Capability Definition Document (CDD) Development

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Abstract

For all organisations, the decision to invest funds is one of balancing options. There is always more demand for funds than funds available, and the organisation always likes to get the most "bang for the buck".

Subsequently, investment decision making methodologies have been developed to help organisations make these investment decisions, and importantly, deliver the outcomes sought. These methodologies include Capability Definition developed by the US Department of Defense (and adopted by the Australian Defence Force), and Investment Logic Mapping (www.lifecycleguidance.dtf.vic.gov.au) used by the Victorian Government.

Both the Capability Definition and Investment Logic Mapping processes are focussed on identifying the real problem that needs to be resolved, so that the capability can be defined in terms of a solution to a problem, rather than as a "nice to have" solution looking for a problem to justify the acquisition. SYPAQ has developed our skills in these methodologies, and applies a tailored version to meet the needs of each client problem.

Introduction

Capability Definition and Investment Logic Mapping are two processes commonly employed within the Defence and Government sectors within Australia. Whilst each of these methodologies are quite different in application and resultant artefacts, the drivers and outcomes are similar in that they define the complete set of problem definition, constraints, solution options and means of measurement defined within the relevant enterprise architecture.

Each of these methodologies has systems engineering at their heart and follow the systems engineering lifecycle of requirements determination, analysis and test. Tools to manage the requirements can also be used, such as Telelogic DOORS and business process mapping tools Vitech CORE and CORESim.

However, Capability Definition is much more than simply requirement definition and management. True Capability Definition overcomes the problems often faced in large, long-term projects, where the project delivers to the Specification, yet the end user remains unsatisfied that they were not provided with a system that meets their intentions. Or, the primary system is delivered to specification meeting its functional needs, without adequate secondary or support systems in place to enable the primary system to meet its full potential and therefore address the capability need required by the end user.

This article will focus upon the use of the Capability Definition process, and the development of the Capability Definition Documentation (CDD) suite.

Capability Definition Overview

Capability Definition is fundamentally concerned with developing investment proposals (including options) for new capabilities for consideration by investors and stakeholders. The Capability Definition process can be applied to any problem, as it effectively follows Systems Engineering process. SYPAQ has successfully applied it to engineering developments, equipment purchases, company reorganisations, tender developments, government services, and innovation commercialisation.

Importantly, in order to deliver meaningful, consistent and useful products, the process and the resultant artefacts should be tailored to meet the client needs.

Figure 1 below demonstrates the key aim of the Capability Definition process, to define the capability needs in terms that are well understood by both the User (in this case the warfighters) and the Engineers who will develop the solution. The transformation process of defining the needs in a way that ensures traceability between the OCD and Engineering Specifications reduces the risk of developing a system fully compliant to a specification that fails to deliver a solution to the User needs.

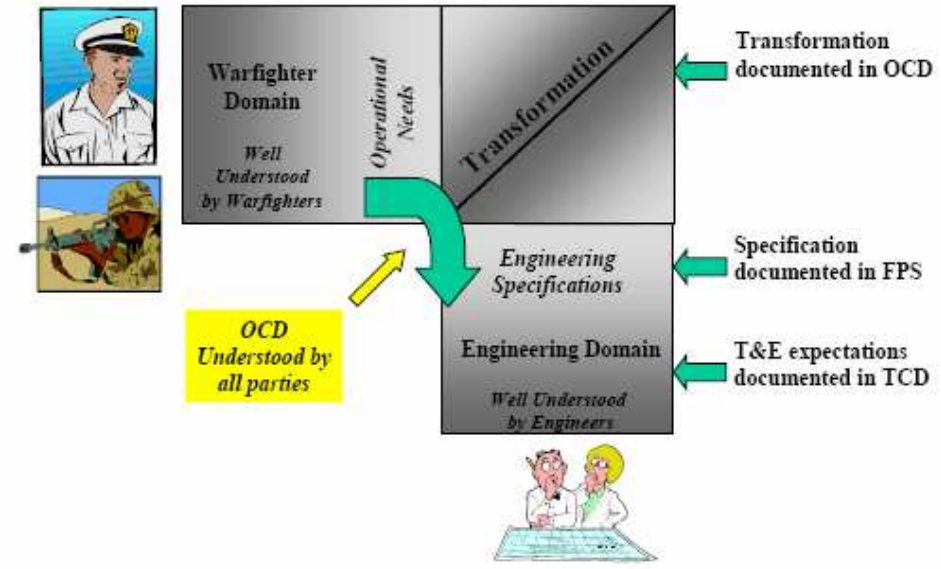

Figure 1: Capability Definition – Linking the User with the Engineers (CDG)

The processes of identifying capability needs, establishing priorities, examining options for meeting those needs, managing an ongoing investment program, and doing so within financial guidance and with high levels of accountability are of necessity complex, rigorous, time-consuming and resource-intensive.

SYPAQ
Transforming Strategy into Capability

To understand the drivers for the Capability Development process, it is important to understand the difference between Capability delivery and Product delivery. Capability is much more than the product required to meet an operational need. Consider, if a product that meets all the specification requirements is delivered without adequate personnel training to operate or maintain the product, or without processes to deploy and maintain the product, you do not have a Capability. The aim of the Capability Definition Process is to capture the full operational and support environment considerations to ensure that a complete solution is defined for implementation.

