Ministry of Communications and Information Technology
National Information Centre
General Department of Information Technology
Information Systems Department
Section Policies and Standards

Software Acquisition Standards
Commission on software standards

July 2010
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Acronym List  IEEE 1062, IEEE 610

Acquisition: The process of obtaining a system or software product.

Acquirer: A person or organisation that acquires or procures a system or software product (which may be part of a system) from a supplier.

Contract: A binding agreement between two parties, especially enforceable by law or similar internal agreement wholly within an organisation, for supply of service or for the supply, development, production, operation, or maintenance of a software product.

COTS (Commercial Off The Shelf) Software: A software product that is driven by market-need and commercially available and whose fitness have been demonstrated by a broad spectrum of commercial user.

Criticality: The degree of impact that a requirement, module, fault, error, failure, or other item has on the development or operation of a system.

Fully developed (custom-built) Software: Software that is produced on a one-of-a-kind or low volume basis that is usually unique to a specific application.

MOTS (Modified Off The Shelf) Software: Software product that is already developed or available, usable either “as is” or with modifications, and provided by the supplier, acquirer or third party.

Product: A complete set of computer programs, procedures and associated documentation and data pertaining to the operation of a computer system. The term is applicable to COTS, MOTS and custom-built software.

Request for Proposal (RFP): A document used by the acquirer as a means to announce intention to potential bidders to acquire system of software product (which may be part of a system).

Software acquisition process: The period of time that begins with the decision to acquire a software product and ends when the product is no longer available for use.

Statement of Work: A document used by the acquirer as a means to identify, describe, and specify the tasks to be performed under the contract.

Supplier: A person or organisation that enters into a contract with the acquirer for the supply of a software product (which may be part of a system) under the terms of the contract.

System: A computing environment that contains both hardware and software. A collection of components organized to accomplish a specific function or set of functions.

Test Cases: A set of test inputs, execution conditions, and expected results developed for a particular objective, such as to exercise a particular program path or to verify compliance with a specific requirement.

Test Environment: An operating environment that emulates, as close as possible, the target environment of the Software under test. The test environment includes hardware, operating system, and any other software products running on the same machine.

Test Plan: A document that describes the technical and management approach to be followed for testing a system or component.

Test Specification: A document that specifies the test inputs, execution conditions, and predicts results for an item to be tested.
**Test Suite**: A collection of test cases to be executed as a logical group.
SECTION A

Introduction to Recommended Practice
Forward

This document is produced as part of a case study on software procurement guidelines that is supported by the National Information Centre (NIC) as part of their efforts to regulate information technologies development and purchase in the public sector. The approach to software acquisition in government has traditionally been building software components and their implementations. More recent IT policies show increased interest and commitment to exploiting the market place of software products because of their functional and economical advantages. This, by and large, is a global move that brings anticipation as well as concern for governments in particular such as change to established processes and the adoption of standard interfaces.

The goal of the study is to derive a process model for use by government agencies in their purchase of software products as classified by the IEEE as COTS, MOTS and tailored (custom-built). The terms acquisition and procurement are sometimes used interchangeably to name the process of software purchase. A distinction between the terms is made by Meyers and Oberndorf where the authors define acquisition as the “set of activities performed to procure, develop and maintain the system” and suggest that this definition is broader and involves issues of software product development and maintenance. This broader acquisition process view is adopted in this case study to derive a model that covers technical (e.g. requirements specification, testing) and management activities (e.g. project planning, contracting). Other aspects to be considered when deriving the process model are set by the beneficiary (NIC) and require that recommended practices are to be based on current international standards and best practice as well as allow for the incorporation of government purchase procedures and regulations and other practices seen as useful by local acquirers from government and business sectors.

The case study was carried out during the period of March – July, 2010, and conducted as a research project that involved an extensive literature review on issues pertaining to software acquisition and related international standards, and interviews with key informants from the NIC, IT Units at Federal Ministries and IT Management in the Banking sector. A committee – that included members of the Software Engineering group at the NIC and one member from the Ministry of Finance – acted as peer reviewers of progress reports that were produced in the course of the case study. The group consensus process that was followed included review meetings and written evaluations by committee members, and feedback was incorporated in the final set of recommended practice.

The recommended practice in this document is adapted from the IEEE 1062 (Recommended Practice for Software Acquisition) and augmented with best practices from areas of project initiation, COTS selection and evaluation, and software process improvement. The derived process model consists of seven phases and each phase is composed of a number of steps. Some phases may have a longer duration or involve more activities than others. The phases are broadly defined by a set of milestones that establish the beginning and end of each phase. They represent the software acquisition life-cycle – considered in the context of this case study as the period of time that begins with an idea (identified need) for a software system and ends when the software is in use by the acquirer's organisation and the lessons learnt from the acquisition project are identified. Based on learnt lessons, the final step in the model involves a decision process that may lead to the initiation an improvement programme to the organisation's acquisition practices.

Additional information on performing the steps within the phases, as well as methods, tools and templates that can be used to produce the specified outputs (work products) are included in the model description. Implementation of this recommended practice is two-fold. First, acquisition management activities that are applicable for the purchase of tailored and commercial software products and (2) Technical aspects that are geared towards the purchase of COTS and MOTS. Future enhancements to the process model can incorporate technical practices that are applicable to custom-built software (such as requirements specification and white box testing methods) to the current set of toolboxes and templates.
Introduction

This introduction provides some background on the rationale used to recommend the specific set of best practice included in this document. While many organisations do attempt to undertake the development of processes under the best practices frameworks described here, many organisations do not succeed in this goal either due to deliberate divergence from the best practice in order to accommodate organisational realities or because of inability to reach the best practices condition for another reason – managerial or technical such as lack of standardised procedures, business strategy or resources. These challenges remain to be addressed by implementers of these recommended practices to yield their anticipated benefits and those of the commercial market of software products.

Readers can refer to progress reports for a discussion of the issues that must be considered when deciding on commercial software use in government such as inevitable change to established processes or the need for long term planning and to obtain the information collected on government software acquisition practice (Report 1). Other issues pertaining to change of software engineering processes in COTS-Based system development such as requirements specification were discussed in the first version of this recommended practice (Report 2).

The following subsections explain the recommended practice in terms of the base components of the process model and its appropriate uses.

The basis for the recommended practice

The model encloses the five phases of the IEEE 1062 (Recommended Practice for Software Acquisition) which includes planning, contracting, implementation, acceptance and follow on activities. These phases are preceded by an acquisition project initiation phase and followed by a set of steps that facilitate the start of a new project to improve the organisation's acquisition process. The IEEE standard which describes a generic nine-step process for software acquisition is suited to kinds of software products that are considered in this case study – COTS and MOTS, in addition to fully-developed or custom-built software.

The rationale for including an initiation phase is two fold. First, to support the organisation in developing the project idea into a defined proposal that has scope, objectives, overall strategy and team. Secondly, to accommodate government financial and project approval procedures. At the other end, an improvement phase is included to stress the importance of continuous feedback to the process model after implementation – seen as mandatory in the context of newly established processes.

The steps in the IEEE standard that deal with defining requirements and evaluating proposals from potential suppliers are adjusted to incorporate best practices on COTS-based system development. This is related to an important aspect of shifting from the build philosophy, where by an organisation is developing a custom system, to the buy mentality, where by the problem becomes one of identifying, buying and then integrating implementations that are built by others. This approach requires organizations to have an understanding of the capabilities and limitations of products and standards in their domain and to conduct market research and product evaluations to select products. A simultaneous exploration of the system context, potential architectures and designs, and available products in the marketplace, and negotiation of the organisation's requirements with available functionality; replace traditional requirements specification where the requirements' engineer must accept product limitations (and excesses) and that there are
requirements that cannot be met by any available products. Readers can refer to report two for a review of methodologies that address the processes of product selection and evaluation.

In the context of government procurement, an important element is the tender process that is facilitated through requests for proposals. This entails the separation of requirements definition and products evaluation (seen as necessarily intertwined in COTS literature). Two iterative processes are adopted in the model – the first deals with establishing software requirements in a way that considers the need to negotiate requirements (to ensure matching) and to define requirements (to enable tendering); and the second deals with proposal (RFP) and product evaluation.

The uses of the recommended practice

The recommended practice describes the management and execution of software acquisition activities – it is intended for:

- Government organisations that use software and acquire that software from suppliers;
- Government organisations that influence how software is acquired from suppliers;
- Suppliers interested in providing high-quality software to government acquirers.

The recommended practice is designed to help government organisations to:

- Promote consistency in acquisition process and documentation of acquisition projects;
- Incorporate quality considerations during the definition, evaluation, selection, and acceptance of supplier software for operational use;
- Determine how supplier software should be evaluated, tested, and accepted by end users.

It is applicable for acquiring:

- **System Software** (systems that make servers and PCs work e.g. operating systems);
- **Applications Software** (systems that perform business functions such as accounting, payroll and human resource e.g. ERP);
- **Productivity Tools** (such as word processors, databases, browsers).

**Note**: Generally, if the software product being considered will have relatively low technical risk for the system and little involvement with strategic or critical end-user processes, the proposed model may be cumbersome, and the focus of the evaluation can be on cost and the speed of implementation. A set of low-impact product evaluation criteria can be established and reused (with appropriate tailoring) for all of an organization’s systems that share these characteristics. The product can then be selected based on an informed decision – for example, a decision made after conducting unstructured product research, such as reading marketing brochures.

The rest of the document is organised to give a summary of the recommended practice in **Section 2** and a detailed description in **Section 3**. The summary section gives brief descriptions of phases and presents a pictorial representation of the model. The detailed description section is organised by phase and defines the steps, inputs, outputs, tools, annotations and check-lists that are associated with each phase. In **Section 4**, recommendations on possible implementation mechanisms and future enhancements of the derived model are presented.
Any project starts with an idea, this initial description is expanded and developed into a sound business case of how the project will address the defined business need or issue. Various approaches to accomplish the project are analysed to determine the best, most technically sound, and economically viable solution. The recommended solution is packaged into a project proposal, which establishes the business case for the project and serves as the information source for investment decision makers to determine whether the project should be planned for execution. If approved, the final step in the initiation phase is the issuance of a Project Charter that authorises the project to proceed with detailed planning, to appoint and empower a project manager and the associated project team, and to allocate resources to the project. Documents resulting from the Initiation Phase activities are the foundation for planning documents developed in the Project Planning Phase.

There are three steps that comprise the planning phase of a software acquisition. During this phase, the acquisition strategy should be planned based on a review of the acquirer’s objectives. A formal Acquisition Strategy document is developed to guide the acquisition. Implementing the acquisition strategy into the organization’s process is the next step. Appropriate contracting practices need to be included in the process. The final step of the planning process encompasses the determination of software requirements. This step is augmented with COTS-based requirements specification practices and is conducted as an iterative process where by matching of the organisation's business and acquisition project objectives with capabilities available in the COTS market of interest. In addition to defining the software being acquired, this step includes the preparation of the quality and maintenance plans for accepting the supplier’s/developer’s software. The release of a Request for Proposal (RFP) is the completion milestone for the planning phase of the software acquisition life-cycle.

The contracting phase of the software acquisition is also comprised of three steps. The first step uses the initial list of potential suppliers from the previous step to examine suppliers who will provide documentation for their software, demonstrate its performance, and submit formal proposals. Failure to perform any of these actions may serve as a basis for rejecting a potential supplier. Past performance data from previous contracts should be reviewed for all potential suppliers. The next step is to actually prepare the contract requirements. The quality of work (acceptable performance and acceptance criteria) should be described, and contract provisions that tie payments to deliverables should be prepared. Legal counsel should also be sought to review and approve contractual language/requirements. Finally, proposals will be evaluated (iterative step) and a qualified supplier(s) will be selected. If appropriate, an alternate supplier should be negotiated with, primarily as a risk reduction measure. This selection follows the PECA process model developed by the SEI which is derived in part from ISO 14598\*. Supplier selection completes the contracting phase of the software acquisition life-cycle, which started with the release of the RFP and ends with the contract signing.

