



# Capability Life Cycle Simulation Support: Acquisition Phase Guide

Version 1.0

Australian Defence Simulation Office

Department of Defence, Canberra

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## Foreword

Simulation offers significant potential to enhance capability, save resources and reduce risks. Defence has embraced the use of simulation in support of training, as evidenced in the widespread use of simulators for complex weapons systems. However, there are a large number of other areas where simulation can be applied both as inherent components of capabilities, as well as in support of the acquisition process itself.

This *Acquisition Phase Guide* has been designed to assist Defence staff planning for and working in the *Acquisition Phase* of the capability life cycle in considering how and where simulation may be used in support of acquisition activities and outcomes. It will aid in identifying and sourcing available simulation capabilities and simulation support services to assist project staff with designing, acquiring and delivering effective capability systems.

This *Acquisition Phase Guide* is intended to be a living document and will be updated as required. Comments or further clarification on aspects of this guide are welcome and should be directed to:

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# 1 Introduction

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## 1.1 Purpose of this Guide

The purpose of this *Capability Life Cycle Simulation Support: Acquisition Phase Guide* is to assist Defence staff with understanding where and how simulation can be employed during the acquisition phase of the capability lifecycle, to improve the methods of delivering capability to the Australian Defence Force and maximise the effectiveness of the delivered capability. This guide is one in a series produced by the Australian Defence Simulation Office (ADSO) in support of Defence Capability.

This guide complements the ADSO Simulation Application Guide and draws upon information from the other ADSO-sponsored material dealing with simulation.

The Acquisition Phase activities focus on the employment of modelling and simulation to assist with transforming capability requirements into an ADF combat system.

There is significant potential for employing simulation methods and techniques during the acquisition phase to minimise risks, reduce costs and promote the full effectiveness of the delivered capability system. This guide suggests potential areas where simulation can assist with the acquisition process.

### 1.1.1 Intended Audience

This Guide is aimed primarily at assisting DMO project line staff and branch support staff with understanding how simulation can improve the acquisition and delivery of effective capability solutions.

This Guide can also inform other agencies and people involved across the acquisition space, including headquarter sponsors, capability development staff, the Defence Science and Technology Organisation (DSTO), test and evaluation (T&E) agencies, operational units and industry players. These groups represent potential users and providers of simulation for the project and consideration needs to be given to their active engagement by the acquisition management staff during the process of identifying simulation support requirements.

## 1.2 Layout of the Guide

This guide is organised according to the basic process recommended for producing a simulation support plan. Each section covers a step in the process of developing the simulation support plan, beginning with confirming the context of the requirement; understanding the scope for simulation; determining the suitability of simulation capabilities, and documenting the results of the requirements analysis in the simulation support plan.

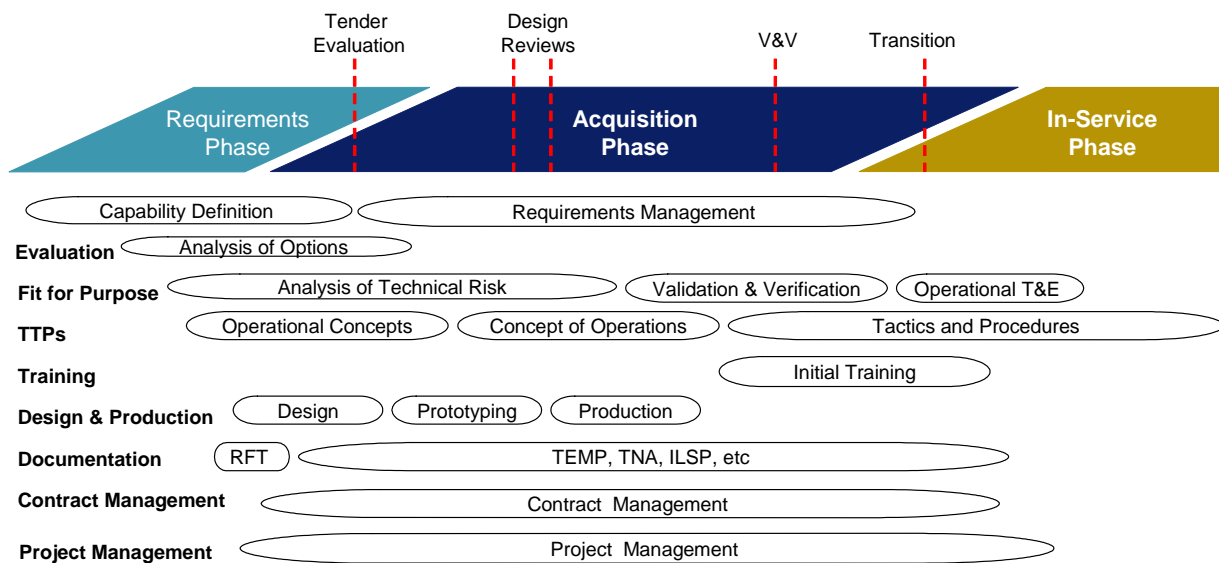
## 1.3 Overview of the Acquisition Phase

The Acquisition Phase formally commences when a capability receives government endorsement and funding approval at 2<sup>nd</sup> Pass and concludes once the full capability has been formally accepted into service. Notwithstanding these formal milestones,

'acquisition' involvement commences well before 2<sup>nd</sup> Pass and incorporates a number of activities that carry through to 'in-service' support and operations.

Those involved in the Acquisition Phase therefore continue the analysis activities commenced during the Requirements Phase, albeit at increasing levels of technical detail, whilst overseeing the establishment of the initial capability for acceptance into service.

Throughout the Acquisition Phase, acquisition staff make decisions to balance the requirement to deliver the best capability package within the financial and time constraints and in the context of acceptable risk. At the same time, they seek to do this in a way that minimises the transition period for the new capability, to reduce the overhead of operating new and legacy weapons systems simultaneously.



**Figure 1-1 Acquisition Phase Activities**

As illustrated at Figure 1-1, the Acquisition Phase activities include:

- ▶ Evaluation and selection of the best value for money tender option based on capability, cost, schedule and risk (managed by the IPT, prior to handover to DMO staff for project management)
- ▶ Requirements Management – managing the translation of needs and requirements into a compliant capability system
- ▶ On-going analyses of system design, logistics support, and other elements of the capability
- ▶ Delivery acceptance (including V&V), and acceptance into service (OT&E)
- ▶ Supporting the transition of the capability into service, including initial training, logistics and support procedures and sustainment measures
- ▶ Contract Management – managing contractor performance and deliverables
- ▶ Project Management – managing cost, schedule and risk



Simulation and modelling may be valuable in supporting each of these activity areas, as well as potentially contributing to the key performance outcomes of the delivered capability.

For the purpose of producing a framework for identifying simulation support, three key acquisition focus areas have been identified: Requirements Management; Validation and Verification and Cost, Schedule and Performance Analysis. These areas are areas where simulation has been known to provide significant benefits to the major acquisition process however the approach can be adapted to incorporate additional focus areas, as required.

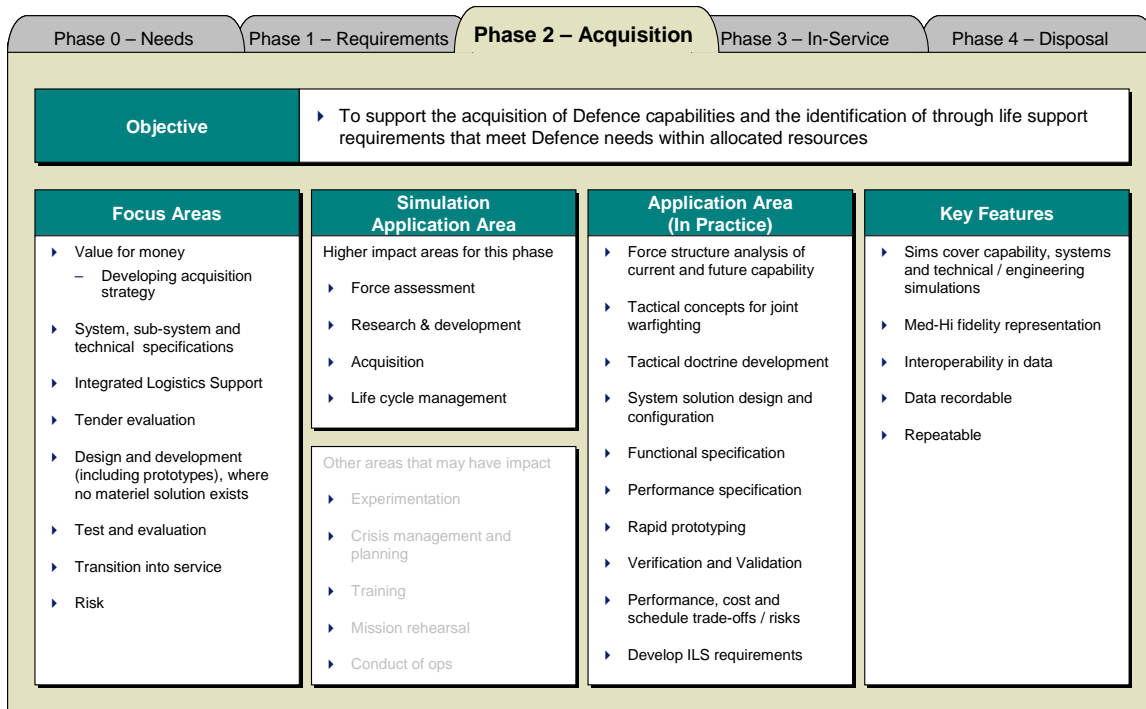
#### **1.4 The Role of Simulation during the Acquisition Phase**

*Simulation offers significant potential for enhancing capability, decreasing costs and reducing risks.*

Within the Acquisition Phase of the Capability Life Cycle simulation can provide support to analysis and evaluation activities, as well as supporting a range of activities aimed at transitioning a capability into service. The Defence Investment Reference Guide published by ADSO indicates that simulation may be used during the acquisition process to help Defence determine and refine user requirements, systems design, prototyping and system test and evaluation for procurement decision purposes.

