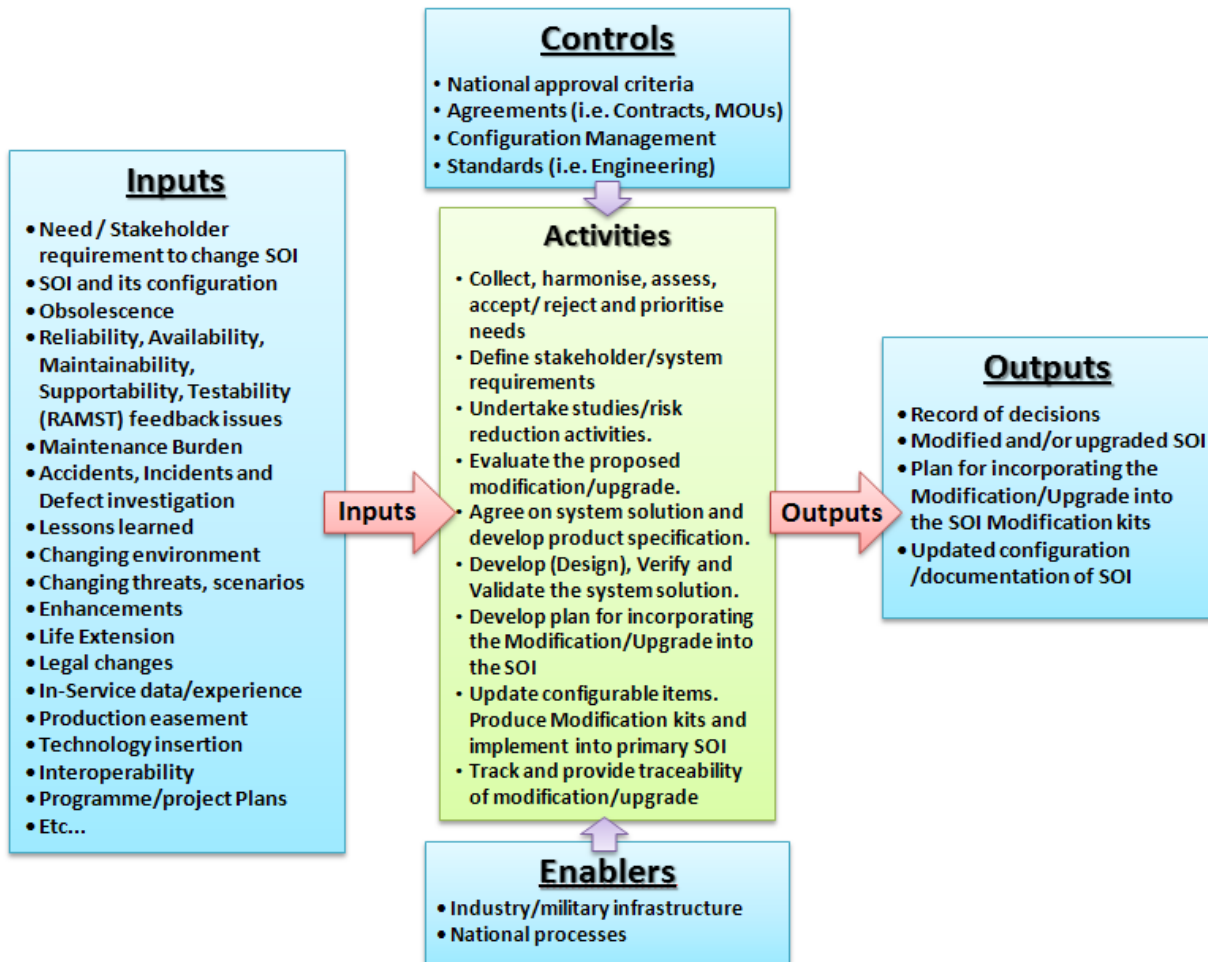


Figure 20: Modification and Upgrade Procedure Overview

#### 4. ACTIVITIES

The activities that comprise the Modification and Upgrade Procedure within the Utilisation and Support Stages follow a tailored AAP 20 life-cycle process. The workflow across the life-cycle stages is summarised as follows:

##### 4.1 Pre-Concept Stage

The Pre-Concept Stage is the first stage in the system modifications and upgrades life-cycle process. It collects, harmonises, assesses, and prioritises all new needs raised by Nations (enhancement proposals and correction of shortfalls).