Once the contract is signed, software development can begin and the product implementation phase of the software acquisition life-cycle is initiated. During this phase, the acquirer must manage supplier performance. The supplier’s progress is monitored to ensure all milestones are met. The acquirer also must approve all appropriate work products. Note that, during this phase, the acquirer has the responsibility to provide all acquirer deliverables to the supplier when required. The product implementation phase of the software acquisition is completed when the software product is delivered to the acquirer (pre-approval).

The next phase of the software acquisition life-cycle is product acceptance. Adequate testing needs to be performed, and a process for certifying that all discrepancies have been corrected and all

acceptance criteria have been satisfied must be established. Acceptance of the software product by the acquirer based on mutually agreed-to pre-defined criteria signals the end of the product acceptance phase.

The follow-on phase of software acquisition covers the period between software acceptance and software retirement, when it is no longer in use. A follow-up of the software acquisition contract should typically be performed to evaluate contracting practices, record lessons learned, and evaluate user satisfaction with the software. During this final phase of the software acquisition life-cycle, the acquirer should record and retain supplier performance data to use for future acquisition projects and for use in the next phase.

The process improvement phase will be concerned with analysing the organisation software acquisition processes and some of the fundamental management practices (e.g. requirements development, contracting) for deficiencies and implementing new/modified processes to correct those deficiencies. The objective of this phase, in addition to the continuous improvement aspect of organisational processes, is also to incorporate a defined process for utilising the lessons learnt from the completed acquisition project (generated in the follow on phase). The output of the phase is project proposal identifying the key areas for improvements and new practices to incorporate in acquisition process. Organisations implementing this phase in their acquisition can use process-oriented tools (such as SA-CMM and CMMI-ACQ developed to aid in the acquisition improvement process).

The table below summarises the phases, their key milestones, and the process steps associated with each phase. As discussed in the introduction, the proposed model is fundamentally based on the IEEE 1062, and is augmented with best practice on project initiation, COTS selection and evaluation, and acquisition process improvement.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Initiation Milestone</th>
<th>Completion Milestone</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Initiation</strong></td>
<td>Idea/Need is identified</td>
<td>Approve Project Charter</td>
<td>1. Define project/Business need</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>2. Analyse potential solutions</td>
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<td></td>
<td></td>
<td></td>
<td>3. Recommend solution</td>
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<td></td>
<td></td>
<td></td>
<td>4. Decide/Approve solution</td>
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<tr>
<td><strong>Planning</strong></td>
<td>Project Charter is approved</td>
<td>Release RFP</td>
<td>5. Plan organisational strategy</td>
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<td></td>
<td>6. Implement organisation’s process</td>
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<td></td>
<td></td>
<td>7. Determining software requirements</td>
</tr>
<tr>
<td><strong>Contracting</strong></td>
<td>RFP is released</td>
<td>Sign Contract</td>
<td>8. Identify potential suppliers</td>
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<td></td>
<td></td>
<td>9. Prepare contract requirements</td>
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<td></td>
<td>10. Evaluating proposals / Selecting supplier</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>Contract is signed</td>
<td>Receive Software Product</td>
<td>11. Manage supplier performance</td>
</tr>
<tr>
<td><strong>Acceptance</strong></td>
<td>Product is received</td>
<td>Accept Product</td>
<td>12. Accept product</td>
</tr>
<tr>
<td><strong>Follow on</strong></td>
<td>Product is accepted</td>
<td>Product no longer in use</td>
<td>13. Use product</td>
</tr>
<tr>
<td><strong>Process Improvement</strong></td>
<td>Acquisition evaluation is conducted</td>
<td>Develop Process Improvement Project Proposal</td>
<td>14. Approve process improvement project</td>
</tr>
</tbody>
</table>

Table 1: Proposed Model, Milestones and Steps

[Sources: IEEE 1062, ITRM Project Management Guidelines, CMMI-ACQ]
Figure 1 - Graphical Representation of Process Model
SECTION B

Detailed Description of Recommended Practice
PHASE I: Initiating the Acquisition Project

Objective

This is the first phase and precedes project planning. Its purpose it to transform an idea (initial description) to a viable project proposal for consideration and approval by management, finance, IT investment and other decision-making bodies. The initiation phase begins with a statement of need for a software-based system and ends with a definition of the project deliverables in the form of a project charter.

Description of Steps

<table>
<thead>
<tr>
<th>Steps</th>
<th>Inputs</th>
<th>Outputs</th>
<th>Tools/Templates</th>
<th>Appendix – Check-list</th>
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<tr>
<td>1) Defining project</td>
<td>- Business problem (project idea)</td>
<td>- Project description</td>
<td>Toolbox – 1 Information</td>
<td>A – 1 Planning</td>
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<tr>
<td></td>
<td>- IT strategic plan and policy</td>
<td>- Business requirements</td>
<td>gathering &amp; Communication Tools</td>
<td>overall organisational acquisition strategy</td>
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<td></td>
<td>- Guidelines on government purchases (goods/services)</td>
<td>- Solution selection criteria</td>
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<tr>
<td>2) Analysing potential solutions</td>
<td>- Identified solutions from research</td>
<td>- Technical and Economic feasibility analysis of identified solutions</td>
<td>Toolbox – 2 Comparison methods</td>
<td>A – 2 List of potential stakeholders</td>
</tr>
<tr>
<td></td>
<td>- Information on system stakeholders</td>
<td>- Context diagram</td>
<td></td>
<td>A – 3 Factors for determining solution feasibility</td>
</tr>
<tr>
<td>3) Recommend a solution</td>
<td>- Analysis of solutions</td>
<td>- Project proposal</td>
<td>Template 1 Analysis Worksheet</td>
<td>A – 4 Analysis</td>
</tr>
<tr>
<td></td>
<td>- Project sponsorship information</td>
<td></td>
<td>Template 2 Project Proposal</td>
<td>Worksheet</td>
</tr>
<tr>
<td>4) Decide on acquisition project</td>
<td>- Project approval</td>
<td>- Project Charter</td>
<td>Template 3 Project Charter</td>
<td>A – 6 Project Charter</td>
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<td></td>
<td></td>
<td>- Project Manager and Team</td>
<td></td>
<td>A – 7 Project</td>
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<td></td>
<td>Manager criteria</td>
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<td></td>
<td></td>
<td>A – 8 Project team</td>
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<td>A – 9 Project</td>
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<td></td>
<td>Initiation Transition</td>
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<td>Check-list</td>
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</table>

1) Defining project

a) Developing project description statement. This statement is an informal, high-level statement that is the foundation of developing the project scope.
   i. Define the project goal
   ii. Describe the basic characteristics of the required product or service
   iii. Identify the beneficiary
   iv. Identify the purpose served by the product or service delivered

b) Determining solution approach. The approach is a general vision of how to solve the business problem, for example, the approach may be to buy a commercial-off-the-shelf (COTS) product versus build a new application. [A – 1]
   i. Collect and summarize information on the relevant business issues
   ii. Determine the project business objectives, core business activities affected, constraints, and project stakeholders [A – 2]
   iii. Conduct research on possible solutions (at least two (2) and preferably less
than four (4) solutions are compared to determine which is best)

iv. Identify general approach to development

<table>
<thead>
<tr>
<th>Examine the business application to be automated. Ask these questions:</th>
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<tbody>
<tr>
<td>- How common/unique its business processes are? If business processes are unique it would indicate the unavailability of software products.</td>
</tr>
<tr>
<td>- How willing/ready the organisation is for change? Willingness to change is a pre-requisite for implementing a COTS-based solution.</td>
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</table>

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<thead>
<tr>
<th>Conduct business analysis. To determine and plan change:</th>
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<tbody>
<tr>
<td>- Organisation’s processes that will change as a result of adopting a COTS product.</td>
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<tr>
<td>- The overall impact on the organisation.</td>
</tr>
<tr>
<td>- Training needs.</td>
</tr>
<tr>
<td>- Organisation change plan.</td>
</tr>
<tr>
<td>- Conflicts or risks to project success (survey perspectives of the different project stakeholders).</td>
</tr>
</tbody>
</table>

c) Establishing solution selection criteria. The key is to select the criteria most appropriate to your organization and maintain a consistent approach throughout the analysis of all solutions. [A – 3]

i. Identify key factors that will determine whether a solution is feasible

ii. Select criteria that will compare solutions on delivery of project objectives

iii. Define the evaluation technique that will be used to compare solutions on selected criteria

<table>
<thead>
<tr>
<th>Consult documents that explain related national guidelines and regulations. These include:</th>
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<tbody>
<tr>
<td>- Purchasing process and regulations (MoF).</td>
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<tr>
<td>- Revision procedures of budgets upon a project approval.</td>
</tr>
<tr>
<td>- Other associated regulations with purchase e.g. on International Cooperation, Commerce, etc.</td>
</tr>
<tr>
<td>- National and Organisation’s and IT Strategic Plans.</td>
</tr>
</tbody>
</table>

2) Analysing potential solutions.

a) Evaluate the technical feasibility of each solution to work in the organization’s environment using data available from external sources (may include testing)

b) Assess both the current technical architecture and the maturity of the proposed technology

c) Determine key technical evaluation criteria and risks (to buy/develop)

b) Evaluate the economic feasibility of each solution to identify and estimate the costs and benefits

i. Identify the cost elements that make up the life-cycle cost for each solution

ii. Identify cost drivers that influence the accuracy or results of the total estimate

<table>
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<tr>
<th>Use a two-step analysis process to analyse potential solutions. These are:</th>
</tr>
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<tbody>
<tr>
<td>- Each solution is first evaluated for technical feasibility to determine if it is a technically sound solution, whether it will fit within the current technical environment and, whether technical resource requirements can be met.</td>
</tr>
<tr>
<td>- If, after the technical evaluation, the potential solution is still a reasonable alternative, the economic feasibility study is performed. This approach saves valuable time by insuring effort is expended</td>
</tr>
</tbody>
</table>
3) **Recommending solution**
   
a) Selecting a solution. [A – 4] [Template – 1]
   This is based on the comparison of how well each solution meets the established criteria.
   
b) Prepare an analysis worksheet.
   i. Compare only the criteria used in the analysis of the solutions. Various techniques can be used in making this comparison. [Toolbox – 1]
   ii. A decision table utilizing any of these techniques should be prepared as part of the project analysis worksheet. [Toolbox – 2]
   
c) Developing project proposal. [A – 5] [Template – 2]
   The goal of the project proposal is to provide a concise summary of information for project review and decision-making during project initiation. The information approved in the project proposal is the basis for the subsequent project charter.
   
d) Identify potential sponsor(s).
   External or internal funding options for beneficiary organisation are reviewed.

4) **Deciding to proceed/terminate project**
   
a) Obtain project approval. This is a management activity and is performed according to the Beneficiary organisation procedures.
   
b) Developing the project charter (task list, time schedule, required resources). [A – 6] [Template – 3]
   Approval of the project charter marks the end of the Project Initiation Phase and the beginning of the Project Planning Phase. Information in the project charter comes from the project analysis documents, the project proposal, and other documents that identify business requirements and establish senior management commitment. In order to complete the charter, an informal plan is required to detail the project management tasks for completing the initiation phase and conducting the planning phase of the project.
   
c) Establish project management [A – 7] [A – 8]
   d) Review project initiation steps and transition criteria to planning phase [A – 9]

<table>
<thead>
<tr>
<th>Establish management for project. Consider these:</th>
</tr>
</thead>
<tbody>
<tr>
<td>✚ Assign project manager at the time the Project Charter is issued.</td>
</tr>
<tr>
<td>✚ Form the project team, consideration should be given to its composition, size and continuity.</td>
</tr>
</tbody>
</table>
PHASE II: Planning the Project

Objective

This phase is the second phase in the project life cycle. It begins when the need for the acquisition project is established by the project charter and ends when the request for proposals is released. The objective of the planning phase is to list the set of activities that must be performed and requirements that must be met to achieve the project deliverables. It involves creating a set of plans to help guide the project team through the execution and closure phases of the project.