A number of the larger and more complex projects have identified and incorporated significant simulation elements to support the Acquisition Phase, but Defence is yet to achieve a consistent, comprehensive approach to the use of simulation across Defence projects. As a result, there is still significant potential for Defence to exploit opportunities to realise the capability, cost and risk benefits that simulation can provide.

This Guide is designed to help Defence realise these benefits, by providing a process whereby staff involved in the Acquisition Phase of the Capability Life Cycle can undertake a quick appreciation of the potential applications and cost/benefit of simulation as it relates to their project, and take steps to resource or further analyse these opportunities.



**Figure 1-2- Application of Simulation Support to Acquisition Phase Activities**

## 1.5 Relationship with DMO Processes and Documents

This Guide is designed to be accessible and useful to DMO project and supporting staff and agencies. For this reason it has been structured with reference to DMO’s key guidance material, including QEMS and the DMO Project Risk Management Manual.

The output of this Guide is a *Simulation Support Plan for Acquisition*, which will:

- ▶ Inform the project manager and project staff where simulation capabilities are able to support project activities and outcomes,
- ▶ Identify potential high pay-off areas for simulation and mechanisms to promote or direct its inclusion as part of the delivered capability, and
- ▶ Identify resources and requirements for ‘internal’ modeling and simulation support for Acquisition Phase activities.

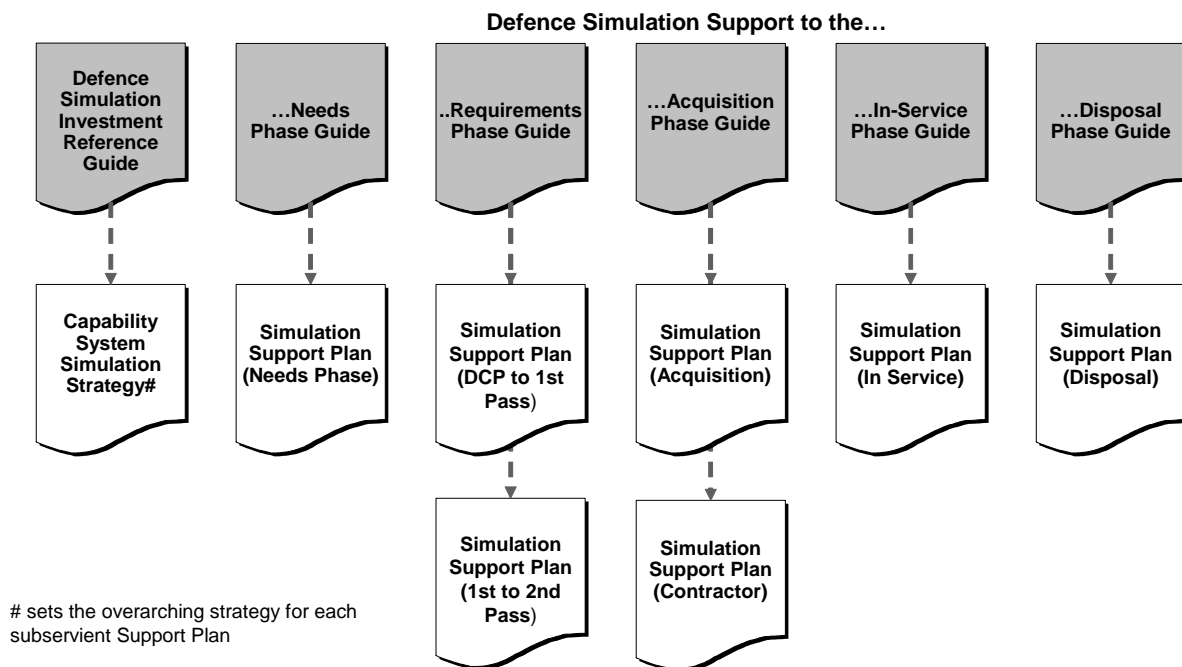
The development of this Simulation Support Plan should align with the *Capability System Simulation Strategy*<sup>1</sup>, a document that provides a vision for how simulation should be applied to support the capability system over its life.

The *Simulation Support Plan for Acquisition* should be developed as an update to the *1st to 2nd Pass Simulation Support Plan*, where one has previously been developed.

The *Simulation Support Plan for Acquisition* should be developed prior to 2<sup>nd</sup> Pass approval so that any financial or resource requirements for supporting future project phases and delivering on the capability outcome requirements, are captured in the financial estimates. Where an RFT is to be released prior to 2<sup>nd</sup> Pass, the Simulation Support Plan should be developed so that any simulation guidance for the capability ‘package’ is incorporated in

<sup>1</sup> The CLC Simulation Application Guide outlines a process and provides a template for the development of a Simulation Strategy.

the tender documentation. Figure 1-3 illustrates the relationship between the Simulation Guides, the Capability System Simulation Strategy and the Simulation Support Plan for each stage of the CLC.



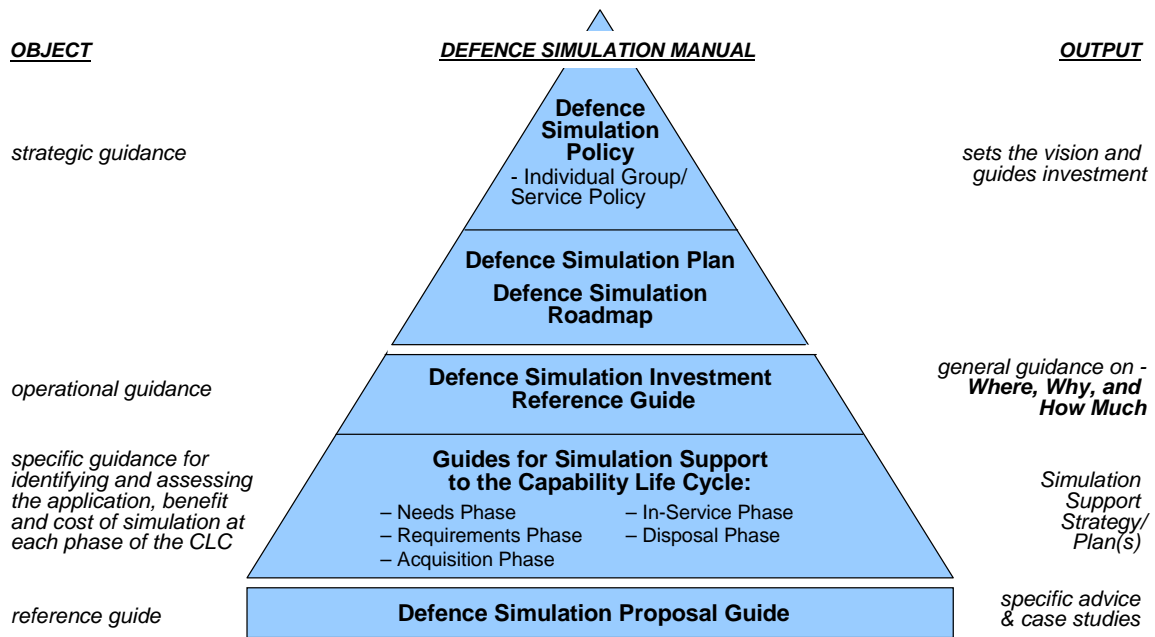
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**Figure 1-3 Relationship between Capability Simulation Guides and Simulation Strategy and Support Plans**

## 1.6 Relationship with other Defence Simulation Documents

The Acquisition Phase Guide is one of a series of simulation support to Capability Life Cycle guidance documents (CLC Simulation Support Guides) that is specifically focused on providing assistance to plan for, and develop simulation support across the CLC. These guides are part of a larger series of Defence simulation documents, as illustrated in Figure 1-3. This guide draws from information in the Simulation Investment Reference Guide to provide a tailored document for use by Defence staff working in each phase of the CLC.

Whilst this Guide captures the key insights from the Simulation Investment Reference Guide, readers should consult other documents where they seek greater detail in specific areas. Reference to these other documents is made in relevant sections of this Guide.



**Figure 1-4- Relationship of Acquisition Phase Guide to other Defence Simulation Documents**

## 1.7 Identifying Simulation Support Needs - Process Overview

A process guide has been developed to assist Defence staff identify where and how simulation may be used to support the achievement of the Acquisition Phase objectives and the capability 'package' to be acquired. Some of the ways in which simulation methods may support acquisition objectives and outcomes are as follows:

- Supporting comprehensive functional assessments to reduce risk and produce better informed decisions;
- Early optimisation and identification of trade-offs between system performance and total lifecycle cost of ownership;
- Minimisation of costs through standards-based reuse of information and software products;
- Optimal program investment through 'system of systems' analysis approach;
- Provision of enduring collaborative environments with reusable, interoperable tools;

Simulation methods and capabilities offer approaches for reducing risks associated with acquisition phase activities and improving the prospects of successful acquisition outcomes.

The process for identifying simulation support for acquisition follows on from the Needs and Requirements Phase simulation considerations and guides staff through the refinement of the initial *Simulation Support Plan*. At this stage the Simulation Support Plan will include details such as the identification of the mechanisms used for including simulation as part of the capability, and details about scheduling, resourcing and costing 'internal' simulation support to the Acquisition Phase processes.

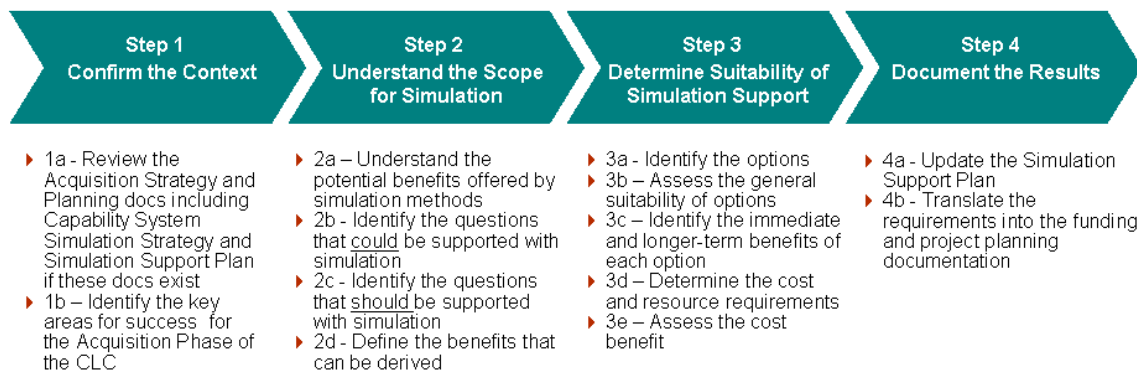
The process comprises four steps (shown in Figure 1-5):

**Step 1 – Confirm the Context.** This step leads to an appreciation of the likely acquisition issues for the specific area under consideration. Understanding the context may include a review of the Acquisition Strategy, the Capability System Simulation Strategy and Simulation Support Plan may assist with gaining an understanding of the context, if these documents are available. Identify the key result areas for the entire Acquisition Phase of the capability lifecycle.