The Pre-Concept stage is the single point of entry for all new support and capability needs into the SOI. In order to enter the Pre-Concept Stage, needs must be supported by at least one Nation/stakeholder and are referred to as candidates, reflecting their status. In the Pre-concept stage, the candidates follow a phased selection process before progressing to the Concept and Development stages. The needs are captured and analyzed in order to allow for prioritization and initial down-selection for further progression.

The Customer, possibly supported by contractors or consultants, conducts a preliminary analysis at an overall System level, in order to estimate effects, impacts and benefits and to assess suitability for further progression.

The scope of such activity could address:

- Identification of clear impracticability's
- Checking for possible duplications
- Broad identification of possible technical options with a recommended priority
- Preliminary SOI impact analysis as to Configuration Items and ILS affected
- Preliminary assessment of category "Stand-Alone" or part of a "Package" and initial proposal on execution
- For new requirements, preliminary identification of details of features in order to reduce project risk
- Rough Order of Magnitude (ROM) cost vs. benefit analysis
  - Operational impact description and score
  - Support impact description and score
  - Resource usage description and score
  - ROM cost description and score
  - Technical complexity description and score
- Identification of impacts involved in adapting certain course of actions
- Identification of initial suitable concepts to be progressed within the next appropriate stage with a recommended priority

The overall output of the Pre-Concept Stage is to define the changes to the capability requirement, in the form of a business case, for progression through any follow-on stage. A decision gate at the end of this stage produces an approved, rejected, or delayed candidate.

#### **4.2 Concept Stage**

The Concept Stage starts after the decision is made to modify/upgrade the SOI, or elements thereof and ends with the Product Specification and the Qualification/Verification Plan for the defined modification/upgrade.

This stage consists of 2 phases: The **Study Phase and the Programme Establishment Phase**. The overall purpose of this stage is to analyse the need, evaluate technical needs, potential risks, and cost benefit of a required modification/upgrade prior to any commitment of resources for detailed design or development. One or more alternative solutions to satisfy the need are developed through the completion of impact analyses, proof-of-concept evaluations, estimations (such as cost, schedule, and logistics), trade-off studies, and risk reduction activities.

#### **Study Phase**

Activities in this phase will provide an evaluation of alternative technical solutions for satisfying the modification/upgrade need and identify the most promising technical concepts for further evaluation. The Study Phase will terminate once sufficient information has been obtained to permit the selection of the preferred feasible solution, thereby ensuring that the entry criteria for the Programme Establishment Phase can be met.

Input to this phase is a modification/upgrade need and the primary objective is to select a preferred solution and to ascertain its feasibility, including available resources and assets, scope of Integrated Logistics Support (ILS) impacts in accordance with ALP-10 (NATO Guidance on Integrated Logistics Support for Multinational Armament Programmes), retrofit requirements schedule, indicative cost, timescales, and initial risk assessment.

In particular, the aim is to:

- Analyze individual modification/upgrade needs as transferred from the Pre-Concept Stage into the Study Phase
- Explore potential technical options and assess their maturity, provide the rationale for the proposed option (including related Support Equipment and ILS aspects)
- Identify and select preferred feasible solutions via a trade-off analysis (e.g. Need Fulfilment vs. Cost vs. Timescale)
- Conduct an initial SOI impact analysis as to Configuration Items/Computer Software Configuration items (CIs/CSCIs) affected and any necessary ILS activities documented in the SOI product hierarchy.
- Identify commonalities between individual Modification/Upgrade Candidates in terms of CIs/CSCIs affected and timescales.
- Allocate Modification/Upgrade candidates to Stand-alone or Modification/Upgrade Package and provide a rationale for a proposed allocation to be considered for the next phase (including related Support Equipment and ILS aspects)
- Conduct top level system analysis of Modification/Upgrade Package considering the complexity and extent of each candidate.
- Identify initial requirements regarding qualification, certification, verification, and acceptance for stand-alone Modification/Upgrade and Modification/Upgrade Packages
- Estimate top-level rough effort and produce indicative cost estimates.
- Identify limitations and potential alternative solutions should it not be practicable for Modification/Upgrade Candidates to be progressed in full.
- Conduct initial risk assessments to secure SOI support via final or suitable work-around solutions, where necessary.
- For immature Modification/Upgrade Candidates evaluate the need for further maturation activities and recommend those activities.