Description of Steps

<table>
<thead>
<tr>
<th>Steps</th>
<th>Inputs</th>
<th>Outputs</th>
<th>Tools/Templates</th>
<th>Appendix – Check-list</th>
</tr>
</thead>
</table>
| Planning organisational Strategy | - Objectives  
- Strategic areas | - Quality characteristics of software  
- Organisational strategy for acquiring software  
- General practices | Template 4 Acquisition Plan | B – 1 Organisational Strategy Check-list |
| Implementing organisation’s process | - Process steps  
- Organisational Strategy  
- Contracting Practices  
- Organisation’s Policies | - Establish a software acquisition process  
- Supplier qualification and selection process | | C – 1 Overall Contracting Strategies  
C – 2 Types of Software Contracts |
| Determining software requirements | - Software definition  
- Supplier evaluation criteria  
- Acquirer & Supplier obligations  
- Content of Quality and Maintenance plans | - Software being acquired defined  
- Proposal evaluation standards  
- contingency plan  
- RFP | Toolbox – 3 Requirements Negotiation  
Toolbox – 4 Product Evaluation Criteria | B – 2 Software Definition  
B – 3 Supplier Evaluation  
B – 4 Supplier & Acquirer Obligations  
B – 5 Quality & Maintenance Plans |

5) Planning organisational Strategy
   a) Initiate a planning process
      i. Review and refinement of project scope and objectives
      ii. Developing a scope for the planning process [Template – 4]
      iii. Forming a planning group and reviewing the organisation's objectives
      iv. Identifying the qualities a software product must possess to achieve the organisation's objectives
   b) Set organisational strategy
      i. Developing a list of capabilities that would be helpful in identifying potential suppliers
      ii. Identifying responsibilities that are associated with either the supplier or acquirer
      iii. Determining the extent of the supplier's organisational involvement in providing a high-quality product. Consider strategic areas in [B – 1]
      iv. Identifying those responsibilities that are best handled by the acquirer's organisation or other internal sources
      v. Identifying those responsibilities that are best included in a contract and negotiated with a supplier
c) Establish general practice
Establish general practices to achieve consistency in negotiating and contracting with suppliers for software products. Practices for handling suppliers may be documented in a policy or operating procedure.

<table>
<thead>
<tr>
<th>Use project charter to initiate planning. Activities include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>✷ Assign key acquisition roles. Roles include the acquisition sponsor, acquisition manager and members of the acquisition team. It also includes representatives from the customer and/or user community and other key stakeholders that will work within the team to define the business needs and software requirements.</td>
</tr>
<tr>
<td>✷ Describe business need for the software in terms of technical and functional needs, quality attributes, project constraints, and acceptance and completion criteria.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Document acquisition plan. Activities include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>✷ Detail in the acquisition plan is established the methods to be employed throughout the acquisition project's life cycle. The time spent defining the acquisition strategy early on will go a long way in assuring stability throughout the acquisition process and the life of the software.</td>
</tr>
<tr>
<td>✷ The acquisition planning process should link acquisition objectives and tasks to resources (time, people, funds, and technology).</td>
</tr>
<tr>
<td>✷ It must organize these resources and define a process for achieving the approval of all stakeholders to guarantee the adoption of the acquisition plan.</td>
</tr>
<tr>
<td>✷ It should then guide the acquisition activities and provide for the integration of the effort. Software acquisition activities are sensitive to the same risks that occur in any project and require the same level of project and risk planning and management concerning decisions, budget, schedule, quality, etc.</td>
</tr>
<tr>
<td>✷ Planning for the changes that will occur in the organisation business processes as a result of the acquisition (identified in the previous phase) should be incorporated in the project plan as required (training needs, budget, schedules, etc.).</td>
</tr>
<tr>
<td>✷ Use [Template 4] for preparing the Acquisition Plan.</td>
</tr>
</tbody>
</table>

6) Implementing organisation's process
a) Establish software acquisition process
Steps 7 – 14 should be adapted to fit the organisation's situation.

b) Include contracting practices [C – 1] [C – 2]
   i. Selection of contracting methods or agreements
   ii. Preparations of contracting exhibits describing the work required, deliverables, support, training, and acceptance of requirements
   iii. Consideration of what support, training and other activities will be provided by the supplier and what will be provided by the acquirer's organisation
   iv. Assignment of negotiation and contract administration responsibilities
   v. Initiation of a supplier qualification and selection process
   vi. Identification and preparation of educational material for training personnel in principles and concepts of software contracting and negotiating

c) Obtain services from other organisations
If needed, help should be obtained from other organisations that can provide consultation and assistance in software contracting and negotiating.

d) Assign responsibility for success of software acquisition project
   i. Specifying appropriate exhibits in the contract and establishing technical, performance, and quality requirements
   ii. Managing supplier performance under the contract
   iii. Assessing supplier performance during the period of the contract
   iv. Evaluating and accepting the product for the organisation
Success will depend on coordination, one person should be appointed with overall responsibility of process success.

e) Tailor the process
Reference to internal qualities and practices may be used for additional guidance on implementing a process for acquiring high-quality software. After acquisition implementation a process, periodic tailor is needed to meet the changing needs and objectives. A person should be appointed who will assure that the implementation process for the organisation is a good one and reflects the objectives of the organisation.

<table>
<thead>
<tr>
<th>Organisation Strategy</th>
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</thead>
<tbody>
<tr>
<td>▶️ Urgency for the software and the availability of products.</td>
</tr>
<tr>
<td>▶️ Number of users (licenses needed) and the expected growth rate.</td>
</tr>
<tr>
<td>▶️ Projected budget for purchase and for ownership as well as licensing restrictions.</td>
</tr>
<tr>
<td>▶️ Integration needs with existing systems and business processes.</td>
</tr>
<tr>
<td>▶️ Tolerance of risk and roll-out costs.</td>
</tr>
</tbody>
</table>

7) **Determining software requirements** (follow process described in [Toolbox - 3])

a) Define the software being acquired
The objective is to obtain from the supplier(s) realistic assessments of the size, scope, and cost of the effort required to produce the software. The needed software, deliverables, and software support should be described as completely as possible in the RFP so that the supplier can understand and address the scope of work in the proposal. [B – 2].

b) Establish proposal evaluation standards
The objective is to establish proposal evaluation criteria that ensures that the supplier most suited to do the work is selected. An evaluation criteria should be developed to use in reviewing supplier proposals, identifying non-responsive suppliers, and selecting a qualified supplier. The supplier’s management qualifications, technical approach, quality assurance program, and proposed cost should be considered. The questions in [B – 3] may be used. A provision should be included in the RFP requiring inspections of supplier facilities to investigate and evaluate various factors, including financial position, technical capability, experience, and quality practices.

c) Establish acquirer and supplier obligations
The objective is to establish and clearly state the obligations of both the acquirer and the supplier. [B – 4]

d) Develop plans to evaluate and accept software and services
Quality and maintenance plans should be developed to use in evaluating and accepting the software and services provided by the supplier. [B – 5]

e) Develop contingency plans
Contingency plans should be developed to use in the event the supplier fails to satisfy contract requirements and the contract is then terminated. The complexity of the project and the risk in achieving the contract requirement should be considered.

<table>
<thead>
<tr>
<th>Software Requirements</th>
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</thead>
<tbody>
<tr>
<td>▶️ Define the requirements set that address tangible features, capabilities or functions of the desired software; requirements that must be inherent throughout the design and are not tied directly to any single feature or function (e.g. usability); any predefined limitations on how the system can be designed and implemented. These constraints include required standards or policies that must be used; external interfaces, communication protocols or operational limitations; existing budget or schedule limitations; platform limitations (e.g., hardware, operating system, language, tools).</td>
</tr>
<tr>
<td>▶️ Employ the iterative process [Toolbox - 3] that consists of two activities aiming to negotiate the business goals into a set of requirements that can be satisfied by the COTS marketplace.</td>
</tr>
<tr>
<td>▶️ Develop RFP that require suppliers to submit information that provides objective evidence of their ability to satisfy the requirements and perform the software assurance aspects of the work statement.</td>
</tr>
</tbody>
</table>
and terms and conditions. Clear instructions must be included in the RFP on what suppliers must submit for evaluation, including instructions pertaining to on-site evaluation, if required by the RFP. Instructions to suppliers explain how to answer the due diligence questionnaire and what to submit in an initial assurance case and software description.
PHASE III: Contracting

Objective

This phase begins after the RFP is released and ends with a negotiated contract that defines the agreed terms and conditions and steps to fulfill mutual commitments in a formal way. It involves activities necessary to ensure that the supplier's products and services can satisfy the acquirer's quality criteria before signing the contract.

Description of Steps

<table>
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<tr>
<th>Steps</th>
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<th>Appendix – Check-list</th>
</tr>
</thead>
<tbody>
<tr>
<td>8) Identifying potential suppliers</td>
<td>- Supplier performance data from prior contracts - Supplier evaluation criteria - Results being acquired - User survey questionnaire</td>
<td>- Acceptance criteria - Supplier performance criteria - Evaluation and test criteria - Tie payments to deliverables - Prepared contract - Legal counsel review</td>
<td>Template – 5 Alhafnawy Contract</td>
<td>B – 4 Supplier &amp; Acquirer Evaluation C – 3 User Survey</td>
</tr>
</tbody>
</table>

8) Identifying potential suppliers

a) Gather information on available software products

Using the defined software requirements discussed in step 7, information should be gathered about available software products. For fully developed software development, the suppliers with MOTS software should be considered. Information may be obtained from sources as trade publications, consultants, suppliers, and user groups.

b) Evaluate software during a demonstration

Describe to the supplier what the intended use of the software product is and ask that the demonstration include the intended use. Suppliers like to demonstrate the software at their own
facility or at a customer site. This demonstration provides insight into how well the software functions, how screen displays and how reports are generated by the system, how file processing is handled, and how users can interact with the system. A potential acquirer may find it helpful to review the supplier's documentation before the demonstration. However, to obtain insight from their experience in using the product or in dealing with the supplier.

c) Survey users of the supplier's software
One indicator of the quality and effectiveness of a software product is the number of satisfied companies currently using the software. Users can provide information on volume throughput planning and system degradation, and important insights on correcting software failures. The nature, quality, speed, and reliability of maintenance may be determined by exploring other users' experiences. The following should be considered:
i. Establishing functional and performance requirements
ii. Evaluating software product against the above
iii. Evaluating the adequacy of the development process including the activities of quality assurance, configuration management, verification and validation, reliability measurement, documentation, and maintenance

When preparing to contact users about a product [C – 3] can be tailored to fit needs

d) Review performance data from previous contracts
If software has been previously acquired from any of the potential candidates, it would be helpful to review performance data on each supplier from previous contracts and to determine user satisfaction with the software and supplier support.
e) Survey several supplier's offerings
Survey suppliers' offerings, evaluating their capability to provide quality software and services.