**Step 2 – Define the Scope for Simulation.** This step is intended to identify where simulation can be used cost effectively to support the achievement of the acquisition phase objectives. Example questions are provided to assist with identifying the kinds of issues and challenges acquisition staff can expect during the acquisition sub-phase or through-phase focus area. This thought-shaping process leads to the identification of the problem areas which can be supported with simulation. Define the benefits that can be derived.

**Step 3 – Determine the Suitability of Simulation Support.** This step covers the identification of support options and the assessment of the immediate and longer-term benefits of each option. Attention is drawn to the cost and resource requirements leading to a cost-benefit analysis and identification of the preferred solution.

**Step 4 – Document the Results.** The results of the process are documented in the Simulation Support Plan for funding and resourcing within the project activity framework. The Capability System Simulation Support Strategy is also amended, as required, to maintain a clear view of the simulation approach into the phase of the CLC.



**Figure 1-5 Producing a Simulation Support Plan for the Acquisition Phase**

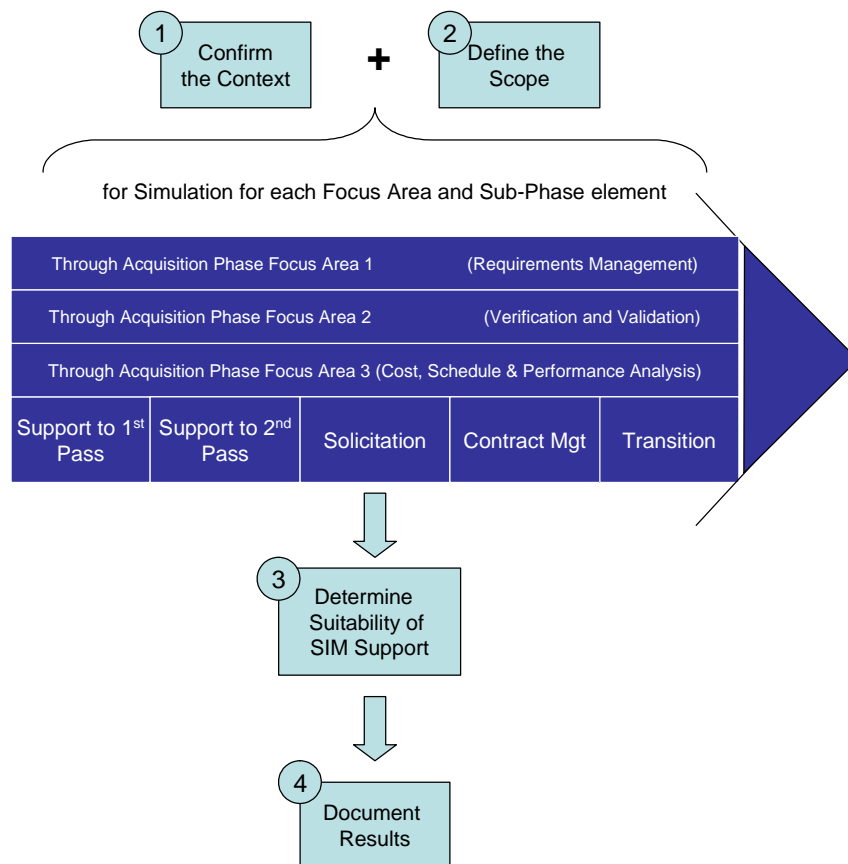
To help focus attention on specific areas where simulation can be used to support each step of the acquisition process, the acquisition phase has been split out into three functional focus areas and five acquisition sub-phases, consistent with DMO’s major acquisition business process model.

The focus areas have been identified as: Requirements Management, Verification & Validation and Cost, Schedule and Performance Analysis, all of which are continuing processes throughout the entire acquisition phase. The sub-phases are defined as: DMO

Support to 1<sup>st</sup> Pass Approval; DMO Support to 2<sup>nd</sup> Pass Approval; Solicitation; Contract Management and Transition.

Steps 1 and 2 of the process for developing the Simulation Support Plan will be applied to each of these 'through-phase' and 'sub-phase' areas.

If needed, additional focus areas can also be used to support the unique needs of an individual capability system. For example, a project introducing a common 'across-weapon platforms' capability might benefit from the addition of an Interoperability Management focus area. The flow diagram at Figure 1-6 outlines this framework for identifying specific ways simulation may assist with reducing risks to achieving acquisition phase capability objectives and outcomes.



**Figure 1-6 Steps for Determining Simulation Support Requirements for Acquisition Phase**

To summarise, this section overviewed the basic approach to be used to identify areas where and how simulation can support acquisition phase activities and key result areas.

The next sections present tabular information intended to guide thinking about the issues likely to arise during the acquisition process and the ways in which simulation can be used to support each focus area and acquisition sub-phase (as defined in Figure 1-6). Each section discusses the Context (Step 1) and the potential Scope for Simulation (Step 2) for the acquisition focus area and sub-phase being considered.

## 2 Through-Acquisition Phase Focus Area: Requirements Management

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Simulation is being used to assist with determining the complex requirements of a number of major weapon systems, including the requirements for the F-35 Joint Strike Fighter. In the United States, the JSF is planned to perform in a range of roles previously undertaken by three Navy carrier-capable, two Marine short-takeoff, and three Air Force aircraft types. Additionally, the requirements of other major overseas customers, including those of the United Kingdom and Australia, are also being fed into the design development process.

To assist with producing the right combination of requirements for meeting the needs of these different operators, the JSF Virtual Strike Warfare Environment was developed. The VSWE is an evolving, interoperable collection of simulations used to analyse different performance requirements under a range of operational and environmental conditions<sup>2</sup>.

Although the actual capabilities of the JSF platform won't be known for some years, it is difficult to imagine how the right balance of requirements for this complex system could have been derived without significant reliance on modelling and simulation techniques.

### 2.1 Step 1: Confirm the Context

The fundamental purpose of the acquisition process is to source and deliver a capability system which fulfils an approved set of capability requirements. From the outset of the acquisition process a high standard of requirements management is necessary for guiding the development and design of the capability system and measuring the project organisation's performance against required outcomes.

The key issues in the requirements management process and the questions arising in the context of the Acquisition Phase are presented in Table 2-1

**Table 2-1 Considerations for Requirements Management Focus Area**

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<sup>2</sup> Randy C. Zittel, 'The Reality of Simulation-Based Acquisition – And an Example of US Military Implementation'

Key Considerations & Questions for Requirements Management	
Issues	Questions
<p>Requirements Management</p> <ul style="list-style-type: none"> <li>▶ Scope and depth of approved capability requirements</li> <li>▶ Ability to manage changes and updates to requirements</li> <li>▶ Ability to check compliance against requirements during tender evaluation</li> <li>▶ Ability to check compliance against requirements during test &amp; evaluation</li> <li>▶ Ability to trace related capability requirements</li> </ul>	<ul style="list-style-type: none"> <li>▶ What are the requirements for conducting force assessments involving the new capability?</li> <li>▶ How are the risks to compliance with the capability system's key functional and performance areas to be managed?</li> <li>▶ How will day-to-day requirements management be performed?</li> <li>▶ How will errors, inconsistencies, omissions in systems requirements be avoided?</li> <li>▶ How are requirements tracked and prioritised?</li> <li>▶ How is requirements traceability maintained throughout the systems engineering process?</li> <li>▶ How will requirements verification status be maintained and managed?</li> <li>▶ How are safety critical requirements identified and managed?</li> </ul>

## 2.2 Step 2: Define the Scope for Simulation

A sample of the questions arising and the potential objectives for simulation support in this context are presented in Table 2-2.

**Table 2-2 Simulation Support to Requirements Management**

Example Questions	Potential Objectives for Simulation Support
<ul style="list-style-type: none"> <li>▶ Force Assessment <ul style="list-style-type: none"> <li>– What are the capabilities requirements for supporting new Defence doctrine and fighting concepts, such as Network-Centric Warfare?</li> <li>– What are the requirements for assessing this capability's ability to perform and interact with other Defence capabilities?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▶ Improve the capacity to 'immerse' decision makers in the environment altered as a result of capability decisions</li> <li>▶ Analyse force structure context for current and future capability</li> <li>▶ Develop and test appropriate tactical doctrine</li> </ul>



Example Questions	Potential Objectives for Simulation Support
<ul style="list-style-type: none"> <li>▶ Technical Design Analysis, Technical Risk Assessment and System Definition               <ul style="list-style-type: none"> <li>– What is the planned approach for analysing specific technical solutions, such as:                   <ul style="list-style-type: none"> <li>Intelligence, Surveillance &amp; Reconnaissance sensor suite optimisation</li> <li>Electronic Warfare Self Protection Measures effectiveness</li> <li>Network Usage Optimisation</li> <li>Platform Survivability Assessment</li> <li>Weapon Accuracy Assessment</li> <li>Platform Mobility Assessment</li> <li>System Safety Analysis</li> <li>Human Machine Interface evaluation</li> </ul> </li> </ul> </li>   <li>▶ Tender Evaluation               <ul style="list-style-type: none"> <li>– How will the tender evaluation activity be managed?</li> </ul> </li>   <li>▶ CLC Requirements Management:               <ul style="list-style-type: none"> <li>– How will the capability requirements be managed throughout the capability lifecycle?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▶ Produce rapid prototype engineering solutions</li> <li>▶ Analyse design solutions and integration concepts</li> <li>▶ Produce and manage functional specification</li> <li>▶ Produce and manage performance specification</li> <li>▶ Produce material for use in technical risk and system safety assessments</li>            <li>▶ Provide decision support to tender evaluation teams</li> <li>▶ Manage information about the ability of the capability system to meet the capability requirements throughout the CLC.</li> </ul>

### 3 Through-Acquisition Phase Focus Area: Verification & Validation (Test & Evaluation)

#### 3.1 Step 1: Confirm the Context

*Today, It is unthinkable to plan a Test and Evaluation program without Modelling and Simulation<sup>3</sup>.*

The evaluation of requirements during the test and evaluation phase of a project is dependent upon the definition of verification used against each of the system requirements. The return on investment in modelling and simulation support to test and evaluation (or validation) programs is high.