Capability = People, Processes and Equipment

The CDD suite intends to answer the following questions which are captured within the appropriate artefacts:

What will it do: Business Requirements are captured within the Operational Concept Document (OCD)

How will it do it: Technical Requirements are captured within the Functional Performance Specification (FPS)

Will it work: Test Requirements are captured within the Test Concept Document (TCD)

How will it be bought: Acquisition strategies are defined and controlled within the Acquisition Strategy Plan (ASP) and Tendering documents, as appropriate.

Is it Value for money: The Business Case includes the costing analysis against the benefits statements as extracted from the OCD and TCD.

The generic process includes the following five key steps: Appraisal, Analysis, Development, Review and Completion. The nature of this process very much aligns with the Systems Engineering process.

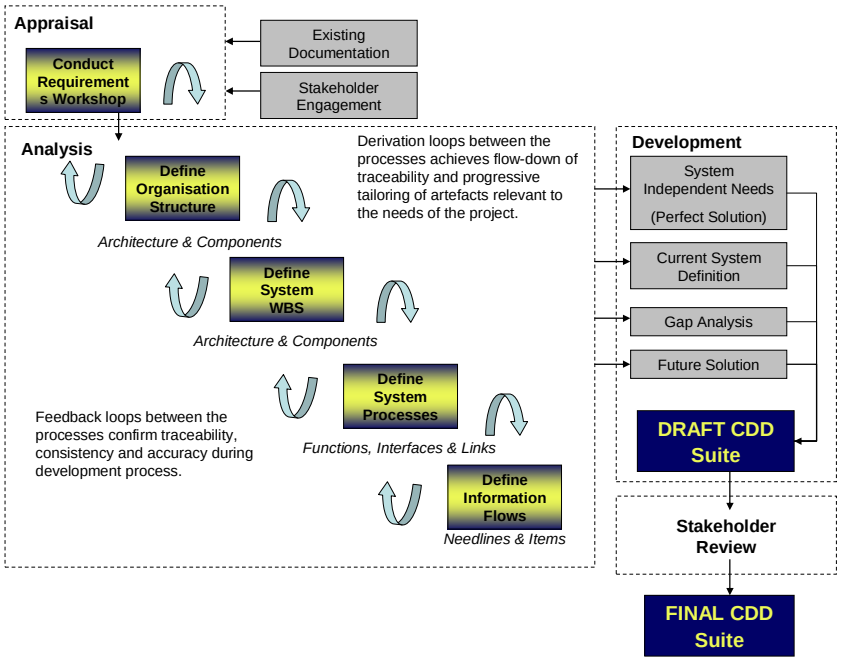

Figure 2: Capability Definition Process Overview

Key outputs of the process include:

- Outputs including diagrammatic representations to align stakeholder understanding as appropriate.
- Solution options are identified, analysed and compared. Defendable preferred solutions are developed.
- Robust requirements traceability between the highest level User Requirement and the lower level System Specifications is documented. Helps solve stakeholder requirement conflicts.
- Forms a sound plan for investment decision making, and basis to form project.

Application

SYPAQ has provided support to a vast range of Systems Engineering projects across Defence, Government and Commercial sectors by providing Capability Definition expertise, and a common problem in the development of the CDD suite has emerged. The Capability Definition process, as defined within the Defence Capability Development Manual (DCDM), is too often interpreted as being a fixed, mandatory process.

The DCDM aims to articulate and, if need be, demystify these processes by providing a concise yet comprehensive coverage of the main steps and features of these processes, and of the considerations involved in

assisting the development of the Government's investment program for new Defence capability. The DCDM provides for the tailoring of the application of the process to meet the needs of a given project.

This misinterpretation leads to clients believing that in order to fulfil the process and extract maximum benefit, the full suite of CDD must be developed, underpinned by the full suite of Defence Architecture Framework (DAF) views. Obviously, where there are elements of the CDD and DAF structure that do not add value to the Capability Definition under assessment, devoting resources to trying to develop them consistent with the remainder of the suite is not only a waste of resources, but can also lead to confusion and inconsistency within the final products.

Further, the original Defence and State Government methodologies and artefacts Framework can be easily adapted to meet the stakeholder and cultural requirements of any organisation. So rather than getting worried about the formalities of the end documents, the focus remains on using the methodologies to provide outcomes that meet the actual stakeholder needs.

By approaching the Capability Definition process with a team experienced in tailoring and developing the CDD suite for a range of project needs, not only can the process be achieved with time and cost savings, the final products will not contain extraneous, inconsistent or confusing elements simply for process sake.

Conclusion and recommendation

In conclusion, SYPAQ utilise the Systems Engineering process to help clients develop capabilities. This process can be applied to any problem that clients may have, as it is focused on applying Systems Engineering principles to ensure that stakeholder needs are fully defined such that they can be fulfilled in a methodical and pragmatic way. The application of Capability Definition processes, be it in accordance with Investment Logic Mapping, Defence Capability Development or other methodology, should always be applied in a manner that is appropriate to the demands, risks and maturity of the investment under investigation to ensure maximum value is delivered to the investor.