<table>
<thead>
<tr>
<th>Essential Suppliers.</th>
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</table>
| ▲ During the step of identifying potential suppliers, sufficient preliminary market research should be performed to narrow the list to the few potential suppliers that best match our business needs in order to target our evaluation and keep evaluation costs to a minimum. The data collected during the research can be used as feedback to reassess our original requirements and to determine whether modification to those requirements will result in greater overall value in terms of cost, performance, availability, reliability, etc. The market analysis should also cover maintenance and support data, test results, and user satisfaction analyses.
| ▲ Evaluation of selected potential suppliers should involve an in-depth information gathering mechanism and a careful examination of their capabilities, quality systems, and products in order to make an informed decision. In addition to the information obtained through the RFP, other methods that can be considered include requesting from the supplier a demonstration of the product or an evaluation copy, or to produce a prototype of a subset of the functionality required. Other methods for gathering information include organizing conferences for potential suppliers, and reviewing literature on supplier evaluations and past performance.
| ▲ Certifications is one way to provide assertions of software trustworthiness when information may be too costly to compile or too voluminous for proposal evaluation. Certifications provide assertions by responders of existing conditions or compliance in certain requirements. Using certifications shifts the burden of compliance to the suppliers (e.g., ISO/IEC 25051). Pre-qualification is another way to evaluate organizational capabilities or other technical management capabilities. |

9) Preparing contract requirements
a) Determine the quality of the work. The following should be included in the contract to describe the expected product quality:
   i. Describe the requirement that the software must meet contract specification.
      Describe in the contract's statement of work the relationship between the supplier
and the acquirer, and who has the responsibility for each task [B – 4]
ii. Describe what constitutes satisfactory performance by the supplier in terms of all
known requirements and constraints [C – 4]
iii. Specify who is authorised to make changes in the contract and to answer supplier
questions
iv. Consider providing means to monitor the supplier's progress. To do this, divide the
development effort into logical work steps and state that the acquirer approval should
be required for each step before the development is allowed to continue to the next
step
v. Identify performance as well as functional specifications
vi. Specify the performance of an acceptance test at the time of installation
vii. Specify the measures of reliability and quality by which the supplier's work will be
evaluated

b) Determine how payments are to be made
The objective is to prepare a contract that ties supplier payments to deliverables [C – 5] and provides
incentive payments associated with significant milestones, achievements, costs or schedules
c) Determine non-performance remedies
i. The objective is to provide the acquirer the right to terminate the contract if the
supplier cannot perform according to the contract's terms [C – 4]. Include a provision
that requires the supplier to deliver, at contract termination, all materials associated
with the work in progress or used in preparing any deliverables associated with the
contract.
ii. If there is significant risk or project is complex, include a provision that requires the
supplier to deposit with an escrow agent intermediate versions of source programs,
statements, and documentation.
iii. Determine whether any termination provisions may prevent or significantly delay the
acquirer in exercising contingency plans (sub-step 7e)
d) Prepare contract provisions that considers:
i. Review the objectives (sub-step 9a) and select those provisions that represent the
acquirer's business practices that influence or contribute to obtaining a high quality
product
ii. Identify the contracting agreement that is most appropriate for acquiring software
product/services and used successfully in the past [Template – 5]
iii. Incorporate the acquirer selected provisions and contract exhibits describing the
work required, deliverables, support and training [B – 2] and the acceptance
requirements [C – 4]
e) Review contract provisions with legal counsel
Modify (with consultation with legal counsel) as required in accordance with intellectual property
or other legal provisions

Contract Requirements.

- Contracting in the case of COTS is a straightforward licence agreement. However, when tailoring
  or modification to the software product is required, contracting strategies and types [C – 1] [C – 2]
  must be considered.
- Evaluation criteria lists can be utilized when evaluating multiple suppliers to ensure complete
  coverage of all the important factors and promote consistency in the evaluation process. See
  [Toolbox - 4] for evaluation criteria lists. These lists can be comprehensive and include all of the
  criteria being considered or they can be directed to a specific part of the evaluation (e.g., product
  specific criteria for a set of features or process specific like a software quality evaluation criteria).
  Standardized evaluation criteria lists can be created for use across multiple acquisition projects to
  promote efficiency and the sharing of lessons learned. However, these standardized lists should be
tailored to the specific needs of each individual project. Completed evaluation criteria list provide
documented input into the supplier selection process. They also provide historical information and evidence that a comprehensive evaluation was performed in case there are any questions about the evaluation in the future.

There should always be additional evaluation for the unique software assurance. Expertise should be sought to evaluate each proposal to determine the level of understanding of the software assurance requirements. This includes an evaluation of the evidence provided to support answers to the due diligence questionnaire. The multiple components of the proposal should be weighed separately and then combined to provide an overall score. An example of three components may be management, technical (includes quality assurance), and price. All three should have weighted criteria to result in a numerical score.

10) **Evaluating proposals and selecting supplier** (follow process described in [Toolbox - 5])
   a) Evaluate supplier proposals
      i. Use the evaluation criteria established in the RFP [C – 6]
      ii. Consider results observed during supplier demonstration and facility visits
      iii. Solicit comments from the supplier’s prior customers [C – 3]
      iv. Costs should be comparable to other supplier’s costs
      v. Suppliers that are not completely responsive to the requirements should be eliminated from further consideration
   b) Visit supplier facilities
      i. Investigate in these visits the financial position, technical capability, experience and quality practices
      ii. Review the experience of the staff assigned to the project
      iii. Determine whether any changes are under consideration that might impact the progress of the project, e.g. changes in organisation, moving of supplier offices, or change in ownership
   c) Select a qualified supplier [Template – 6] [Template – 7]
      Summarise the results achieved from supplier evaluations, demonstrations, and visits to supplier facilities and compare against the proposal evaluation standards. Select a qualified from the best two or three and begin negotiations
   d) Negotiate the contract [C – 7]
      i. Negotiate with the supplier representative who has final negotiating authority.
      ii. Negotiations should be based upon the existence of adequate written specifications; a definition of the obligations and responsibilities of the supplier and acquirer; the time frames in which the work is to be accomplished; and a balance of the responsibilities, risks, and benefits to both parties.
      iii. During the negotiation process, identify any problems and misunderstandings, examine potential uncertainties, regardless of whose the are, allocate the risks and protect the parties.
      iv. Consider the following:
         - Provide a means of avoiding disputes and of resolving disputes that arise
         - Provide for investing only a minimum amount of funds before the quality of the suppliers work is demonstrated
         - Provide for a maximum total price, payment amounts, or total value of contract

**Contract Negotiation.**

The evaluation results in the selection of the best proposals provide the basis for contract negotiation. During negotiations, the acquirers and suppliers negotiate on requirements, terms, and conditions, and is followed by signing a purchase contract. Negotiations should be based upon the existence of: adequate written specifications, clear definition of the obligations and responsibilities, time frames for work to be accomplished, and a balance of the responsibilities, risks, and benefits to both parties. One approach for negotiation is to break the negotiations into “technical” and
“commercial” parts. One should consider future upgrades, technical support, and contingencies such as product substitution or code escrow.

- It is important that the give-and-take on Software Assurance requirements, terms, and conditions does not compromise the ultimate assurance goals or critical assurance goals. Suppliers may push back on the requirements because they may not be fully competent to do the job or be willing to take the risk. Acquirers may find that suppliers may overbid because of perceived risk and doing something they have never done. Acquirers can consider share-in-savings arrangements (savings as a result of implementing requirements as stated). The sharing includes not only costs and benefits but also the willingness to afford the supplier more time to engage in the education and training that is needed. An alternative would be to consider a contract type that shifts the burden of some of the risk to the acquirer and/or provide additional cost or performance incentives (see \([C – 2]\) for incentive contracts). When awarding the contract, acquirers must ensure that all negotiated agreements are incorporated into the contract when it is awarded.

Supplier Agreements.

- Agreements with a COTS supplier should include: Discounts for large quantity purchases; Coverage of relevant stakeholders under the licensing agreement, including project suppliers, team members, and the project’s customer; Plans for future enhancements; On-site support, such as responses to queries and problem reports; Additional capabilities that are not in the product; Maintenance support, including support after the product is withdrawn from general availability.

- If contracting for a modification to a COTS product is established, a supplier agreement should specify reviews, monitoring, evaluations, acceptance tests to be performed. It should also specify whether the acceptance process will be performed before, during, or after supplier delivery. If the supplier will continuously or repeatedly deliver the service to the customer, the content should also specify when or how often the acceptance process will be performed (e.g., every time the service is delivered, at specified or random times on a subset of deliveries) and should address the expected end of service, early end of service, and transition of service as appropriate. These agreements are typically reviewed by legal or contract advisers prior to approval.
PHASE IV: Implementation

Objective

This phase covers the period from contract signing until the software product has been received. A key activity is monitoring the supplier's efforts to ensure that all work and milestones are satisfactorily completed prior to the delivery of the software product.

Description of Steps

<table>
<thead>
<tr>
<th>Steps</th>
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<th>Appendix – Check-list</th>
</tr>
</thead>
</table>
|       | - Negotiated contract  
- Contract milestones  
- Acquirer's deliverables provided to supplier  
- Monitor supplier progress  
- Supplier performance criteria | - Work segments approved  
- Completed milestones  
- Software deliverables  
- Reliability and quality measurements  
- Feedback to suppliers | | |
| I  Managing supplier performance | | | | |

11) Managing supplier performance

a) Manage the contract during execution, consideration given to:
   i. The acquirer should provide all of its required deliverables (e.g. equipment, software, machine time and reference materials) to the supplier within the specified time frames so that the supplier is not delayed
   ii. When provided, such work products should be complete and accurate and provide a basis for the supplier's work. Any discrepancies should be dealt with immediately
   iii. Management should create an environment within the organisation that supports the supplier's efforts. Internal disagreements should be resolved in-house by management and not left for the supplier to encounter
   iv. An individual should be appointed to deal with the supplier on all aspects of the contract. If possible, the same person who previously worked with the supplier should be kept on the project throughout the contract
   v. An open line of communication should be maintained with the supplier. However, undocumented informal communication can lead to additional costs. Any changes to the scope of work should be handled by amending the contract

b) Monitor the supplier's progress. The objectives are to ensure all milestones are met and to approve work segments [D – 1]. Consideration is given to:
   i. Use the measure of reliability and quality specified in the contract to evaluate the supplier's work
   ii. Provide some means for regular and continuous feedback to the supplier performance [C – 4] in terms of overall progress and on handling problems.
may affect the supplier's ability to satisfy the requirements of the supplier agreement. Once data is obtained from monitoring selected supplier processes and analysing, it is analysed to determine whether there are serious issues.

Supplier processes that are critical to the success of the project (e.g., due to complexity or importance) should be monitored. The selection of processes to monitor must consider the impact of the supplier's processes on the project. On larger projects with significant subcontracts for development of critical components, monitoring of key processes is expected while for smaller, less critical components, the selection process may determine that monitoring is not appropriate. Between these extremes, the overall risk should be considered in selecting processes to be monitored. The processes selected for monitoring should include engineering service system development, project management (including risk management and contracting), and support processes critical to successful project performance. Monitoring, if not performed with adequate care, can at one extreme be invasive and burdensome, or at the other extreme be uninformative and ineffective.
PHASE V: Accepting the Software

Objective

This phase includes all activities necessary to evaluate, test and accept the software product. It begins when the software product is received and ends when the product is accepted.

Description of Steps

<table>
<thead>
<tr>
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</tr>
</thead>
</table>
| Accepting the software | - Acceptance criteria  
- Evaluation criteria  
- Test criteria  
- Quality plan  
- Maintenance plan  
- Supplier performance criteria  
- Establish acceptance process | - Acceptance process  
- Acceptable software  
- Usable documentation | C – 6 Software Evaluation  
E – 1 Test types and Activities  
E – 2 Software Test  
E – 3 Software Acceptance  
E – 4 Data Migration |

12) Accepting the software (Use E – 1 to examine appropriate Test types and Activities)

a) Evaluate and test the software. The objective is to adequately evaluate and test to ensure that the software meets contract specifications. Consideration should be given to:

i. Acceptance criteria provided as part of supplier performance standards should be kept meaningful and current. If test criteria and data were developed in the beginning, make certain they have been revised to incorporate changes if any.

ii. Evaluations and tests should be conducted to detect the differences between existing and required conditions and to evaluate the features of the software (e.g. performance, portability or functionality).

iii. Consideration should be given to conducting a system-level test, particularly when the software is to be used in another system. This test may be conducted in a simulated environment or in a user environment. Once it has been determined the test is needed, then it should be included in the acceptance criteria.

iv. Final acceptance criteria should include field testing results to verify performance and quality of the software in a use environment.

v. The quality and maintenance plans developed for the project should be used in evaluating and accepting the software and services provided by the supplier.

b) Maintain control over the test. The acquirer should ensure that an appropriate amount of effort and cost is applied to assure high-quality software. Consideration should be given to the following:

i. When evaluating a software product, the list [E – 2] may be helpful in considering significant factors that would have some impact on the quality of the product. This list may be tailored by adding other factors and questions that are important to the acquirer's organisation.

ii. When accepting software, final payment should not be made to the supplier until it has been certified that all the software deliverables meet contract specifications and that all acceptance criteria have been satisfied.

iii. To the degree that non-performance is encountered, exercise the contract provisions for withholding or reducing payments to the supplier. To minimise losses and time
delays, if the contract is terminated, exercise the organisation's contingency plans.