In the case of weapons testing, simulation can dramatically reduce the need for expensive ‘live firings’. For other weapon systems, simulation can dramatically reduce the costs of making actual weapon systems available and the lifecycle cost of testing under harsh conditions. As one example, the US Weapons Software Support Facility in China Lake is estimated to save the US Navy and Defense \$USD 10M per year in T&E activities<sup>4</sup>.

The use of simulation and modelling in representing the extremes of operation and hazardous environments can also reduce unnecessary risks to the safety of personnel and combat systems. In some other situations may not be practical to produce and maintain a suitable test environment (e.g. the complexity involved in producing the real conditions for force structure analysis).

Commonly used verification methods include: test, demonstration, analysis and inspection. The key issues for verification and validation (covering T&E) and the questions arising in the context of the acquisition phase are presented in Table 3-1.

**Table 3-1 Considerations for the Verification & Validation Focus Area**

Key Considerations & Questions for DMO Support to Verification and Validation	
Issues	Questions
Developmental T&E	<ul style="list-style-type: none"> <li>▶ How will the project gain confidence in the successful use of new technology and/or novel applications of technologies?</li> <li>▶ What is the project plan for determining compliance with key project acceptance requirements?</li> <li>▶ What is the project plan for determining compliance with the relevant regulatory requirements?</li> </ul>
Acceptance T&E	
Operational T&E	
	<ul style="list-style-type: none"> <li>▶ What is the project plan for determining compliance with operational requirements?</li> </ul>

<sup>3</sup> Joint Simulation Based Acquisition Task Force Roadmap for SBA, December 1998

<sup>4</sup> Ibid, table 6-4

### 3.2 Step 2: Define the Scope for Simulation

A key part of the Verification and Validation process is the management of expectations and building confidence in the end-users' minds that the capability delivered is fit for its intended purpose. A sample of the questions arising and the potential objectives for simulation support in this context are presented in Table 3-2.

**Table 3-2 Simulation Support to Verification and Validation**

Example Questions	Potential Objectives for Simulation Support
<ul style="list-style-type: none"> <li>▶ What is the plan for verifying the mission system and support system against the capability's functional and performance requirements?</li> <li>▶ What is the plan for validating the systems against the end-users requirements?</li> <li>▶ How will T&amp;E be planned and undertaken for satisfying the requirements for project acceptance?</li> <li>▶ How will T&amp;E be planned and undertaken for satisfying the technical regulatory requirements?</li> <li>▶ How will T&amp;E be planned and undertaken for satisfying operational suitability requirements?</li> <li>▶ How will T&amp;E be planned and undertaken for satisfying force level interoperability requirements?</li> <li>▶ How can the capabilities of other Defence agencies and specialist areas, such as specific weapon system support facilities (F-111 WSSF, AWD Support Centre, FFG CDSC, F/A-18 IASSF and HREF) and other technical support agencies (DSTO Labs, NETWARS communications systems modeling facility, JEWOSU) be leveraged for validation or verification purposes?</li> </ul>	<ul style="list-style-type: none"> <li>▶ Test system operating concepts to gain confidence in the design/approach</li> <li>▶ Test system functional and performance designs and conceptual limits against force level requirements</li> <li>▶ Demonstrate system functions and performance in a controlled environment</li> <li>▶ Demonstrate compliance with human machine interface requirements using live and virtual simulations</li> <li>▶ Analysis system function and performance test results with respect to capability requirements</li> </ul>

## 4 Through-Acquisition Phase Focus Area: Cost, Schedule & Performance Analysis

### 4.1 Step 1: Confirm the Context

The management of cost, schedule and performance of the project against required targets is a basic responsibility of management and acquisition support staff. Often the decision to acquire a major complex weapon system is made before the system design has been completely developed or proven and design changes are likely to occur during the period of the acquisition process. If project forecasts indicate that some aspect of the required system performance cannot be delivered by the required date or within the allocated costs, it may be necessary to trade-off system or sub-system performance against cost and/or schedule in order to satisfy the higher capability requirement. Simulation may provide a systematic way to conduct this kind of analysis. Table 4-1 lists questions for consideration during the provision of support to this identified focus area.

**Table 4-1 Considerations for the Cost, Schedule and Performance Analysis Focus Area**

Key Considerations & Questions for DMO Support to Cost & Schedule Performance Management	
Issues	Questions
Cost, Schedule and Performance measurement against the project's targets/objectives	<ul style="list-style-type: none"> <li>▶ How will cost and schedule performance be measured collectively in the lead up to design review milestones and throughout the period of the Acquisition Phase?</li> <li>▶ How will cost, schedule and performance risks be managed?</li> </ul>
Cost, Schedule, Performance trade-off decisions	<ul style="list-style-type: none"> <li>▶ How will cost, schedule and performance tradeoff decisions be made?</li> </ul>

### 4.2 Step 2: Define the Scope for Simulation

While office automation tools provide many opportunities to model cost, schedule and performance individually, simulation capabilities assist in making tradeoffs across these component areas of analysis to address the 'very hard' questions. Table 4-2 sets out some of these hard questions and provides some example objectives for where simulation support may assist.

**Table 4-2 Simulation Support for Cost, Schedule and Performance Analysis**

Example Questions	Potential Objectives for Simulation Support
<ul style="list-style-type: none"> <li>▶ Cost, Schedule and Performance Analysis                             <ul style="list-style-type: none"> <li>– What are the implications of delivering a degraded capability?</li> <li>– What are the implications of late delivery of the capability?</li> <li>– What are the implications of not meeting project budgetary targets?</li> </ul> </li>   <li>▶ Cost, Schedule and Performance Tradeoff                             <ul style="list-style-type: none"> <li>– How can cost, schedule and performance tradeoffs be conducted to provide the ‘best fit’ solution to capability requirements?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▶ Cost, Schedule and Performance Analysis                             <ul style="list-style-type: none"> <li>– Optimise Project Activity Schedule (&amp; Costs)</li> <li>– Estimate Project and Through-Life Costs</li> <li>– Project the development of technology developments in support of sub-system design solutions (e.g. software development)</li> <li>– Production and assessment of performance measures to indicate how well technical development and design are meeting capability requirements in terms of functions performance, cost and timings</li> <li>– Improving the capacity to provide quantitative data to support decision making</li> </ul> </li>   <li>▶ Cost, Schedule and Performance Tradeoff                             <ul style="list-style-type: none"> <li>– Support performance, cost and schedule tradeoffs. Specific performance tradeoff activities may involve: weapon accuracy assessments, platform mobility studies, and human machine interface development/definition design options.</li> </ul> </li> </ul>

## 5 Acquisition Sub-Phase: DMO Support to First Pass Approval

### 5.1 Step 1: Confirm the Context

The DMO members of the Capability Systems-led Integrated Product Team (IPT) represent the interests of DMO to the other stakeholders involved in the Requirements Phase of the capability lifecycle. The DMO team members are to identify the need for, and coordinate specialist input from the broader DMO into the early stages of the process to help to mitigate risks later on in the capability lifecycle. This section of the Acquisition Guide deals specifically with DMO considerations for simulation during provision of support to Capability Systems in the lead up to the 1<sup>st</sup> Pass Approval milestone<sup>5</sup>.

For details about the general considerations and potential for the application of simulation by capability staff during the Needs or Requirements Phases of the Capability Lifecycle refer to the Needs and Requirements Phase Simulation Guides in this series.

Table 5-1 lists issues and areas for consideration in terms of satisfying DMO's goals during the provision of support to the 1<sup>st</sup> pass approval phase<sup>6</sup>.

**Table 5-1 Considerations for 1<sup>st</sup> Pass Approval Acquisition Sub-Phase**

Key DMO Considerations & Questions During 1 <sup>st</sup> Pass Approval Sub-Phase	
Issues	Questions
<ul style="list-style-type: none"> <li>▶ Availability of valid capability requirements</li> <li>▶ Availability of stable requirements for cost, schedule and risk analysis</li> <li>▶ Realistic cost &amp; schedule estimates</li> <li>▶ Identification of key support issues and requirements</li> <li>▶ Availability of existing system definition</li> <li>▶ Identification of issues affecting Mission System and Support System implementation</li> <li>▶ Achievability of Australian Industry Involvement plan</li> <li>▶ Soundness and acceptability of Management Plan for 2<sup>nd</sup> Pass approval</li> </ul>	<ul style="list-style-type: none"> <li>▶ How will the validity of the capability requirements be determined? How will the capability requirements be managed?</li> <li>▶ How will requirements be made available and managed for cost, schedule and risk analysis purposes? Is it possible to conduct sensitivity analyses using the available cost and schedule estimates information? How have the details about the existing mission/support systems been captured and managed for analysis purposes?</li> <li>▶ How are key mission and support system issues being identified and tracked? How is the achievability of the All plan to be measured against target requirements?</li> </ul>

<sup>5</sup> Refer to the Defence Capability Development Manual 2006

<sup>6</sup> Refer DMO Project Risk Management Manual June 2004

## 5.2 Step 2: Define the Scope for Simulation

The issues and questions identified at Table 5-1 lead to the identification of areas where simulation may support key acquisition result areas in Table 5-2.