NOTE: Within the Study Phase customer involvement and guidance is essential in order to mature the need, down select the preferred option, decide on packaging or stand-alone requirement, or decide on further maturation activities at the end of this phase.

#### **4.2.1 Programme Establishment Phase**

Activities in this phase are dependent on individual Modification/Upgrade needs and characteristics of the technical solution and their interrelations when treated in a package. The input to this phase is a Modification/Upgrade need with the (preferred) solution identified. During this phase the solution will be further refined and confirmed by increased definition and, where necessary, further trade-off analysis.

The primary objective is to further define and specify the optimum technical solution, already identified at the end of the study phase, taking into account performance, cost, timescales, and risks and to establish comprehensive proposals for the Development Stage.

In particular, the aim is to:

- Analyze individual Modification/Upgrade candidates as transferred directly from the Study Phase into the Programme Establishment Phase
- Further analyze technical solutions identified in the Study Phase

- Where necessary to achieve a better understanding of the identified technical solutions and the associated risks, conduct selected risk reduction activities, e.g.:
  - Initial design or design analysis activities
  - Prototyping
  - Trial installations
  - Functional demonstrations
  - Laboratory tests, as might be appropriate and approved
  - Liaison with suppliers
- Fully define and specify the optimum technical solution taking into account performance, cost, time, and risks
- Define the Support Equipment Modification/Upgrade and ILS data to be delivered and accepted
- Identify workaround solutions for enabling systems, if required (services, procedures and/or HW/SW)
- Allocate Modification/Upgrade candidates to Modification/Upgrade Package and/or Stand-Alone Modification/Upgrade
- Define and freeze customer requirements
- Finalize requirements regarding qualification, certification, verification and acceptance for stand-alone Modifications/Upgrades and Modification/Upgrade Packages
- Establish comprehensive proposals for the Development Stage:
  - Produce a priced Development Proposal including e.g. a Project Work Breakdown structure, a Product Specification, a Qualification Programme Plan, a Risk Assessment
  - Produce a Programme Plan and Schedule, including removal of any workaround solutions which may be required.
- For immature Modification/Upgrade candidates evaluate the need for further maturation activities and recommend those activities

Within this phase, Customer/Nation involvement and guidance is essential in order to refine decisions on packaging or stand-alone and to decide on further maturation activities.

At the end of this phase, confirm down selection of the preferred option, freeze the requirements, agree on specifications, and agree on qualification, certification, verification, and acceptance criteria to be included within the formal proposal of Industry.

The overall output of the Concept Stage is a full Product Specification and the Qualification/Verification Plan for the defined Modification/Upgrade.

### **4.3 Development Stage**

Inputs to this stage are Modification/Upgrade requirements, where the Modification/Upgrade is defined and specified.

The Development Stage aims at full validation of the technical solution through design engineering work to the point where production actions can be taken.

In particular, the aim is to:

- Perform development, test, qualification and verification, and validation activities
- Refine, in exceptional cases and where necessary, the requirements and definitions/specifications until the design has been frozen
- Conduct Customer SOI Evaluations (where applicable)
- Confirm that the Modification / Upgrade meets requirements and is producible,



- operable, and supportable
- Generate the relevant Data and Documentation necessary to utilise the Modification / Upgrade and fully support the SOI

The primary output is to achieve a fully developed, qualified, verified, validated, and supportable Modification/Upgrade ready for incorporation, production, and field usage.

#### **4.4 Production Stage**

Input to this stage is an affirmative Customer decision to introduce the qualified and supportable Modification/Upgrade into the SOI. This stage comprises the following activities:

- Preparation for incorporation of the Modification/Upgrade into the SOI
- Production of appropriate Modification/Upgrade Kits and supporting documentation (e.g. content list, testing plan, upgrade manual)
- Update the configuration documentation of the SOI
- Enable the utilisation of Modification/Upgrade (operation, maintenance, training, and through-life support))
- Conduct acceptance tests

#### **4.5 Utilisation & Support Stages**

The integration of the Modification/Upgrade into the SOI life cycle occurs during these stages. Once the Modification/Upgrade is incorporated, activated, and is being used, it's operational and support performance will be monitored and anomalies, deficiencies, and failures will be properly recorded, identified, and resolved as part of the overall SOI monitoring.