An acceptance process involving activities, such as acceptance reviews and tests, and configuration audits, should be completed before accepting the product as defined in the supplier agreement. This involves establishing acceptance test procedures, conducting acceptance review and testing to obtain results, discrepancy reports or corrective action plans; and confirming that the non-technical commitments associated with the acquired work product are satisfied (e.g. license, warranty, ownership, use, and support or maintenance agreements).

The physical testing of COTS candidates is necessarily constrained by the fact that the source code is not available. Some of the testing is for discovery of undocumented features and/or bugs while other testing involves Confirming or denying the published vendor data and specifications. Both of these can be seen to be a special case of validation; the first because we are trying to increase our understanding of the candidate under evaluation, and the second to attempt to confirm the vendor's claims as to the effectiveness of the COTS product. The various black box techniques seem to be ideal for these purposes since the visibility into the system, that white box testing requires, is not needed. Products can be tested for conformance with relevant standards (e.g. ISO/IEC 25051: 2006).

Two types of testing are required: Unit and Integration testing. Unit testing verifies that the interface works properly and integration testing ensures that the interface functions properly when all components/interfaces are installed. The team should develop a test plan and expected results for each interface. Results should be recorded on a test case log and reported to the vendor.

Pilot deployment can be used as a verification mechanism to ensure that the software operates as needed in a real environment where the acquired software is deployed in a subset of the systems and tested by a subset of the users. This process has three steps: definition, evaluation, and analysis. The definition sub-stage specifies the pilot group size, pilot group members, work load, and test suites. In the evaluation sub-stage, the software is deployed to the pilot group and evaluated. A risk mitigating model with faster review process and low maintenance cost is used in this sub-stage. In the analysis sub-stage, the IT group analyses the results obtained from the pilot group. All the results are summarized according to the requirements met or missed. Thereafter the software receives a final evaluation.

Data migration involves deciding on the data that will be converted which determines the volume and complexity of conversion programs, and the cleansing required. If the vendor does not provide a conversion inventory form, the team should record their decisions to establish the scope of the data conversion with the vendor [E – 4].

Some organisations have created a "Super User Model" (also called Power User, Champion) in order to take regular users and raise them to a level of leadership within the system - originally developed by SAP and Oracle. Doing this accomplishes three objectives: more engaged use of the system as there is a personal face assigned to champion the system and make acceptance of the technology less challenging; significant time and cost reduction as companies are not seeking or hiring new or temporary resources for the purposes of developing and/or delivering documentation, training, and support; and ROI or proof of concept of investment should be more easily achieved as users are directly involved, thereby using the system invested in, which benefits the company overall.
PHASE VI: Follow-on

Objective

After the software is accepted, this phase includes using the product to meet the acquirer's objectives and evaluating user satisfaction with the software product, its documentation, and support provided from the supplier. This phase continuous until all provisions provided in the contract have been completed or until the software product is no longer available for use. It involves evaluations of contractual practices and user satisfaction with software acquired.

Description of Steps

<table>
<thead>
<tr>
<th>Steps</th>
<th>Inputs</th>
<th>Outputs</th>
<th>Tools/Templates</th>
<th>Appendix – Check-list</th>
</tr>
</thead>
</table>
| 13) Using the software | - Software deliverables  
- Documentation  
- Support available  
- Quality plan  
- Maintenance plan | - Contracting practices evaluated  
- Practices to change  
- Practices to retain  
- User satisfaction assessment  
- Supplier performance data | Toolbox – 6 Methods of User Survey Data Collection | C = 4 Supplier Performance Standards  
F = 1 User Survey Drivers & Scope  
F = 2 Survey Areas  
F = 3 Survey Design |

13) Using the software. The objective is to identify both good and bad aspects of the software acquisition and to perform necessary corrective action (in the next phase).

a) Evaluate contracting practices. Consider:
   i. Identify practices that are weak and need to be changed.
   ii. Identify and retain practices that produced good results.
   iii. Identify additional guidelines that need to be developed and implemented.

b) Evaluate user satisfaction. Consider:
   i. Evaluate user satisfaction with the software.
   ii. Record the actual amount of software maintenance work that is needed soon after the software is put into use.

c) Evaluate supplier performance.

Retain performance data on the individual supplier for future reference.

System Deployment.

- The general deployment stage performs the delivery of the acquired software to users’ systems. A deployment team installs the acquired software. The acquisition group tracks their progress through status reports to ensure the process meets customer expectations. They review the reports for compliance with cost, schedule, and user satisfaction goals.

- The IT group in the organisation supports the deployed software and administer maintenance tasks that includes: routine maintenance, troubleshooting, and end user reviews. Routine maintenance includes periodic upgrades or vendor patches. Troubleshooting solves user problems with a feedback channel to the vendor. End user review periodically evaluates customer satisfaction with the product. It also looks at any changes in end user requirements, the maintenance history of the software, and long term costs. This may result in a new iteration of the acquisition model to find replacement software.

- It is important that the IT group maintain a written history of software products. Over time, the main benefit will be for impact analysis. When the organisation wishes to change systems at a later date, it becomes important to know how that will affect installed software.
PHASE VII: Improving the Acquisition Process

Objective

This is final phase in the process model whose objective is to use the evaluations performed in the acquisition project – and incorporate current best practice – to identify process areas for improvement and initiate a program to improve (or update) the organisation's process. This should be treated as a new project after the acquisition and requires (1) a documented process for software acquisition planning, requirements development/management, project management/oversight and risk management; (2) efforts to develop appropriate metrics for performance measurement and continual process improvement; (3) a process to ensure that key personnel have an appropriate level of experience/training in software acquisition; and (4) a process to ensure that each unit in the organisation select, implement and adhere to established processes and requirements relating to software acquisition (SEI, 2002).

Description of Steps

<table>
<thead>
<tr>
<th>Steps</th>
<th>Inputs</th>
<th>Outputs</th>
<th>Tools/Templates</th>
<th>Appendix – Check-list</th>
</tr>
</thead>
<tbody>
<tr>
<td>14) Improving the acquisition process</td>
<td>- Contract performance information - User acceptance data - Supplier performance data</td>
<td>- Key process areas for improvement</td>
<td>Toolbox - 7 Implementation Questions</td>
<td>G = 1 Acquisition Process Areas G = 2 Acquisition Generic Practices</td>
</tr>
</tbody>
</table>

14) Improving the acquisition process. The objective is to identify key areas for improvement in the organisations' acquisition process and to initiate an improvement programme.

a) Prepare organisation for improvement.
   i. Establish the business reasons and the business goals for the effort.
   ii. Secure funding for and ensure senior management commitment to improvement effort
   iii. Form a process improvement project team and develop capacities required

b) Plan improvement programme
   i. Review performance evaluations from previous phase to identify key processes for improvement
   ii. Map CMM best practices on key processes identified for improvement
   iii. Initiate improvement programme

Preparation for Improvement.

- Sponsorship and funding are critical to ensuring the success of the improvement effort. This may require presenting an overview of SA-CMM or CMM-ACQ to senior management, the case for change, including the rationale for the undertaking and the expected benefits and costs for the people affected, problems and opportunities, and key people involved in the organization's process improvement efforts that should also take training on improvement model used.

- The process improvement (or engineering process) team coordinates activities across the enterprise and exists for the duration of the process improvement activity. Members can serve as process improvement mentors. If the team is new to process improvement, members should consider taking Process Improvement courses (e.g. see SEI training on [http://www.sei.cmu.edu/training/](http://www.sei.cmu.edu/training/)).
A mapping of best practices from chosen improvement model to the organization's processes or doing an informal gap analysis is required to determine how processes compare to improvement model practices. This involves building a detailed picture of the present by selecting an appraisal method; conducting a survey to gather data from managers, project leaders and workers; and identifying cultural opportunities and barriers to change.

A similar mapping must be performed to create a picture of the future. This involves defining the elements of success and identifying priority process areas by consultation with management, project leaders, and staff – each of which will have different objectives and they must be prioritised to address and build the improvement plan. This plan must be shared with everyone who will be affected and their comments must be considered.

The difference between the present and future pictures is the focus of the process improvement programme.

A periodic (e.g. monthly, weekly) report that demonstrates the programme's progress in reaching its (and the organization's) goals is required. In addition, an authorized appraiser can conduct an appraisal, which will provide an objective evaluation of the organization improvement programme.
SECTION C

Recommendations and Further Reading
Model Implementation, Tailoring and Enhancement

This recommended practice can be applied to software that runs on any computer system regardless of the size, complexity, or criticality of the software. For the most part, the derived acquisition process model is based on the IEEE 1062 which specifies management activities suited for use on MOTS software and custom-built software as well as incorporates acquisition practices from COTS-based development methodologies. However, organisations using this practice will need to identify the classes of software to which the recommended practice applies and the specific quality characteristics and activities that need to be included in the acquisition process. Generally, success in acquiring high quality products and services from software suppliers can be achieved by doing the following things:

1. Identifying quality characteristics necessary to achieve the acquirer's objectives.
2. Including quality considerations in the planning, evaluation, and acceptance activities.
3. Developing an organisational strategy for acquiring software.
4. Establishing a software acquisition process using the steps stated in Figure (1) as a starting point.
5. Putting the defined process into practice.
6. Conducting process reviews and improvements.

Implementers of the process model need to consider that:
1. The derived process model assumes an intertwined technical and financial evaluation process during the first three phases. Previous experience with a centralised government team can be examined for possible reformation.
2. Follow-on procedures are not enabled in government practice. This information can only be obtained at service level. Without enacting the role of IT management Units and creating mechanisms to accumulate acquisition projects experience, information gathering activities during the final two phases of the model cannot be realised.
3. The decisions on which strategies will be used in government acquisition, which practices are possible and those that are not, affect planning, selection of products and services, and the nature of control and influence in the acquisition of systems.
4. Assigning a process supervisory role within the NIC (or any other implementing agency) is useful to ensure that the process is followed; that the work products meet the defined standards; and that lessons learnt are analysed and incorporated for future acquisition projects.

While it is important to carry out the specified management activities, the model can be tailored for use with three kinds acquisition projects in the following way:
1. The initiation phase must be conducted for all kinds of acquisition (COTS, MOTS and custom-built).
2. The first six phases of the model must be carried out for MOTS and custom built software products.
3. For COTS acquisition, organisation may choose to only carry out the COTS-steps specified in the model.

Enhancements to the recommended practice can come from a variety of sources including:
1. New standards and/or guidelines from international standards bodies and market place.
2. Process improvements based on lessons learnt from model implementation.
3. Additional tools and templates to address new government processes, specialised kinds of software, requirements or constraints, as well as to cover the broader spectrum of government software purchases.
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SECTION D

Appendices, Templates & Toolboxes
Appendices
Appendix A: Project Initiation Phase Check-lists and Guidelines

A – 1 Planning Overall Acquisition Strategy
An acquisition strategy has been defined as a “master plan, a road map, a blueprint, and a plan-to-plan-by to achieve program goals and objectives”. The SEI Handbook on software acquisition planning presents a concise set of practical guidelines with a focus on the issues of software aspects of acquisition planning. Each guideline is supported by:

- a guideline statement
- a scenario that exemplifies the practice or issue
- an analysis of the scenario and discussion of the broader issues
- a set of “Required Actions” that recommend preventative or corrective actions to be taken
- “Danger Signs” that a project manager should look for as symptoms that a program is going “off course”
- links and references to practical “how to” information

There are eight areas in strategy development covered in the handbook. They are split into 13 guidelines (implementers must consult the full descriptions when developing their acquisition strategy) as follows:

Modular/Open Systems
2. Commercial Off-The-Shelf (COTS)-Based Systems: Guidance on assessing maturity of COTS, reconciling COTS and existing user processes, and managing the continuous evolution of COTS technology and products.
3. Software Architecture: Guidance to define quality attributes of the required system as a whole (where the COTS product will work), and on involvement of stakeholders in the documentation and evaluation of the architecture.