**Table 5-2 Simulation Support during 1<sup>st</sup> Pass Approval Acquisition Sub-Phase**

Example Questions	Potential Objectives for Simulation Support
<ul style="list-style-type: none"> <li>▶ Capability Requirements Management               <ul style="list-style-type: none"> <li>– What support is available for managing the uncertainty normally associated with the developing the requirements of a new capability system?</li> </ul> </li>   <li>▶ Research and Development               <ul style="list-style-type: none"> <li>– Does the new capability make use of new technologies, methods or processes?</li> </ul> </li>   <li>▶ Risk Management               <ul style="list-style-type: none"> <li>– What methods will be used to identify and manage risks to manage system performance, and project schedule and cost tradeoffs?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▶ Assist Force structure analysis of current and future capability to address sustainability and through-life support issues early</li>   <li>▶ Improve Functional and Performance specification management to incorporate reliability, availability and maintainability consideration early</li>   <li>▶ Support rapid prototyping to gain confidence in system capabilities and to develop integrated logistics support concepts and test and validate critical ILS issues</li>   <li>▶ Visualise the implications of technical risks in terms of operational and strategic consequences</li>   <li>▶ Assist with Performance, cost and schedule analysis tradeoffs</li> </ul>

## 6 Acquisition Sub-Phase: DMO Support to Second Pass Approval

### 6.1 Step 1: Confirm the Context

The DMO team members of the Capability Systems-led Integrated Product Team (IPT) represent the interests of DMO to the other stakeholders involved in the pre-Acquisition stages of the capability lifecycle. The following table lists issues and areas for specific DMO consideration during the provision of support to Capability Systems in the lead up to the 2nd Pass Approval milestone.

For general considerations concerning the potential uses and application of simulation earlier in the Requirements Phase of the CLC, refer to ADSO's Requirements Phase Simulation Guide.

**Table 6-1 Considerations for the 2<sup>nd</sup> Pass Approval Sub-Phase**

Key Considerations & Questions for DMO Support to 2nd Pass Approval Sub-Phase	
Issues	Questions
<p>Ensuring a successful project through:</p> <ul style="list-style-type: none"> <li>▶ Valid solution class-dependent requirements (Mission System and Support System)</li> <li>▶ Each solution class presented for approval meets criteria associated with DMO Contract Acceptance Review</li> <li>▶ Australian Industry Involvement plan is defined and is feasible</li> <li>▶ Acquisition PMP approval</li> </ul>	<ul style="list-style-type: none"> <li>▶ How will the generated capability options be measured in terms of their fit against cost, schedule and performance criteria?</li> <li>▶ What is DMO's plan for conducting the Contract Acceptance Review?</li> <li>▶ What criteria will be used for gauging the feasibility of the All plan?</li> </ul>

### Step 2: Define the Scope for Simulation

The issues and questions identified at Table 6-1 lead to the identification of areas where simulation may support key acquisition result areas in Table 6-2.

**Table 6-2 Simulation Support to the 2nd Pass Approval Sub-Phase**

Example Questions	Potential Objectives for Simulation Support
<ul style="list-style-type: none"> <li>▶ What processes will be used to perform Requirements Management throughout the acquisition phase of the CLC?</li> </ul>	<ul style="list-style-type: none"> <li>▶ Support Functional and Performance specification management</li> <li>▶ Facilitate Tender Evaluation activities</li> <li>▶ Assist with performance, cost and schedule</li> </ul>



Example Questions	Potential Objectives for Simulation Support
	tradeoff analyses <ul style="list-style-type: none"><li data-bbox="815 271 1406 309">▶ Streamline test concepts development</li><li data-bbox="815 331 1366 400">▶ Assist with analysis of ILS and LCC requirements</li></ul>

## 7 Acquisition Sub-Phase: Solicitation

### 7.1 Step 1: Confirm the Context

The solicitation sub-phase commences with development of the tender documentation and planning of the tender evaluation process. Simulation methods may be helpful in terms of managing this part of the process, as well as assisting with identifying where additional attention needs to be given to critical areas of the proposal responses. Table 7-1 lists areas of specific consideration for the provision of simulation support to the Solicitation sub-phase.

**Table 7-1 Considerations for the Solicitation Sub-Phase**

Key Considerations & Questions for DMO Support to the Solicitation Sub-Phase	
Issues	Questions
<p>Reaching a contract with a supplier that represents value for money over the whole of the capability life while satisfying the purchasing principles of:</p> <ul style="list-style-type: none"> <li>• Efficiency and effectiveness</li> <li>• Accountability and transparency</li> <li>• Ethics</li> <li>• Industry development</li> </ul>	<p>What provisions have been made for managing the following key aspects of the project:</p> <ul style="list-style-type: none"> <li>• Project Risks</li> <li>• Systems Design Configuration</li> <li>• Technical Management</li> <li>• Software Design</li> <li>• Software Acquisition Management</li> <li>• Integrated Logistics Support</li> <li>• Systems Engineering</li> <li>• System Safety Assessment</li> <li>• Environmental Management</li> <li>• Validation &amp; Verification Activities</li> <li>• Industry Involvement</li> <li>• Design Acceptance</li> <li>• Regulatory Certification</li> </ul>

### 7.2 Step 2: Define the Scope for Simulation

During this sub-phase the role of simulation is to provide additional rigor and auditability in the tender evaluation process.

Table 7-2 lists areas of specific interest during the provision of support to the Solicitation sub-phase.

**Table 7-2 Simulation Support to the Solicitation Sub-Phase**

Example Questions	Potential Objectives for Simulation Support
<ul style="list-style-type: none"> <li>▶ How can the Tender Evaluation process be managed effectively to minimize the demands on project staff and subject matter experts?</li> <li>▶ What processes, system(s) and information will be used to support decision-makers in their understanding of contractor performance during the acquisition phase?</li> <li>▶ How will the management of project risks by the project office and the project contractors be handled so that project managers are continuously aware of the risk situation.</li> <li>▶ What consideration has been given to the planning and resourcing of Test &amp; Evaluation activities by specialist organisations in support of V&amp;V activities?</li> <li>▶ How will the process and requirements for Configuration Management be defined for the capability's lifecycle?</li> <li>▶ How will decision-makers be able to source and make use of ILS and LCC Analyses throughout the capability lifecycle?</li> <li>▶</li> </ul>	<ul style="list-style-type: none"> <li>▶ Supporting the evaluation of tender response proposals, for example in comparing capability solutions in terms of identified critical performance, through-life support, cost and benefit issues.</li> <li>▶ Assisting decision-maker with defining required contractor performance against cost, schedule and performance goals.</li> <li>▶ Assisting with the analysis of project and technical risks and analyses, including system safety analysis.</li> </ul> <p>(refer to section dealing with Verification and Validation Sub-phase)</p> <ul style="list-style-type: none"> <li>▶ Supporting the management of the capability system's configuration</li> <li>▶ Improving the definition of the quantitative data required to support LCC analysis and decision making</li> </ul>

Note that where a contractor proposes to deliver simulation as part of the tender response it is essential the contractor outline their simulation proposal using the guidance provided at Annex B. The contractor should also be provided access to the Defence Simulation Proposal Guide to assist.

## 8 Acquisition Sub-Phase: Contract Management

### 8.1 Step 1: Confirm the Context

In the acquisition process, contract management is about the creation and maintenance of commercial relationships with project suppliers and monitoring and managing the provision of services according to the terms and conditions laid out the contract.

The following table lists DMO's areas of specific interest during the provision of support to the Solicitation sub-phase.

**Table 8-1 Considerations for the Contract Management Sub-Phase**

Key Considerations & Questions for DMO Support to the Contract Management Sub-Phase	
Issues	Questions
<p>Reaching a contract with a supplier that represents value for money over the whole of the capability life while satisfying the purchasing principles of:</p> <ul style="list-style-type: none"> <li>▶ Efficiency and effectiveness</li> <li>▶ Accountability and transparency</li> <li>▶ Ethics</li> <li>▶ Industry development</li> </ul>	<ul style="list-style-type: none"> <li>▶ What are the key factors contributing to the efficiency and effectiveness of the project deliverables?</li> <li>▶ How will the contractor's accountability for performance against the contract requirements and deliverables be gauged?</li> <li>▶ What is the process for managing the contract-related project management decisions, including risk decisions?</li> </ul>

### 8.2 Step 2: Define the Scope for Simulation

During this sub-phase the role of simulation is to support contract management in contractor performance monitoring and reduction of risk. Table 8-2 lists areas of specific interest during the provision of support to the Contract Management sub-phase.

**Table 8-2 Simulation Support to the Contract Management Sub-Phase**

Example Questions	Potential Objectives for Simulation Support
<ul style="list-style-type: none"> <li>▶ Technical Risk <ul style="list-style-type: none"> <li>– How is the project maintaining regular visibility of design developments and progress towards meeting performance targets?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▶ Analysing and Managing Technical Risk <ul style="list-style-type: none"> <li>– Assessing the prime and sub-contractor performance to gauge how well technical development and design are evolving relative to what was planned and relative to meeting capability requirement in terms of functions, performance, cost and timings</li> </ul> </li> </ul>

Example Questions	Potential Objectives for Simulation Support
<ul style="list-style-type: none"> <li>▶ Contractor Performance               <ul style="list-style-type: none"> <li>– How is the project maintaining confidence in the contractor's ability to deliver against the capability requirements?</li> <li>– Does the possibility exist for using innovative reporting methods for establishing and maintaining awareness of contractor progress against contract requirements?</li> <li>– How are project risks being managed for continuous changes in the project environment?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>– Analysing and Managing program risks in support of contract change proposals</li> <li>– Identifying operational risks and limitations to inform and support contract relationships and contractor performance</li> </ul>

## 9 Acquisition Sub-Phase: Transition

### 9.1 Step 1: Confirm the Context

The main aim of the transition sub-phase is to effect a complete transfer of the capability system to the operational groups and in-service management and organisation(s) in such a way as to minimise the time it takes for the capability system to reach its minimum required level of capability. A key focus area during this phase is acceptance testing of the new system. Test and Evaluation issues and considerations are covered in the V&V focus area at Section 3 to this guide. Another key requirement affecting the timeframe for system availability is for the effective transfer of all knowledge gained throughout the acquisition phase to the in-service organisation(s).