Successful ongoing assessment requires a means to identify and report deficiencies and proposals for improvements. This In-Service experience will be the source to trigger new Pre-Concept Stage activities, when applicable.

#### **4.6 Common approaches and tips:**

Modifications/Upgrades may be progressed "stand-alone" as they arise or several Modifications/ Upgrades may be combined in a form of a Modification/Upgrade "Package".

The partitioning of the project and its life cycle into stages is based on the practicality of doing the work in small, understandable, and timely steps. In addition, stages and phases help address uncertainties and risk associated with cost, schedule, performance, general objectives, and decision making. Each stage has a distinct purpose and contribution to the whole life cycle. The transition between stages uses decision gates and entry/exit criteria in addition to milestones within stages.

This Modification and Upgrade Procedure within the Utilisation and Support Stages is intended to provide a structured approach to describe the stages and to aid decision-making at these decision points for all management levels. At decision points, decision-makers need to review the results of the past efforts and the options available for the subsequent work.

#### **4) OUTPUTS**

- Record of decisions: Decisions along with rationale made during the Modification and Upgrade Process must be properly documented
- Modified and/or upgraded SOI: A fully Qualified/Certified and supportable Modification (change to the configuration baseline)

- Plan for incorporating the Modification/Upgrade into the SOI: Containing of instructions (in-line production, retrofit), leaflets, identification of Retrofit Kits/Sets requirement
- Modification kits: Hardware, software, and the associated documentation required to implement the physical change to the SOI
- Updated configuration/documentation of SOI

**5) ENABLERS**

National processes, industry infrastructure, technical & programme management processes are the key enablers that underpin this procedure.

**6) CONTROLS**

National approval criteria, Configuration Management and Engineering practices, Technical and safety standards provide the necessary regulatory framework to ensure the desired outcomes are appropriate and fit for purpose.

## ANNEX 4: Glossary

Term	Definition	Source
Capability Packages	A CP is defined as a combination of national (military and civilian) and NATO funded capital investments, O&M cost, manpower and other associated costs, which together with the military forces and other essential requirements, enable a NATO Commander to achieve a specific Military Required Capability.	C-M(92)16(revised)
Criteria	Standards, rules, or tests on which a judgement or decision can be based, or by which a product, service, result, or process can be evaluated.	PMBOK 2004
Decision Gate	A decision gate is an approval event (often associated with a review meeting). Entry and exit criteria established for each decision gate; continuation beyond the decision gate is contingent on the agreement of decision-makers.	INCOSE SE-Handbook V. 3 (June 2006)
DOTMLPFI	Doctrine, organization, training, materiel, leadership and education, personnel, facilities and interoperability.	
Materiel Solution	Correction of a deficiency, satisfaction of a capability gap, or incorporation of new technology that results in the development, acquisition, procurement, or fielding of a new item, hardware, software, or service, necessary to equip, operate, maintain, and support military activities without disruption as to their application for administrative or combat purposes.	DAU ACQuipedia
Milestone	A significant point or event in the project.	PMBOK 2004
Programme	A group of related projects managed in a coordinated way. Note: Programmes usually include an element of ongoing work.	PM-BOK 2000
Project	An endeavour with defined start and finish dates undertaken to create a product or service in accordance with specified resources and requirements.	ISO/IEC 15288

Requirement	A statement that identifies a system, product or process' characteristic or constraint, which is unambiguous, can be verified, and is deemed necessary for stakeholder acceptability.	INCOSE SE-Handbook V. 3 (June 2006)
Specification	A document that specifies, in a complete, precise, verifiable manner, the requirements, design, behaviour, or other characteristics of a system, component, product, result, or service and, often, the procedures for determining whether these provisions have been satisfied. Examples are: requirement specification, design specification, product specification, and test specification.	PMBOK 2004
Stakeholder	A party having a right, share, or claim in a system or in its possession of characteristics that meet that party's needs and expectations.	ISO/IEC 15288
SWOT Analysis	SWOT analysis is a structured planning method used to evaluate the <b>Strengths, Weaknesses, Opportunities, and Threats</b> involved in a project.	INCOSE SE-Handbook V. 3 (June 2006)