Product Support
4. Software Sustainment: Guidance on selecting the type of sustainment (internal or external) based on the complexity of the software being acquired and the ability of an organisation to manage it.

Capability Needs
5. Requirements Development: Guidance on developing requirements using use cases and scenarios.
6. Requirements Management: Guidance on developing baseline requirements, mechanisms for requirements change control and traceability to products.

Information Assurance
7. Operational Information Assurance: Guidance on establishing mechanisms to ensure that operational risk is considered during development (contracting, verification & validation, and quality targets).
8. Information Assurance for COTS Sustainment: Guidance on kinds of information assurance artefacts that must be provided at transition to sustainment, and establishing the responsibilities of the sustainment organization.
9. Information Asset Protection: Guidance on identifying critical assets and protection needs, and on analysing information security risks to determine sufficiency of existing protection.

Integrated Test and Evaluation
10. Software Testing: Guidance on types of software products that are required for system success and types of tests that can be performed.

Risk Management

Systems Engineering – Metrics
12. Software Metrics: Guidance on the choice of metrics to monitor areas of high risk.

Systems Engineering – Performance Incentives
13. Software-Based Award Fees: Guidance on establishing incentives, examining desired behaviour and their consequences.

A – 2 Potential Project Stakeholders
1. End users
2. System administrators
3. Operators
4. Maintainers
5. Integrators
6. Architects
7. Sponsors
8. Managers
9. Vendors/Suppliers

**A – 3 Criteria that can be used in the analysis of Project Solutions**
1. Business Process Impact
2. Technical Feasibility
3. Maturity of Solution
4. Resources Required
5. Constraints Impact
6. Cost Benefit Analysis (Table A – 3)
7. Return on Investment

<table>
<thead>
<tr>
<th>Costs</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>acquisition and supplier management</td>
<td>increased efficiency/ effectiveness</td>
</tr>
<tr>
<td>licensing</td>
<td>increased profits/revenues</td>
</tr>
<tr>
<td>new equipment</td>
<td>taking advantage of innovation</td>
</tr>
<tr>
<td>acceptance and roll-out</td>
<td>response to competition</td>
</tr>
<tr>
<td>operating and support costs</td>
<td>adaptation to change (e.g., environment,</td>
</tr>
<tr>
<td>maintenance costs including</td>
<td>technology, business)</td>
</tr>
<tr>
<td>enhancements, corrections, and</td>
<td></td>
</tr>
<tr>
<td>adaptation</td>
<td></td>
</tr>
</tbody>
</table>

*Table A – 3: Cost & Benefit Factors*

**A – 4 Components of Project Analysis Document**
1. General information on project (date, title, beneficiary, prepared by, etc.)
2. Description of project purpose (business purpose and objectives, impacted business activities, constraints, decision criteria used)
3. Analysis of solutions (description of solutions, evaluation of solutions against decision criteria)
4. Recommended solution (comparison table of solutions, recommendation rationale)

**A – 5 Components of Project Proposal**
1. General information on project identification (date, title, contact information, etc.)
2. Project purpose (from A – 3)
3. Project description (project approach, the specific solution, users served, and expected benefits)
4. Strategic justification (explanation of how the project is consistent with national and organisational IT plans, how it complies with regulations and standard procedures)
5. Estimated project development schedule (estimated start date and duration of major project activities or milestones from completion of project plan to project close out)
6. Financial estimate (resources used or consumed during the execution of the project, cost benefit analysis summary, estimates of expenditures and funding during operations and execution of the project)
7. Project risks (budget, external dependencies, management, business, complexity, etc.)
8. Project Approvals

**A – 6 Components of Project Charter**
1. General Information
2. Project Purpose (high level summary of business case and rationale for the project)
3. Project Business Objectives (definition of the specific business objectives of the project and how
they are related to key business initiatives or issues within the organisation)
4. Project Scope (clarification of products and services provided by a project)
5. Project Authority (authority and mechanisms to resolve potential problems, management level
that issued the project charter, authority for allocate organizational resources and control over
project elements, appointed project manager and terms of reference, support mechanism to
resolve issues outside the authority of the project manager)
6. Project Organization (graphic and text description of the project team, the type of organization
used for the project team, its make-up, the lines of authority, and definition of the responsibilities
of project stakeholders, including those not under the authority of the project manager)
7. Management Review (planned dates when project progress is measured, developed project
transition items list)
8. Resources (indication of the resources the management plans to make available to the project,
including people, facilities, equipment, and funding)
9. Signatures

**A – 7 Selection criteria of Project Manager**
1. Experience managing projects to the level of the anticipated project size
2. Knowledge of project management methodology and tools
3. Demonstrated interpersonal and team leadership skills
4. Knowledge of basic business and management skills
5. Experience within the project’s technical field
6. Respect and recognition among peers within the organisation

**A – 8 Formation of Project Team**
The team must include the technical personnel in the organisation and end users, in addition to management,
financial, legal and external advisers; ideally the team should consist of 6 – 10 members; and ensuring
continuity of team members throughout the acquisition. Project managers of small projects should have
training in the project management methodology and tools used within the agency, or obtain external training
e.g. PMI or PMBOK methodologies. They should also have an interest in and reasonable knowledge of the
product or services that the project will deliver. Typical selection criteria for project managers
include:uisition project helps retain project/process knowledge.

**A – 9 Project Initiation Transition Check-list**
The check-list on the next page provides a vehicle to verify completion of a project phase before beginning
the next phase. The Project Initiation Transition Check-list is a tool to verify that necessary steps have been
completed and establishes the exit criteria from the initiation phase. The transition check-list focuses on
completion of the project proposal and approval of the project charter. It is important to make sure that all the
necessary information and supporting documents pertinent to authorizing the project are completed and
approved by management in the Project Charter.

- Y = Item has been addressed and is completed.
- N = Item has not been addressed, and needs to be to complete the process.
- N/A = Item has not been addressed and is not related to this project.

Comments or plans to complete items that have not been addressed are also documented on the check-list.
**Project Initiation Transition Check-list**

Provide basic information about the project including: Project Title – The proper name used to identify this project; Project Working Title – The working name or acronym that will be used for the project; Proponent Secretary – The Secretary to whom the proponent agency is assigned or the Secretary that is sponsoring an enterprise project; Proponent Agency – The agency that will be responsible for the management of the project; Prepared by – The person(s) preparing this document; Date Prepared - The date this document is initially prepared.

**Project Title:** ____________________________  **Project Working Title:** ______________________

**Proponent Secretary:** ____________________  **Proponent Agency:** _________________________

**Prepared by:** ____________________________  **Date Prepared:** ____________________________

Complete the Status and Comments column. In the Status column indicate: Yes, if the item has been addressed and completed; No, if item has not been addressed or completed; N/A, if the item has not been addressed and is not related to this project. Provide comments or plan to resolve “No” items in the last column.

<table>
<thead>
<tr>
<th>Item</th>
<th>Status</th>
<th>Comments/ Plan to Resolve</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Has the technical and economic feasibility of several potential solutions been analysed?</td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Was the project proposal approved by the Project Sponsor and the Agency Head?</td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>Does the project proposal include a Preliminary Risk Assessment?</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Has the Project Charter been approved by the appropriate authority?</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Does the Project Charter include the following areas:</td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Project Purpose</td>
<td></td>
</tr>
<tr>
<td>3.2</td>
<td>Assumptions</td>
<td></td>
</tr>
<tr>
<td>3.3</td>
<td>Project Description</td>
<td></td>
</tr>
<tr>
<td>3.4</td>
<td>Project Scope</td>
<td></td>
</tr>
<tr>
<td>3.5</td>
<td>Project Management Milestones and Deliverables</td>
<td></td>
</tr>
<tr>
<td>3.6</td>
<td>Project Authority including approval authority, a designated Project Manager, and management oversight</td>
<td></td>
</tr>
<tr>
<td>3.7</td>
<td>Project Organization with roles and responsibilities</td>
<td></td>
</tr>
<tr>
<td>3.8</td>
<td>Approvals</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Have all required resources for project planning been assembled?</td>
<td></td>
</tr>
</tbody>
</table>

**Signatures**

The Signatures of the people below relay an understanding that the key elements within the Initiation Phase section are complete and the project team is ready to transition to the Planning Phase.

<table>
<thead>
<tr>
<th>Position/Title</th>
<th>Name</th>
<th>Date</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Appendix B: Project Planning Phase Check-lists and Guidelines

B.1 Organisational Strategy Check-list

☐ 1) Who will provide software support? Supplier ☐

☐ 2) Is maintenance documentation necessary?   Yes ☐ No ☐

☐ 3) Will user training be provided by the supplier?   Yes ☐ No ☐

☐ 4) Will acquisition's personnel need training? Yes ☐ No ☐

5) When software conversion or modification is planned:

☐ 2) Will supplier manuals sufficiently describe the supplier's software?   Yes ☐

b) Will specifications be necessary to describe the conversion or modification requirements and the implementation details of the conversion or modification?   Yes ☐ No ☐

c) Who will provide these specifications? Supplier ☐

d) Who should approve these specifications? .............................................................

☐ 2) Will source code be provided by the supplier so that modifications can be made?   Yes ☐ No ☐

7) Are supplier publications suitable for end users?   Yes ☐ No ☐

a) Will unique publications be necessary? Yes ☐ No ☐

b) Will unique publications require formal acceptance? Yes ☐ No ☐

☐ 2) Are there copyright or royalty issues? Yes ☐ No ☐

8) Will the software be evaluated and certified?   Yes ☐ No ☐

☐ 2) Is a survey of the supplier's existing customers sufficient? Yes ☐ No ☐

☐ 2) Are reviews and audits desirable? Yes ☐ No ☐

☐ 2) Is a testing period preferable to demonstrate that the software and its associated documentation are usable in their intended environment? Yes ☐ No ☐

d) Where will the testing be performed?.............................................................................

e) Who will perform the testing?......................................................................................

f) When will the software be read for acceptance?................................................................

☐ 2) Will supplier support be necessary during initial installations of the software? Yes ☐ No ☐

10) Will subsequent releases of the software be made?   Yes ☐ No ☐

a) If so, how many?............ will they be compatible with each other? Yes ☐ No ☐

11) Will the acquired software require rework whenever operating system changes occur?   Yes ☐ No ☐

a) If so, how will the rework be accomplished?......................................................................