Table 9-1 lists DMO's areas of specific interest during the provision of support to the Transition sub-phase.

**Table 9-1 Considerations for the Transition Sub-Phase**

Key Considerations & Questions for DMO Support to the Transition Sub-Phase	
Issues	Questions
<p>Transfer of management responsibilities for the whole Materiel system including:</p> <ul style="list-style-type: none"> <li>• Support Contracts</li> <li>• Financial Elements</li> <li>• Mission System including support services</li> <li>• Training materials</li> <li>• Support and Test Equipment</li> <li>• Spares and Packaging</li> <li>• Facilities and Plant</li> <li>• Technical Data and support</li> <li>• Special items</li> <li>• Systems and processes for operations, engineering, maintenance, supply and training support</li> </ul>	<ul style="list-style-type: none"> <li>▶ How will the monitoring and performance of acceptance and operational test and evaluation activities be managed to enable the delivered capability system to achieve minimum required level of capability performance sooner?</li> <li>▶ How will the knowledge transfer of mission and support systems' suitability including data, information and knowledge for lifecycle management, be transferred to the In-Service management organisation?</li> <li>▶ Which acquisition systems, processes and decision-supporting tools need to be transferred to the in-service organization to assist with engineering, maintenance or training support?</li> </ul>

## 9.2 Step 2: Define the Scope for Simulation

During this sub-phase the roles of simulation are to support the completion of acceptance and operational testing and provide the in-service management with data and tools used during the acquisition phase which will support through-life management decision-making. Table 9-2 lists areas of specific interest during the provision of support to the Transition sub-phase.

**Table 9-2 Simulation Support to the Transition Sub-Phase**

Example Questions	Potential Objectives for Simulation Support
<ul style="list-style-type: none"> <li>▶ Acceptance and Operational Test and Evaluation</li> <li>▶ Engineering/Maintenance               <ul style="list-style-type: none"> <li>– How will information about engineering decisions that occurred throughout the phase be captured and transferred to the in-service management organisation?</li> <li>– How will engineering/technical data and support systems be transferred to the in-service engineering management team?</li> </ul> </li> <li>▶ Training               <ul style="list-style-type: none"> <li>– How will the training needs of the capability system operators and support personnel be met?</li> </ul> </li> <li>▶ Life Cycle Management:               <ul style="list-style-type: none"> <li>– What are the implications of a degrading capability?</li> <li>– What can/cannot be achieved with current maintenance and distribution networks?</li> <li>– What are the Life Cycle Cost implications for maintaining the capability?</li> </ul> </li> </ul>	<p>(T&amp;E covered in detail under V&amp;V focus area at Section 3)</p> <ul style="list-style-type: none"> <li>▶ Engineering Decision Support               <ul style="list-style-type: none"> <li>– Improve the ability to manage the effects of engineering changes on the system's performance</li> </ul> </li> <li>▶ Maintenance Decision Support               <ul style="list-style-type: none"> <li>– Optimise maintenance support to improve the operational availability of the system</li> <li>– Maximise maintenance support cost effectiveness</li> </ul> </li> <li>▶ Supply System Decision Support               <ul style="list-style-type: none"> <li>– Optimise 'throw-away' spare parts supply requirements</li> <li>– Optimise repairable parts supply chain</li> </ul> </li> <li>▶ Training               <ul style="list-style-type: none"> <li>– Support training requirements</li> </ul> </li> <li>▶ Life Cycle Management Decision Support               <ul style="list-style-type: none"> <li>– Improve the capacity to provide quantitative data to support decision making</li> </ul> </li> </ul>

## 10 Identifying Acquisition Simulation Support

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The previous sections are intended to shape thinking about the ways simulation can be used to support the acquisition phase focus areas and sub-phase process areas. Each section discussed the acquisition context (Step 1) and the potential scope for employing simulation for each area considered (Step 2). This section continues the four step process for developing the business case for employing simulation where it makes sense during the acquisition phase of the CLC.

### 10.1 Step 3: Determine Suitability of Simulation Support

Step 3 involves the identification and assessment of the simulation options available to support Defence staff in their acquisition activities. There are a number of different avenues to pursue, including the use of simulations already developed or owned by Defence areas (eg. ADSO, DSTO and/or DMO), commercially available simulations and simulation or modelling tools that may be accessed by way of outsourcing tasks to industry or other Defence forces. This step involves five sub-steps:

- ▶ Step 3a – Identify the options,
- ▶ Step 3b – Assess the general suitability of options,
- ▶ Step 3c – Identify the immediate and longer-term benefits of each option,
- ▶ Step 3d – Determine the costs and resource requirements, and
- ▶ Step 3e – Assess the cost benefit.

#### 10.1.1 Step 3a - Identify the Options

Step 3a is to identify possible simulation options to support the high payoff questions that have been identified as part of the acquisition phase. This step has a number of dimensions, and can be approached in a number of different ways depending on the scope of the project to support the option. The suggested process is provided, but can be tailored to suit the specific circumstances of individual projects:

- ▶ **Contact ADSO to discuss available simulations within Defence.** ADSO staff have a good understanding of the simulations available within Defence and where these have been applied to previous analysis activities.
- ▶ **Scan the ADSO Simulation Database.** The Simulation database provides a brief description of all the simulations that are currently supported by Defence. These descriptions are sufficient to identify those simulations that offer the potential to support the analysis of high payoff questions.
- ▶ **Contact the Simulation Manager/Point of Contact.** The simulation managers should be contacted to provide a better understanding of the features and focus of the simulation, its inputs (in terms of the type and level of data required) and outputs (the types of metrics it provides, reports, etc). Outlining the question(s) to be analysed to the manager may also assist them to assess the suitability of the simulation for the task.
- ▶ **Identify external simulation options.** Though the scope for seeking additional resources for acquisition support may be limited, it may still be worthwhile identifying



whether there are any simulation options that are not currently owned or used by Defence that may offer benefits to the Acquisition Phase activities with limited impact on the project's performance objectives. There are a number of ways to identify other simulation options including:

- *Internet Search.* An internet search is a relatively simple way to identify other simulations that are being used to support the analysis of different capability systems.
- *Attend SimTecT and/or other conferences.* Conferences are a particularly good way of identifying the availability of different simulation tools. The SimTect conference is held annually in Australia and provides a broad range of papers and working sessions on simulation. Other conferences that focus on the capability or related technologies being assessed by the project can also provide insight into simulation tools being used by other forces or manufacturers to support their analyses.
- *Contact capability system manufacturers.* Through initial identification and assessments of capability system options, Defence staff will have developed a network of contacts with the weapon system manufacturers. These manufacturers will often have acquired or developed in-house simulation capabilities to support their systems.
- *Contact simulation system manufacturers.* There are also a number of manufacturers and developers who specialise in simulation systems. ADSO can provide guidance on the specific manufacturers.
- *Contact parallel projects in other nations.* One of the greatest users of simulation is the United States Department of Defense (US DoD). Defence staff should seek to understand how they and other military forces are using simulation and what tools they are using. Many of these forces also maintain simulation databases that can be accessed over the internet.

Through the preceding steps Defence staff will have developed a list of possible simulation options that can then be assessed in terms of their suitability.

### **10.1.2 Step 3b - Assess the General Suitability of the Options**

Assessing the suitability of modelling & simulation support options requires staff to have a sound understanding of the M&S applications in terms of:

- ▶ Which areas the simulation is designed to support (e.g. refine requirements; identify critical operational issues; test & evaluation),
- ▶ What level of fidelity is required, versus what level the simulation provides,
- ▶ Are suitable models already available within the simulation tool,
- ▶ What data is required to support the simulation,
- ▶ What are the outputs of the simulation (what Measures of Effectiveness (MOEs) does it provide, does it produce tailored reports, etc),
- ▶ What is the simulation designed to do (e.g. engineering support and analysis, performance evaluation; training, etc), and

- ▶ What level of verification and validation is required?

Where practical, Defence staff should arrange to see a demonstration of the simulation options and explore the suitability of options by discussing the specific analysis tasks to be addressed.

#### **10.1.3 Step 3c – Identify the Benefits of each Option**

Identifying the benefits each option is necessary for supporting the business case for the option. Benefits should be described in terms of support to the acquisition phase, as well as how the benefits may carry forward into the in-service phase of the CLC. Investment decisions need to be considered in the context of the usefulness of a simulation system across the CLC and how this aligns with the Simulation Strategy. The Simulation Manual provides detailed guidance for identifying simulation benefits.

#### **10.1.4 Step 3d - Determine the Costs and Resource Requirements**

Once the suitability and benefits of each simulation option have been determined Defence staff should seek to obtain cost estimates. This should include (where applicable):

- ▶ Acquisition cost;
- ▶ Operating and support costs (including on-going license and help-desk costs);
- ▶ Data costs to populate the simulation;
- ▶ Development costs for new models, operational scenarios, etc;
- ▶ Training and on-going development support costs; and
- ▶ Facilities and other infrastructure requirements.

For more guidance on costing simulation systems and related support, Defence staff should consult the relevant sections of the Defence Simulation Investment Reference Guide.

#### **10.1.5 Step 3e - Assess the Cost Benefit**

Few simulation options provide the same functionality; therefore the assessment of cost benefit is largely a trade-off between the cost of acquiring or further developing simulation options and the range of benefits that each option provides. Defence staff need to objectively assess the relative merits of each option and decide which options they will pursue in delivering simulation support to their project.

## 11 Documentation

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### 11.1 Step 4: Document the Results

The final step in the process is to document the results of the process so that details about the business case for obtaining and using simulation are referenced in a single document – the Simulation Support Plan. Key elements of this plan may also need to be incorporated into other project documents (e.g. Project Development Funds (PDF) submissions and the PMP) such that the plans for simulation are translated into project activities. This step has three sub-steps:

- ▶ Step 4a - Develop the Simulation Support Plan,
- ▶ Step 4b – Update the funding and project planning documentation with simulation requirements, and
- ▶ Step 4c – Update the Simulation Strategy.

#### 11.1.1 Step 4a – Develop the Simulation Support Plan

The results of undertaking the preceding steps should be documented in the Simulation Support Plan, which provides the business case for employing simulation and captures the high pay-off options, costs and activities required to obtain the specific simulation support resources needed. The plan may be developed from the Simulation Support Plan produced for the Requirements Phase of the CLC, if it exists.