**ANNEX 5: Acronyms**

AAP	Allied Administrative Publication
ALP	Allied Logistics Publication
ALCCP	Allied Life Cycle Cost Publication
CBP	Capability Based Planning
CNAD	Conference of National Armaments Directors
COTS	Commercial-off-the-shelf
DRR	Defence Requirement Review
GOTS	Government-off-the-shelf
IPT	Integrated Project Team
LC	Logistics Committee
LCC	Life Cycle Cost
MC	Military Committee
MOU	Memorandum of Understanding
MT	Mission Types
MTD	Mission Task Deco
MOTS	Military-Off-The-Shelf
NCIA	NATO Communications and Information Agency
NDPP	NATO Defence Planning Process
NIAG	NATO Industrial Advisory Group
NSDD	NATO Standardisation Document Database
PFP	Partnership for Peace
NSPA	NATO Support Agency
NPA	NATO Procurement Agency

NSPO	NATO Support Organisation
NSTO	NATO Science and Technology Organisation
NMAs	NATO Military Authorities
NSO	NATO Standardization Office
RAMST	Reliability, Availability, Maintainability, Supportability, or Testability
SOI	System of Interest
R&D	NATO Research and Development
SC	Strategic Commander
SLC	System Life Cycle
SLCM	System Life Cycle Management
STANAG	Standardisation Agreement
TOR	Terms of Reference

## ANNEX 6: Project Management Concept

A programme is about benefits, outcomes, and capabilities and a programme is also a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually.

As a part of a programme, a project is about products and is an endeavour with defined start and finish dates undertaken to create specific parts of a system (a specific part of the SOI or of the enabling systems depending of the complexity of the system or a service) or a product as a result of a process in accordance with specified resources and requirements.

The System Life Cycle processes of AAP-48 apply whether it is a project or programme. Therefore, when you see the term “project”, you should also see “programme”.

This Annex provides guidance to facilitate project execution through the System Life Cycle stages.

Possible project scenarios within a programme are:

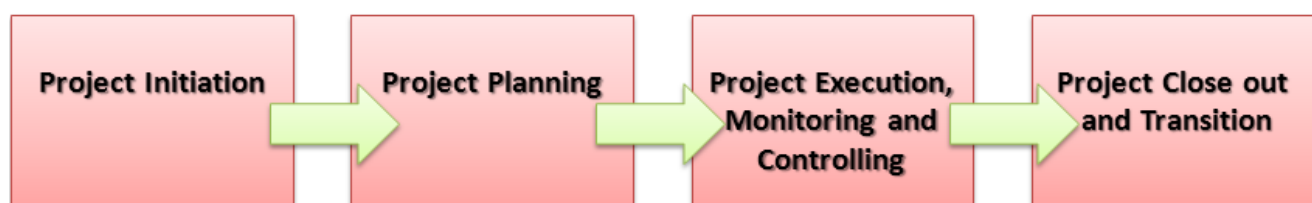
- Performance orientated
  - o Assessment of the possible use of available solution (Commercial/Government/Military-Off-The-Shelf (COTS/GOTS/MOTS))
  - o Integration of existing solutions
  - o Development of a new solution
- Time orientated
  - o Project management concept can be applied to both long term and short term projects

Every project begins with the essential activities listed below:

- Identify stakeholders
- Capture stakeholders requirements
- Develop requirements documents
- Obtain stakeholders commitment of requirements

### Project Phases

A project comprises the following four phases:



**Project Initiation**

The initiation phase defines and authorizes the project. The following should be accomplished:

- Formal authorization of the project:
  - Establish Project Charter
  - Define preliminary Project Scope Statement
- Assign Project Manager and establish decision-making bodies
- Funding for project planning is released to the Project Manager

**Project Planning**

The planning phase defines and refines the objectives and plans the course of action to achieve the desired objectives. The following should be accomplished:

- Identify and understand the requirements
- Evaluate project skill needs
- Evaluate project training needs
- Evaluate project resources (personnel, schedule, budget)
- Create Project Management Plan (PMP)
- Provide project orientation to team members