12) Will the acquired software commit acquire organization to continue some software product, such as a language, that could possibly be discontinued in the future? Yes ☐ No ☐

13) What are the options/risks if the software is not required?..........................................................
1) Rate the importance of the following aspects of the software being acquired.
   a) Software specification
      - important □ not important □
   b) Functional requirements
      - important □ not important □
   c) Any known constraints or parameters
      - important □ not important □

2) Rate the importance of the deliverables to be included with the software defined.
   a) Software description
      - important □ not important □
   b) Source code listings
      - important □ not important □
   c) Object code and listings
      - important □ not important □
   d) User manuals
      - important □ not important □
   e) Support publications
      - important □ not important □
   f) Sales and promotional material
      - important □ not important □
   g) List of current users(existing software product)
      - important □ not important □

3) Rate the importance of the software support to be provided with the software being defined.
   a) User training
      - important □ not important □
   b) Internal training
      - important □ not important □
   c) post-installation support
      - important □ not important □
   d) Corrections of errors
      - important □ not important □
   e) Modifications, when requested
      - important □ not important □
   f) Software warranty
      - important □ not important □
   g) documentation warranty
      - important □ not important □
**B – 3 Supplier Evaluation Check-list**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Can a current financial statement be obtained for examination?</td>
<td>1) On a separate page, list by job function the number of people in the company.</td>
<td>1) Are software development practices and standards used?</td>
<td>1) What assistance is provided at the installation time?</td>
<td>1) Is there a guarantee in writing about the level and quality of maintenance services provided?</td>
<td>1) Can a demonstration of the software be made at a user site?</td>
<td></td>
</tr>
<tr>
<td>Yes ☐ No ☐</td>
<td>2) On a separate page, list the names of sales and technical representatives and support personnel. Can they be interviewed?</td>
<td>2) Are software development practices and standards adequate?</td>
<td>2) Can staff training be conducted on site?</td>
<td>2) Are requirements, design, and code reviews used?</td>
<td>2) Are there restrictions on the purposes for which the product may be used?</td>
<td></td>
</tr>
<tr>
<td>3) Has the company or any of its principals ever been involved in Bankruptcy or computer-related litigation?</td>
<td>3) list the supplier’s software products that are sold and the number of installations of each.</td>
<td>3) Are the currently used practices written down?</td>
<td>3) To what extent can the software and documentation be modified to meet user requirements?</td>
<td>3) Is a total quality program in place?</td>
<td>3) Can a demonstration of the software be made at a user site?</td>
<td></td>
</tr>
<tr>
<td>Yes ☐ No ☐</td>
<td>4) How long has the company been in business?</td>
<td>4) Are documentation guidelines available?</td>
<td>4) Who will make changes to the software and documentation?</td>
<td>4) If a total quality program is in place, is it documented?</td>
<td>4) Will modification invalidate the warranty?</td>
<td></td>
</tr>
<tr>
<td>5) What is the company’s history?</td>
<td>5) Is a list of users available?</td>
<td>5) How is testing accomplished?</td>
<td>5) Will future enhancements be made available?</td>
<td>5) Does the quality program assure the product meets specifications?</td>
<td>5) Will modification invalidate the warranty?</td>
<td></td>
</tr>
<tr>
<td>6) Are any enhancements (software and documentation) planned or in process?</td>
<td>6) What assistance is provided at the installation time?</td>
<td>6) Will future enhancements be made available?</td>
<td>6) Are any enhancements (software and documentation) planned or in process?</td>
<td>6) Is a configuration management process established?</td>
<td>6) Will future enhancements be made available?</td>
<td></td>
</tr>
<tr>
<td>Yes ☐ No ☐</td>
<td>7) Will future enhancements be made available?</td>
<td>7) Are the development and control processes followed?</td>
<td>7) Are the development and control processes followed?</td>
<td>7) Is a corrective action process established to handle error corrections and technical questions?</td>
<td>7) Can a demonstration of the software be made at a user site?</td>
<td></td>
</tr>
<tr>
<td>8) Are any enhancements (software and documentation) planned or in process?</td>
<td>8) Are the development and control processes followed?</td>
<td>8) Are requirements, design, and code reviews used?</td>
<td>8) Is a corrective action process established to handle error corrections and technical questions?</td>
<td>8) Is a configuration management process established?</td>
<td>8) Are any enhancements (software and documentation) planned or in process?</td>
<td></td>
</tr>
<tr>
<td>Yes ☐ No ☐</td>
<td>9) Are any enhancements (software and documentation) planned or in process?</td>
<td>9) Are requirements, design, and code reviews used?</td>
<td>9) Is a corrective action process established to handle error corrections and technical questions?</td>
<td>9) Is a configuration management process established?</td>
<td>9) Are any enhancements (software and documentation) planned or in process?</td>
<td></td>
</tr>
<tr>
<td>10) Will modification invalidate the warranty?</td>
<td>10) Are any enhancements (software and documentation) planned or in process?</td>
<td>10) Are requirements, design, and code reviews used?</td>
<td>10) Is a corrective action process established to handle error corrections and technical questions?</td>
<td>10) Is a configuration management process established?</td>
<td>10) Are any enhancements (software and documentation) planned or in process?</td>
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<tr>
<td>Question</td>
<td>Yes</td>
<td>No</td>
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<td>------------------------------------------------------------------------</td>
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<tr>
<td>1) Is there an unconditional warranty period?</td>
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<tr>
<td>2) If not, is there a warranty?</td>
<td>Yes</td>
<td></td>
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<tr>
<td>3) Does successful execution of an agreed-upon acceptance test initiate the Unconditional warranty period?</td>
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<tr>
<td>4) Does an unconditional warranty period provide for a specified level of software product performance for a given period at the premises where it is installed?</td>
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<tr>
<td>5) How long is the unconditional warranty period?</td>
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<tr>
<td>1) What pricing arrangements are available?</td>
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<tr>
<td>2) What are the license terms and renewal provisions?</td>
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<td></td>
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<tr>
<td>3) What is included in the acquisition price or license fee?</td>
<td></td>
<td></td>
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<tr>
<td>4) What costs, if any, are associated with an unconditional warranty period?</td>
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<td></td>
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<tr>
<td>5) What is the cost of maintenance after the warranty period?</td>
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<tr>
<td>6) What is the cost of modifications?</td>
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<td>7) What is the cost of enhancements?</td>
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<tr>
<td>8) Are updates and error corrections provided at no cost?</td>
<td></td>
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<tr>
<td>1) Is a standard contract used?</td>
<td></td>
<td></td>
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<tr>
<td>2) Can a contract be obtained now for examination?</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3) Are contract terms negotiable?</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4) Are there royalty issues?</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5) What objections, if any, are there to attaching a copy of these Check-list questions with responses to a contract?</td>
<td></td>
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</tr>
</tbody>
</table>
B – 4 Supplier and Acquirer Obligations Check-lists

1) Definition of software development framework
   a) Were development steps to be accomplished by the supplier identified?  Yes □  No □
   b) Was a product (deliverable) included at the end of each step that
      Demonstrates that the step has been satisfactorily completed, e.g., surveys,
      Feasibility studies, general and detail designs, test data and test plans, the
      Actual programs, user manuals, support publications, and integration/
      Acceptance test results?  Yes □  No □
   c) Were milestones that must be satisfied before the development is allowed to
      continue to the next step identified?  Yes □  No □
   d) Were the acquirer obligations included in the same milestone chart as the
      supplier obligations?  Yes □  No □

2) Who is responsible for the following?
   a) publication and expense of user documentation  supplier □  acquirer □  N/A □
   b) publicity releases  supplier □  acquirer □  N/A □
   c) software distribution to end users  supplier □  acquirer □  N/A □
   d) notices and reports, if specified  supplier □  acquirer □  N/A □
   e) new software that replaces old software  supplier □  acquirer □  N/A □
   f) appointment of a representative for
      Supplier ...........................................................................................................................
      Acquirer ..........................................................................................................................
## B – 5 Quality and Maintenance Plans Check-lists

### Identify what a quality plan should contain.

1) what are the quality objectives?
   - a) Documentation is usable.  
   - b) Warranty is adequate.  
   - c) Software possesses functional capabilities that are required.  
   - d) Software is verified to properly perform its functional capabilities.  

2) what are the evaluations and tests planned to satisfy the quality objectives?
   - a) demonstration  
   - b) test  
   - c) documentation review

3) who is responsible for conducting the evaluations and tests?
   - a) Supplier  
   - b) acquirer  
   - c) third party

4) for which of the following items is test documentation required?
   - a) test plans  
   - b) test procedure  
   - c) test data  
   - d) test results

5) the responsibility and method used to get timely correction of errors.

### Identify what a maintenance plan should contain.

1) what are the maintenance objectives?
   - a) support documentation is usable.  
   - b) Technical support is available.

2) what is included in the technical support?
   - a) error corrections  
   - b) modifications  
   - c) new releases of software  
   - d) updating of user documentation  
   - e) installation assistance  
   - f) training

3) the responsibility of providing technical support on a timely basis.
   - a) who provides technical support during the warranty period? Supplier  
   - b) Who provides technical support after the warranty period?  
   - c) Who pays for the cost of the technical support?

4) what acquirer responsibilities are obtained or satisfied by other organizations?
   - a) internal organization(s)  
   - b) third party
Appendix C: Contracting Phase Check-lists and Guidelines

C – 1 Contracting Strategies
Contracting strategies vary by the level of control and sharing of responsibilities/risks between acquirer and supplier. It is noted in the literature and local practice that industry is more inclined towards adopting joint control and responsibility with contractors and use collaborative forms project management (e.g. integrated project teams) while government require a stricter control and maximum responsibility delegation to contractors. The requires a much broader discussion and policy making because government contracting is driven by more complex factors than private sector such as protecting public funds or complying with regulations that dictate the contracting process and other aspects of acquisition. These include purchase procedures required by the Ministry of Finance and international trade regulations (and constraints such as sanctions).

The set of laws that are central in the software contracting profession include intellectual property (copyright, patents, the law of confidence and trade marks), contract, criminal law and data protection law (Marcinak & Reifer). National laws and international regulations laws that apply include:

1. مرشذ الأداره العام للعقود، صادر عن وزارة العدل 2008
2. قانون الاجراءات المالية و المحاسبة لسنة 2007
3. قانون التحكيم السوداني لسنة 2005
4. قانون براءات الاختراع لسنة 1971
5. ICC - International Chamber of Commerce Arbitration Rules, 1998

C – 2 Types of Software Contracts
Software contracts can be in broad terms divided into main categories that are the sale contracts and the licence agreements: (1) sale contract is used for tailored and MOTS software development and (2) sale and license agreement is used again in COTS and MOTS software business environment (Ohulu book).

License Agreement include the kind that come with shrink-wrapped software which are non-negotiable (therefore not of interest). Other kinds of agreements depend on the license choices as number of users or organisational processes supported; or on factors such as customisation, vendor support, fee caps (Meyer & Obernordlf). The types of sale contracts that are considered for software (Marcinak & Reifer) include:

**Fixed Price:** This provides a prices that is not subject to any adjustment on the basis of the contractor's cost experience in performing the contract. There are four variations of this contract type:

- Firm fixed-price: A contract that is basically an agreement to pay a specified price upon delivery and acceptance of the product and services.
- Fixed-price with economic price adjustments. A form of fixed-price contract that includes a special clause allowing for economic price adjustments when they are needed to protect wither or both parties from significant fluctuations in labour or material costs.
- Fixed-price incentive. A fixed-price contract whose fee is varied and used to motivate the supplier to increase efficiency or reduce cost. The incentive relates profits directly to performance goals.

**Cost Reimbursement:** This type of contract promises payment to the contractors of allowable costs incurred in the performance of the contract, to the extent prescribed in the contract. It establishes an
estimate of the total cost for the purposes of obligations for funds and a ceiling that the contractor must not exceed, except at own risk, without prior approval. Among the variations in this type of contract are:

- **Cost or cost sharing**: The seller receives no fee. In a cost contract only the supplier allowable costs are reimbursed. In a cost sharing contract, the buyer and the seller agree on the ratio by which they will share costs.

- **Cost plus incentive fee**: Similar to a fixed price incentive contract, this form uses fee to motivate the seller to control costs. Negotiations set a target cost, a target fee, a ceiling price, and an adjustment formula. A minimum and maximum fee are established and related to performance goals.

- **Cost plus award fee**: This extends the financial incentives into subjective areas by establishing a number of performance criteria whose finite measurements are difficult to quantify (e.g. quality, ease of use). The fee structure is then established so that there is a base fee and an award amount directly related to the criteria.

A comparison of these major types of contract can be obtained from (http://www.bestpractices.osi.ca.gov/sysacq/%5Cdownloads%5CBP%20Website%20Topic%20contract%20strategy%203204_2.PDF). A similar analysis is required for the types of contracts used in government. The link also provides a guidebook of software acquisition management that offers a set of best practices on software contracting for government software intensive projects that can be used to develop check-lists for the proposed model under consideration. The contract template used by the NIC (extracted from AlHafnawy book on Software Contracting) can be revised accordingly, and other samples from the variations above can be prepared as mandated by national regulations.
C – 3 User Survey

Flexibility

1) What software product modifications have been done? .................................................................
2) Who did the modifications? ...........................................................................................................
3) Are changes done on site?  Yes ☐ No ☐
   If the changes are not done on site, where are they done? ............................................................
4) How long did changes in each area take? ......................................................................................