The Simulation Support Plan can be viewed as the document which captures the details about the approach to identifying and sourcing the simulation capabilities and supporting tools for the project. For the acquisition phase there is significant merit in developing the plan concurrently with the PMP and other related planning documents. One benefit of capturing a ‘tool-based’ view in plan is that it may identify the potential for re-using the identified tools and/or data by different organisational elements within the project analysis process (eg. different DSTO Divisions). The plan can also identify opportunities for leveraging the simulation capabilities of other organisations where they exist. Examples of such organisations include: F-111 WSSF, AWD Support Centre, FFG CDSC, F/A-18 IASSF, DSTO, NETWARS, JEWSON, and the Hornet Radar Evaluation Facility.

A Contractor Simulation Support Plan may also be needed, where the contractor(s) have a key role in the delivery of simulation products or services. ADSO advice should be sought on the Data Item Description requirements of a Contractor Simulation Support Plan. Where there are clear benefits in the contractor use of simulation in support of achievement of project objectives (other than in the satisfaction of in-contract project requirements), then consideration might be given to the provision of additional incentives to encourage simulation usage. For example, the contractor may be able to supplement actual product testing with simulation test capabilities as part of a risk reduction initiative.

Annex A provides a basic outline for the basic Simulation Support Plan. Annex B provides guidance as the minimum requirements of a Contractor Simulation Support Plan. Examples of previously completed plans and additional advice about contractor requirements can also be sourced from ADSO staff.

### **11.1.2 Step 4b – Update the Funding and Project Planning Documentation**

To ensure project funding and adequate resources and provisions are sourced for the identified simulation support measures and activities, in addition to producing/updating the Simulation Support Plan, the requirements for simulation may need to be transferred into the relevant areas of project documentation that serve to drive project activities. Typically, updates will be required to the following:

- ▶ Funding documents:
  - Acquisition Business Case.
- ▶ Program and Project Plans:
  - PMP and other related support plans, including the Project WBS.

### **11.1.3 Step 4c – Update the Simulation Strategy**

Though a major shift in simulation strategy wouldn't be anticipated at this stage, a review of the Capability System Simulation Strategy document should be conducted to incorporate any significant details that may have emerged during the analysis process. The CSSS continues to provide guidance for defining simulation support requirements for the In-Service phase of the CLC. So it is important that any changes or key details that become apparent due to acquisition phase activities/outcomes are adequately captured in the strategy document to provide coverage for the In-Service Simulation Support Plan.



## **Annex A: Simulation Support Plan Management Template**

## Annex A – Simulation Support Plan – Management Template

Serial	Heading	Description for DCP to 1 <sup>st</sup> Pass Plan	Description for 1 <sup>st</sup> Pass to 2 <sup>nd</sup> Pass Plan	Description for Acquisition Phase Plan
1.	<b>Introduction</b>	Overview of the Project, current phase and timelines	<i>Same as for DCP to 1<sup>st</sup> Pass Plan</i>	<i>No change</i>
2.	<b>Purpose</b>	Define the purpose of this document.	<i>Same as for DCP to 1<sup>st</sup> Pass Plan</i>	<i>No change</i>
3.	<b>Methodology</b>	The methodology for developing the plan	<i>Same as for DCP to 1<sup>st</sup> Pass Plan</i>	<i>No change</i>
4.	<b>Simulation Application Areas, Supported Questions and Organisational Benefits</b>	<ul style="list-style-type: none"> <li>▶ Describe and reference the issue/question that simulation will be used to support</li> <li>▶ Discuss the benefit that will be provided by using simulation support</li> </ul>	<i>Same as for DCP to 1<sup>st</sup> Pass Plan</i>	Update to” <ul style="list-style-type: none"> <li>▶ Describe and reference the Acquisition processes/goal outcomes that simulation will be used to support</li> <li>▶ Discuss the benefit that will be provided by using simulation support</li> </ul>

Serial	Heading	Description for DCP to 1 <sup>st</sup> Pass Plan	Description for 1 <sup>st</sup> Pass to 2 <sup>nd</sup> Pass Plan	Description for Acquisition Phase Plan
5.	<b>Simulation options</b>	<p>Identify and provide rationale for simulation options that are set aside from further consideration.</p> <p>Outline the simulation options being considered, including:</p> <ul style="list-style-type: none"> <li>▶ Source</li> <li>▶ Application areas</li> <li>▶ Strengths</li> <li>▶ Weaknesses</li> <li>▶ Resource Requirements</li> </ul>	<p>Discuss the simulation options used to support the DCP to 1<sup>st</sup> Pass activities and identify where these can be re-used for the 1<sup>st</sup> to 2<sup>nd</sup> Pass activities.</p> <p>Identify additional simulation options that may be necessary to support 1<sup>st</sup> to 2<sup>nd</sup> Pass activities.</p> <p>Outline the options being considered, including:</p> <ul style="list-style-type: none"> <li>▶ Source</li> <li>▶ Application areas</li> <li>▶ Strengths</li> <li>▶ Weaknesses</li> <li>▶ Resource Requirements</li> </ul>	<p>Investigate modelling and simulation capabilities that may be used specifically to support Acquisition phase project activities and outcomes.</p>
6.	<b>Summary of Business Level Outcomes and Benefits</b>	<p>Outline the benefits that will be realised by the organisation as a whole. Detail any potential to re-use the simulation in other phases of the Capability Life Cycle, or other areas of Defence.</p>	<p><i>Same as for DCP to 1<sup>st</sup> Pass Plan</i></p>	<p><i>Same as for DCP to 1st Pass Plan. Consider the potential for reusing Modelling and Simulation capabilities for In-service support phase requirements.</i></p>

Serial	Heading	Description for DCP to 1 <sup>st</sup> Pass Plan	Description for 1 <sup>st</sup> Pass to 2 <sup>nd</sup> Pass Plan	Description for Acquisition Phase Plan
7.	<b>Resource Requirements</b> <ul style="list-style-type: none"> <li>▶ <b>Simulation Systems and Funding</b></li> <li>▶ <b>Personnel</b></li> <li>▶ <b>Infrastructure and Support</b></li> <li>▶ <b>Follow-on Support</b></li> </ul>	<p>Simulation System and Funding Requirements:</p> <ul style="list-style-type: none"> <li>▶ Detail the simulation being acquired/modified or 'hired' (Defence may consider an option to engage the services of a firm to conduct the analysis) and the method of utilizing the simulation. There may be specific options for each 'capability option' under consideration, therefore a range of options may be proposed.</li> <li>▶ Discuss what questions are being answered by specific simulation options</li> <li>▶ Identify the requirement for data and documentation</li> <li>▶ Identify the funding required including; acquisition/modification cost, training, facilities purchase/hire, verification and validation, etc.</li> </ul> <p>Personnel:</p> <ul style="list-style-type: none"> <li>▶ Identify the personnel required including; source(s), skill-sets, and period of requirement</li> </ul> <p>Infrastructure and other support requirements:</p>	<p><i>Same as for DCP to 1<sup>st</sup> Pass Plan</i></p>	<p><i>Same as for DCP to 1<sup>st</sup> Pass Plan</i></p>



Serial	Heading	Description for DCP to 1 <sup>st</sup> Pass Plan	Description for 1 <sup>st</sup> Pass to 2 <sup>nd</sup> Pass Plan	Description for Acquisition Phase Plan
8.	<b>Assessment and Recommendations</b>	Summary of the simulation options selected to support the project. Recommendations for investment and activities to acquire or develop the simulation options.	<i>Same as for DCP to 1<sup>st</sup> Pass Plan</i>	<i>Same as for DCP to 1<sup>st</sup> Pass Plan</i>
9.	<b>Project Plan</b> <b>- Gantt Chart of Activities to 1<sup>st</sup> Pass (highlighting where simulation will be utilised)</b> <b>- Gantt Chart(s) for Developing and Delivering Simulation Support</b>	<p>Develop a plan of where and when simulation will be used to support the capability requirements activities during the period. The plan should include responsibilities and tasks for delivering the simulation support.</p> <ul style="list-style-type: none"> <li>▶ Ensure the activity Gantt chart details where and when simulation support is required</li> </ul> <p>Develop a plan of how the simulation support will be developed and delivered including (where relevant); RFT/RFQs, modification and/or delivery of simulation, training, etc. The plan should include responsibilities and tasks for developing and delivering the simulation capability.</p> <ul style="list-style-type: none"> <li>▶ Develop Gantt chart(s) for the activity of acquiring/developing and fielding the simulation capability</li> </ul>	<i>Same as for DCP to 1<sup>st</sup> Pass Plan</i>	<i>Same as for DCP to 1<sup>st</sup> Pass Plan</i>

Serial	Heading	Description for DCP to 1 <sup>st</sup> Pass Plan	Description for 1 <sup>st</sup> Pass to 2 <sup>nd</sup> Pass Plan	Description for Acquisition Phase Plan
10.	<b>Assigned/Requested Resources and Tasks</b>	Detail the assigned resources against the various tasks.  Detail the requested resources against the various tasks.	<i>Same as for DCP to 1<sup>st</sup> Pass Plan</i>	<i>Same as for DCP to 1<sup>st</sup> Pass Plan. Where contractor resources are employed, consider the use of an incentive scheme to encourage the use of simulation where it makes sense, in the performance of the contracted work.</i>
E.1	<b>Enclosure: Updated Capability System Simulation Strategy</b>	Provide an updated Capability System Simulation Strategy	<i>Same as for DCP to 1<sup>st</sup> Pass Plan</i>	<i>Update CSSS document as necessary.</i>



**Annex B: Contractor Simulation Support -  
Requirements for Contractor Simulation Support  
Proposals**

## Annex B – Contractor Simulation Support - Requirements for Contractor Simulation Support Proposals

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The format and content of a contractor simulation support proposal will vary considerably depending factors such as the scope of the planned activity and the intended lifespan of the capability. To assist the contractor with understanding Defence policy in relation to the use/benefits of simulation and Defence's approach to producing simulation proposals, the contractor should be provided access to the Defence Simulation Proposal Guide, available through ADSO.