**Execution/Monitoring/Controlling**

Execution integrates the people and other resources to perform in accordance with the PMP. Monitoring and controlling measures and monitors progress to identify variances from the PMP so corrective actions can be taken to meet the objectives of the project. The following should be accomplished:

- Implement monitor and control the project
- Conduct formal and technical reviews
- Replan/update project plan

**Close-out/Transition**

The Close-out/transition phase formalizes the acceptance of the product, service or results and brings the project to an orderly conclusion. The following should be accomplished:

- Project Asset Closure
- Contract Closure (Formal Contracts)
- Administrative Closure

In principle these phases apply to every project. There are however specific implications that have to be considered and described in the PMP to meet the project specific needs. The attached PMP template can be used as a guide for projects to develop their individual PMP.



**ANNEX 7: AAP-20 decision documents (stage approval)**

The enclosed formats are provided as a guide to facilitate the development of AAP-20 decision documentation that is generally consistent from one project/programme to another. Their use is encouraged but not necessarily in an inflexible manner. AAP-20 decision documentation actually provides the basis for arriving at decisions governing the projects/programmes. They are also intended as a vehicle to describe to non-participating nations and interested NATO bodies the key results of the last stage and objectives of the next stage.

**I. TOR or MOU/Stage Approval Document for Concept (Concept Approval):**

The Concept Approval describes the functional requirements which are necessary for the analysis of alternative approaches aimed at closing a capability gap. It will usually form the basis for prefeasibility/feasibility studies by experts, in order to determine feasible alternative system solutions to the capability required based on the available systems and technological and economic considerations. The basic requirement of a Concept Approval is that it should be a broad document, which deduces from a capability gap the overall system requirements/constraints of cost-effective system alternatives. The Concept Approval shall not aim at a concrete technical solution; it must permit innovative approaches.

Generally, the format for a Concept Approval needs to be flexible and yet provide a fairly comprehensive checklist on areas to be addressed. The format proposed seeks to achieve this objective by comprising the following information:

**1. General Information**

Designation (name of the project/programme) project/programme-ID.

**2. Reference Documents**

Reference documents from which the target capability is derived.

**3. Description of the Capability Gap**

Within the NATO system context.

**4. Alternative Solutions**

Description of non-materiel approaches analyzed.

**5. Parameters determining the required capability****6. Time and cost framework**

In accordance with the level of priority (as far as feasible); financial requirements for the concept phase (as far as determinable).

## 7. **Requirements for Project Elements** (as far as determinable) such as:

- **Technical and Economic Aspects**

This comprises all supporting measures and processes designed to provide the best possible products and services in a state of operational readiness, corresponding to the state of the art, with due consideration of all relevant legal requirements, modern business operations as well as budget and planning aspects.

- **Command / Operation**

Command regulations, operational doctrines, and procedures.

- **Organization**

Changing the organizational structures and procedures of military and civilian government agencies as well as founding / disbanding military and civilian government agencies (commissioning/decommissioning). Development and negotiation of the organizational bases. The decisive organizational bases for infrastructure requirements shall be negotiated early enough to leave sufficient time for their implementation.

- **Personnel / Training**

Availability of personnel for introduction and service use in the required numbers and with the required qualification (including the necessary training organization and means).

- **Logistics**

The project's element logistics comprises all essential requirements for products and services with regard to planning and controlling of logistic personnel, means and procedures during operations and routine duties, training and exercises (this includes materiel documentation, materiel maintenance, inspections, materiel management, technical-logistic support, IT support, packaging, storage, transportation, envisaged service life).

- **Infrastructure Measures**

Infrastructure requirements and construction plans for all sites where the product is to be fielded (including schools and logistics facilities).

- **Security**

Ensuring military and IT security for service use.

- **Safety**

Ensuring and implementing the statutory requirements with regard to occupational safety, radiological protection, technical safety, and traffic safety (incl. flight safety). Traffic safety encompasses all activities, procedures, arrangements, and measures ensuring the safe use of means and routes of transport by land, water and air.

- **Environmental protection**

Assessment of any adverse environmental effects generated during production, service use and disposal of the products, with special consideration of the government's waste disposal obligations; precautions for training, operation, logistics and infrastructure.