For general guidance purposes, the following information should be requested of the contractor as a minimum:

1. **The Basis of the Requirement.** An explanation should be provided to address the question of why the proposal for simulation should be considered. The explanation should address the nature of the Defence problem, capability gap or opportunity that the use of simulation is intended to address. This section should also describe the objectives that need to be achieved to address the problem and the ways simulation will cost effectively support achievement of these objectives.

2. **Simulation Proposal.** This section needs to discuss the proposal in relation to the six criteria established for Defence simulation proposals, as follows:

**User Requirements.** What gave rise to the requirement? Who will be using the simulation and why is it important? What will the simulation do towards meeting the identified requirement?

**Representations.** Which entities and relationships need to be represented? What are the minimum requirements for the simulation's fidelity? Is the information available to define the simulation's behaviours and interactions to the degree/standards required?

**Data.** What data is required? What are the implications of any shortfalls in available data? How will data be managed over time?

**Technology.** What is the approach to using technology to combining requirements, business processes and technology into a simulation system?

**Confidence Building.** How will appropriate levels of confidence and trust be established in the proposed simulation capabilities?

**Costs/Benefits.** What are the direct costs and benefits of the simulation approach? What are the indirect costs and benefits of the simulation approach?

3. **Contract Deliverables.** This section covers a detailed description of the simulation deliverables, including a description of their intended ownership.



## **Annex C: Acquisition Phase Simulation Support Checklist**

## Annex C – Acquisition Phase Simulation Support Checklist

ACQUISITION PHASE AREAS & QUESTIONS	
<b>1. Modelling &amp; Simulation (M&amp;S) Strategy</b>	
Has the Australian Defence Simulation Office been consulted for advice about the project's M&S strategy, plans and activities?	
Have the detail and intent of the M&S strategy been integrated into the Simulation Support Plan under the Project Management Plan?	
Does the Simulation Support Plan refer to key simulation milestones and special events?	
<b>2. Project Management</b>	
Does the Capability Acquisition Strategy refer to a Capability System Simulation Strategy (CSSS)?	
Has a Simulation Support Plan been produced as one of the component plans of the initial PMP?	
Has early consideration been given to the benefits of using simulation capabilities in assisting with managing the project's key activities and processes, in addition to the capability outcomes? (See ADSO's Defence Simulation Benefits Guide)	
Has a M&S management organisation been identified?	
Have key M&S personnel been identified?	
Have M&S areas in which contractors will work been identified?	
How will M&S tools be used in making cost, schedule, performance and supportability tradeoffs?	
<b>2.a. Resources and costs. (also see the ADSO Defence Simulation Reference Guide)</b>	
What models are used to estimate and track life cycle costs?	

What analysis models are used to identify cost effective alternatives for detailed requirements?	
How will previous defence and/or commercial data be used in M&S efforts to reduce design, engineering and test costs?	
What Computer Aided Design/Computer Aided Manufacturing tools are being employed and how are the M&S design products addressing system effectiveness, cost estimates, supportability requirements and operational effectiveness?	
How are CAD/CAM tools integrated with other M&S tools to allow trade-off analyses?	
How are CAD/CAM system design products being used to provide system representations for use in force-on-force simulations?	
Is the project taking advantage of M&S technologies to assist in the manufacturing of the system?	
Are M&S resources such as equipment, services, and facilities identified?	
Have tools been identified for managing M&S software developments?	
What additional infrastructure, IT, communications systems and facilities are required to provide support to identified project M&S requirements?	
Have infrastructure, IT, communications systems and facilities support elements been identified for fielded M&S capabilities?	
<b>2.b. Data Management</b>	
Are there recognised sources for the data, algorithms and object representations?	
Are the data sources for each simulation or model area: credible, authoritative, validated, certified, and releasable?	
How will the data be used and by whom?	
Are data reuse methods available/appropriate?	
Does the data meet recognised Defence and/or other related standards?	

Is the environmental data available and in the format for the selected simulation/modelling activity?	
Who will require access to the data generated by the M&S tools?	
<b>2.c. M&amp;S Support to the Acquisition Processes and Areas</b>	
b. Certification. M&S requirements for meeting the project's technical regulation requirements. (For example, system loads analysis models).	
<b>2.d. Project Simulation Products &amp; Deliverables</b>	
Have capability simulation requirements been clearly articulated in the SOW, FPS and TCD documents?	
Capability Modelling. Has consideration been given to the M&S requirements of capability battlespace modellers?	
Have linkages been identified between related developmental or current systems in ADF (and allied) inventory to meet on-going capability development M&S requirements?	
Has consideration been given to the follow-on In-Service phase M&S support requirements?	
What representations of the system are required for future analysis or capability development purposes?	
Is there a need for M&S products and deliverables to be compatible with organisational and technical systems architectures currently used by Defence or Science & Technology or Future Warfare definition areas?	
<b>2.e. Test and Evaluation</b>	
Has the Simulation Support Plan been reviewed in conjunction with the TCD and TEMP?	
How does M&S assist in conducting the system's test and evaluation program in each functional area and phase?	
How can M&S be used to represent the expected Operational Environment?	
How is M&S used to facilitate Developmental testing?	



How is M&S used to facilitate Operational Testing?	
How will M&S be used to verify interoperability requirements?	
How is M&S to be used to facilitate live fire test and evaluation?	
Have the models and simulations used for T&E been considered for use in Training for the system?	
<b>2.f. Training</b>	
Will M&S be used for initial development of training support products to be incorporated into the training support system?	
Does the life cycle strategy include the development and sustainment of training support packages?	
Are training capabilities embedded in the system?	
Are simulations, simulators and stimulators incorporated for individual; crew; unit; collective; battlestaff; Joint, national and allied forces training?	
Are synthetic environments used to support training?	
Can M&S provide efficiencies in the training functional environment?	
Are training devices reusable in other functional areas?	
Are the T&E M&S tools reusable for training?	
What M&S tools are being used for training throughout the system's life cycle?	
<b>2.g. Interoperability</b>	
Has the scope of the requirements for systems interoperability with other weapon systems been clearly defined?	
Have system-of-systems concepts been used to define the interoperability requirements and identify technical and other integration requirements?	
How is the capability affected or influenced by Network-Centric Warfare concepts and capabilities?	

Have M&S techniques/tools been considered for assessing/enhancing the capability system's interoperability?	
<b>2.h. Survivability</b>	
How is M&S used during the acquisition phase to address issues related to system survivability? E.g. evaluating the effectiveness of Weapon System EW self protection measures.	
If required, can M&S add value to the platform survivability assessment?	
<b>3. Life cycle use of M&amp;S (In-service phase considerations)</b>	
What types of M&S can provide insight into the capability logistics and support?	
Have M&S techniques/tools been considered for assessing/enhancing system RMA?	
How is M&S to be used to identify methods to minimise maintenance requirements?	
How will M&S tools be used to define logistics support requirements?	
How will M&S tools be used in making cost, schedule and performance trade-offs as they relate to improving deployment, enhancing reliability, reducing logistics footprint and reducing logistics costs?	
How will M&S tools be used to identify an optimum support structure for the system?	
How will M&S tools be used to enhance the human-machine interfaces?	
What other systems, models and simulations will logistics models and simulations need to interact with?	
How will M&S tools be used in evaluating total ownership cost or life cycle cost over the system's life cycle?	
What type of M&S will be used to estimate the total cost of ownership for the system? For example, life cycle cost model.	
What M&S cost tools are being used to estimate the life cycle cost of a system?	
Is a standard Defence cost model being used? (eg. Automated Cost Estimating Integrated Tool (ACEIT))	

Are the cost M&S tools linked with engineering design tools?	
What design trade-off analysis M&S tools are being used?	
What software cost estimating M&S tools are being used?	
What M&S tools are being used for In-service Support cost estimating?	
What type of M&S can be used to train operators on sustainment and maintenance of the system?	
How can M&S be used to enhance operator and/or maintenance training?	
Will embedded M&S support logistics, sustainment and maintenance of the system?	
Will M&S tools be embedded within the system to enhance product support, training, or sustainment engineering?	
Does the M&S provide insight into life cycle costs?	
How will M&S tools be used to determine the optimum product support system?	
What type of M&S may be used to assist with in-service assessment analysis?	

**Annex D – Evaluation Form for the Capability Life Cycle  
Simulation Support: Acquisition Phase Guide**

# Annex D – Evaluation Form for the Capability Life Cycle Simulation Support: Acquisition Phase Guide

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Because this Guide will continue to be a 'living' document, ADSO welcomes your comments and will use the feedback to ensure that the Guide meets the needs of the audiences for which it is intended. Please take a moment to answer some or all of the five questions below. Including your name and address will be appreciated but is not necessary. Send your responses to:

ADSO Navy 1  
R1-3-B066  
Phone: (02) 6265-4797; Fax: (02) 6265-2223;  
e-mail: adso@defence.gov.au

\* \* \* \* \*

**1. According to your understanding of simulation, is any information presented in this Guide incorrect or inaccurate? (You may want to attach a copy of the page marked with your suggested changes.)**

<i>Page and line number</i>	<i>What is in error in this statement or discussion, in your estimation?</i>

**2. In your opinion, should any discussions in the Guide be expanded and presented in greater detail? Is any statement or discussion unclear?**

<i>Page and line number</i>	<i>What unanswered question(s) do you have after reading this material?</i>  <i>For the work you do, what additional information do you need? Is this statement or discussion unclear?</i>

**3. In your opinion, should any material in the Guide be eliminated or condensed?**

<i>Page and line number</i>	<i>Why do you believe these statements or discussions should be omitted or shortened? (eg, 'too detailed for my needs,' 'redundant,' 'irrelevant for my needs,' 'too elementary.')</i>

4. Did you find any typos, misspellings, or other production errors in the Guide?

<i>Page and line number</i>	<i>Error</i>

5. Do you have any other suggestions for making the Guide a more effective and usable document?

<b>Optional</b>	
Name	_____
Address	_____ _____ _____
Phone	_____
	Fax _____
email address	_____

*Thank you for taking the time to share your opinions with ADSO.*