**8. Future Intentions:**

A statement of proposed actions related to the future processing of the Concept Stage, taking into account national and NATO studies, and the identification of follow-on studies, key activities, and schedule milestones.

**II. Programme MOU/Stage Approval Document for Development (Development Approval):**

At the end of the Concept Stage, the selected solution, which should not be contractor-specific, is laid down in the stage decision document referred to as Development Approval. The Development Approval represents the entirety of requirements and conditions for the subsequent implementation of the programme.

In the Development Approval, technical solutions shall not be anticipated. However, the document shall be worded in sufficiently concrete terms to permit the preparation of detailed functional/technical statements of work. It constitutes the prerequisite for the appropriation of budgetary funds for the subsequent phase.

The Development Approval includes information on

**General Information**

Programme designation; programme-ID.

**Reference Documents****Purpose of Capability**

Description of the required operational capability in terms of functions, numbers, and projected time in service.

**Requirements**

Detailed description of the SOI requirements.

**Alternative Solutions**

Description of approaches analyzed (e.g. modification of existing products, use off-the-shelf products or development of a new product)

**Selected Solution**

Description of the selected approach with justification.

**Time and cost framework**

Description of yearly budget requirements over the life cycle.

**Details of project elements** for the Concept Stage.

**Dependancies**

Dependancies from planned or emerging or existing projects in terms of time, operational, technical, logistic and economic aspects (solution architecture).

**Survey of potential cooperations**

Short review of co-operative opportunities offered by the programme.

**Management Approach**

General thoughts on overall management approach to developing and producing system – e.g. key milestones, programme reviews, governmental management structure (including developer, user and supporter), and configuration control.

Overall quantitative requirements such as numbers to be developed/produced, production rates, etc.

**Responsibilities**

Future users (nations), programme managers.

**Future Intentions**

A statement of proposed actions related to the future processing of the programme. Target dates in planning procedure, including where possible, latest dates for completion of each step, financial provision for following stages. etc.

**III. Programme MOU/Stage Approval Document for Production (Production Approval):**

The signed Production Approval will be the procurement justification document and the prerequisite for the authorization of funds for the Production Stage.

The Production Approval shall contain:

**1. General Information**

Programme designation; programme-ID.

**2. Alternative Solutions**

Description of approaches analyzed.

**3. Selected Solution**

Description of the selected approach with justification.

**4. Time and cost framework**

Time and cost plans, updated and detailed, optimization of the overall balance between performance, time and cost; detailed information on expenses during the Development Stage.

**5. Details of project elements**

A detailed plan for the Production Stage covering all project elements; if necessary, a procurement in batches or step-by-step introduction shall be envisaged.

**6. Dependancies**

Dependancies from planned or emerging or existing projects in terms of time, operational, technical, logistic and economic aspects (solution architecture).

**7. Management Approach**

Update of overall management approach.

**8. Competitive Situation**

Presentation of the competitive situation for production; if necessary, selection of a prime contractor.

**9. Operational Tests**

Plans for the operational tests (on the first item).

**10. Technical-logistic Support**

Justification of measures of technical-logistic support (according to their nature and, if applicable, extent of the programme).

**11. Future Intentions****IV. Programme MOU/Stage Approval Document for Utilisation/Support (Operational Approval):**

Based on the results of the integrated verification activities, the phase decision Operational Approval is taken. The Operational Approval constitutes the prerequisite for any future contracts covering additional batches or, if applicable, subsequent implementation steps. Furthermore, it is necessary for the transfer to the in-service phase.

This decision certifies that:

- the product meets the performance requirements as set out in the Development Approval;
- the product is suitable for its intended purpose;
- the product can be safely commissioned taking into account all applicable legal requirements;
- initial operational capability is ensured; and that
- the user is ready to accept the product.

The Operational Approval shall contain

**General Information**

Programme designation; programme-ID.

**Results of the previous stages**

Summary of the main results of the previous stages (short description of performance and functions, and a brief statement about the project elements). In the event that residual activities required for the achievement of initial operational capability are outstanding, or if partial utilisation is envisaged, the Operational Approval shall contain information on the degree of initial operational capability achieved so far. If appropriate, utilisation of the product shall be restrained.

**Time and cost framework**

Updated time and cost plans for the rest of the life cycle.

**Future Intentions**

**AAP-20 (C)(1)**