Performance

1) What are the daily transaction volumes? ....................................................................................... 
2) How long does daily processing take? ..............................................................................................
3) What size are the acquirer's files? ...................................................................................................
4) What files are being used? ..............................................................................................................
5) How many terminals concurrently process transactions? ............................................................... 
6) How many users can be on the system before response time becomes sluggish, and how serious is the degradation? ........................................................................................................
7) How have multiple-user degradation problems been solved? ....................................................... 
8) Is the acquirer's print capacity adequate?  Yes ☐ No ☐
9) Does the system use spooling for reports?  Yes ☐ No ☐
10) Are there any terminal lockouts when the printer is running?  Yes ☐ No ☐
11) What do you envision response time to be? ..................................................................................

Reliability

1) How long has the system been in use? ............................................................................................
2) During this time, how many updates, error corrections, and enhancements have there been? .................................................................................................................................
3) Was the documentation supplied?  Yes ☐ No ☐
4) How many errors have been encountered during thing time? ....................................................
5) What parts of the system are particularly error-prone? .................................................................
6) What other parts the system have become unusable and for how long? ........................................
7) What error can be made that will bring the system down? .............................................................
8) In the event of an error, are there any recovery procedures?  Yes ☐ No ☐
9) How long does it take for recovery? ............................................................................................... 
10) Is a diagnostic package available on site to verify that the system functions properly?  Yes ☐ No ☐
11) Are supplier backup facilities available?  Yes ☐ No ☐

Service

1) How reliable and accessible is the supplier? ...................................................................................
2) How frequently is maintenance service required? .......................................................................... 
3) Are supplier personnel competent in solving problems?  Yes ☐ No ☐
4) What is the average turnaround time between a maintenance service call and the supplier's response? ....................................................................................................................
5) Are backup procedures adequate?  Yes ☐ No ☐
6) How long does backup take? ........................................................................................................
7) Is there anything error-prone about the procedure?  Yes ☐ No ☐

Operation

1) Is the system easy to use?  Yes ☐ No ☐
2) What is the level of technical knowledge required to use and maintain the system?.................
3) Have there been any serious operator complaints?  Yes ☐ No ☐
4) Was adequate operator and support training given?  Yes ☐ No ☐
5) How long did it take the acquirer's operator to become familiar with the system?......................

1) How long did changes in each area take? ......................................................................................
5) What fully developed software has been added? .................................................................
6) Who added the software? ........................................................................................................
7) How long did it take? .................................................................................................................
8) Were there any interface problems? Yes ☐ No ☐
9) How has the system been expanded or upgraded? .................................................................
10) How successful was the conversion? .....................................................................................
11) How much time was involved? ................................................................................................
12) How much cost was involved? ...............................................................................................  
13) How many personnel were involved? .....................................................................................

1) Was the system installed as planned? Yes ☐ No ☐
2) How long did installation take? .............................................................................................
3) How much did installation cost? .............................................................................................
4) Was supplier installation training adequate? Yes ☐ No ☐
5) Was supplier installation support competent and complete? Yes ☐ No ☐
6) Was the system cut over smoothly? Yes ☐ No ☐
7) What anomalies, if any, marred the installation? .................................................................
8) What environmental changes were required to install the system? ........................................

1) What unanticipated charges were incurred during installation and training? ......................
2) What unanticipated charges were incurred after installation and training? ......................
3) Is the acquirer's service agreement cost-effective? Yes ☐ No ☐
4) What have new product enhancements from the supplier cost? ........................................
5) What charges, if any, have been incurred to update or correct software? ............................
6) What does customized software work cost? ..............................................................................
7) Does customized software work also include updated documentation? Yes ☐ No ☐
8) In what areas have you found the system to be least cost-effective? ................................
9) In what areas have you found the system to be most cost-effective? ....................................

1) Are user and file security levels adequate? Yes ☐ No ☐
2) Can unauthorized transactions or programs be run? Yes ☐ No ☐
3) Are accounting audit controls satisfactory? Yes ☐ No ☐
4) Do accounting audit controls satisfy the acquirer's accountant? Yes ☐ No ☐

1) Is the documentation accurate? .............................................................................................
2) Is the documentation adequate? ...........................................................................................
3) Is the documentation kept up to date? .....................................................................................

1) Why was the system purchased? .............................................................................................
2) Would the system be bought today if you were in the market for a system? Yes ☐ No ☐
3) What changes would you make? ...........................................................................................
4) What changes do you think realistically could have been implemented? ............................
5) What did you learn from other users of the system? ................................................................

Installation

Costs

Security

Documentation

Maintenance
Describe what constitutes satisfactory performance by the supplier. Satisfactory performance should be quantified in terms of all known requirements and constraints.

<table>
<thead>
<tr>
<th>Performance Criteria</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Approach to meet software's functional requirements is defined.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2) Growth potential or expansion requirements of the system is defined.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3) Supplier meets time constraints for deliverables.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4) Test and acceptance criteria that are to be met are defined.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5) Programming language standards and practices to be followed are defined.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>6) Documentation standards to be followed are defined.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>7) Ease of modification is addressed.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>8) Maximum computer resources followed, such as memory size and number of terminals, are defined.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>9) Throughput requirements are defined.</td>
<td>Yes</td>
<td>No</td>
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<table>
<thead>
<tr>
<th>Evaluation Test</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>1) Software possesses all the functional capabilities required.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2) Software performs each functional capability as verified by the following method(s).</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Documentation evaluation</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Demonstration</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>User survey</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Test</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3) Software error revealed are documented.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4) Software performs all system-level capabilities as verified by a system test.</td>
<td>Yes</td>
<td>No</td>
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<table>
<thead>
<tr>
<th>Correction of Discrepancies</th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>1) Supplier documents all identified discrepancies.</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>2) Supplier establishes discrepancy correction and reporting.</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>3) Supplier indicates warranty provisions for provisions for providing prompt and appropriate corrections.</td>
<td>Yes</td>
<td>No</td>
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<thead>
<tr>
<th>Acceptance Criteria</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>1) All discrepancies are corrected.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2) Prompt and appropriate corrections are provided.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3) Satisfactory compliance to contract specifications is demonstrated by evaluations and tests.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4) Satisfactory compliance to contract specifications is demonstrated by field tests.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5) All deliverable items are provided.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>6) Corrective procedures are established for correction of errors found after delivery.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>7) Satisfactory training is provided.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>8) Satisfactory assistance during initial installation(s) is provided.</td>
<td>Yes</td>
<td>No</td>
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</table>
Rate the payments provisions that ensure the maximum chance for success and reward the supplier for achieving satisfactory progress.

1) Provide for investing only minimum amount of funds before the quality of the supplier’s work is demonstrated.

2) Provide separate due dates and costs for each deliverable.

3) Identify allowable printing expense associated with publishing user documentation.

4) Identify allowable travel and diem expenses.

5) Stagger the frequency and amount of supplier payments to coincide with major milestones, test results, or achievements.

6) Identify the amount and method of determining incentive payments associated with significant results, achievements, costs, or schedules.

7) Consider the complexity of the project and the risk in achieving the contract requirements.

8) Include a dollar amount limit on royalty payments. Consider the amount of a fully paid license fee when setting the limit on royalties.

9) Ensure that payments are limited to those copies of the software products and deliverables actually provided by the supplier and are not tied to forecasted quantity or dollar volumes.

10) Withhold payment for incomplete or unacceptable work.

11) Reduce payment if certain requirements are not met.

12) Reduce payments to the supplier by the amount of any deliverable (e.g., documentation) specified in the contract but not produced.

13) Withhold as a final payment some reasonable percentage of the entire contract dollar value to ensure that the supplier follows through on all deliverable items and correct all discrepancies.
## C – 6 Software Evaluation

### Functionality

1) Does the basic function of the software meet the acquirer’s needs?  
   - Yes [ ]  
   - No [ ]

2) Are its overall capabilities consistent with the requirements of the acquirer’s application?  
   - Yes [ ]  
   - No [ ]

3) Can the software be run under the acquirer’s operating systems?  
   - Yes [ ]  
   - No [ ]

### Performance

1) Is the performance adequate for the acquirer’s needs?  
   - Yes [ ]  
   - No [ ]

2) Are believable performance figures available?  
   - Yes [ ]  
   - No [ ]

3) How many users can be on the system before it begins to slow down?  
   - Yes [ ]  
   - No [ ]

4) What verifiable evidence is available showing that the supplier has tested performance issues in a suitable environment?  
   - Yes [ ]  
   - No [ ]

### Reliability

1) Does the product have a clean, modular design?  
   - Yes [ ]  
   - No [ ]

2) Has it been in actual use long enough to make sure that most of its bugs have been cleaned up?  
   - Yes [ ]  
   - No [ ]

3) Are there errors that a user can make that will bring the system down?  
   - Yes [ ]  
   - No [ ]

4) What are the recovery capabilities?  
   - Yes [ ]  
   - No [ ]

### Availability

1) Was the software available for actual use when it was needed?  
   - Yes [ ]  
   - No [ ]

2) Can another user prevent you from using the system?  
   - Yes [ ]  
   - No [ ]

3) How much time is needed to correct errors that bring the system down?  
   - Yes [ ]  
   - No [ ]

4) Are recovery capabilities automated?  
   - Yes [ ]  
   - No [ ]

5) How long does recovery take?  
   - Yes [ ]  
   - No [ ]

6) How effectively did the supplier test the product in the acquirer’s operational environment?  
   - Yes [ ]  
   - No [ ]

7) Are software errors caused by problems in performance rather than function?  
   - Yes [ ]  
   - No [ ]

### Ease of Modification

1) Are the software’s input, and processing capabilities flexible enough to accommodate the changing requirements of the acquirer’s business?  
   - Yes [ ]  
   - No [ ]

2) Can the software be adapted to new applications?  
   - Yes [ ]  
   - No [ ]

1) Is the software available in source code from?  
   - Yes [ ]  
   - No [ ]

2) If the supplier will be doing maintenance, how reliable and accessible is the company?  
   - Yes [ ]  
   - No [ ]

3) What level and quality of maintenance will the supplier provide?  
   - Yes [ ]  
   - No [ ]

4) Is this guaranteed in writing?  
   - Yes [ ]  
   - No [ ]

5) Are sets of test data available with adequate documentation about how to use them and about what results to expect?  
   - Yes [ ]  
   - No [ ]

6) What are the opinions of past and present users?  
   - Yes [ ]  
   - No [ ]

### Ease of Servicability

1) How difficult will it be to install the software?  
   - Yes [ ]  
   - No [ ]

2) What type of training and orientation will be needed?  
   - Yes [ ]  
   - No [ ]

3) Will data files need to be converted?  
   - Yes [ ]  
   - No [ ]

4) Can the supplier provide procedures for the installation and conversion process?  
   - Yes [ ]  
   - No [ ]

5) How much assistance will the supplier furnish during the process?  
   - Yes [ ]  
   - No [ ]

### Ease of Installation

1) Will the software be easy to use?  
   - Yes [ ]  
   - No [ ]

2) Is it designed for straightforward operation with a well-documented
Operating procedure?

Yes ☐ No ☐

Are the reports and screen displays it produces reliable, informative, and Easy to interpret?

Yes ☐ No ☐

Are help screens provided?

Yes ☐ No ☐

Will the users be enthusiastic about this product?

Yes ☐ No ☐

1) Is the user documentation complete and up to date?

Yes ☐ No ☐

2) Is the user documentation easy to read and understand?

Yes ☐ No ☐

1) What was the total cost of acquiring and using the software product ………………………………………

2) Are direct costs included for the price of the software?

Yes ☐ No ☐

3) Are direct costs included for the price of the documentation?

Yes ☐ No ☐

4) What are included in the indirect costs?

Yes ☐ No ☐

Cost to acquire and use

- Modifying the software ☐
- Training personnel ☐
- Converting files ☐
- Installing the software ☐
- Checking out the software ☐
- Operating the software ☐
- Maintaining the software after installation ☐
- Travel expenses ☐

C – 7 Contract Negotiation Factors

- Software purchase / licensing
- Software Maintenance Cost (1st year and subsequent years)
- Hardware
- Migration of data from your old system to your new system
- Additional customization or development work needed to fulfil unique business requirements
- Integration of existing software applications into the system
- Number of user licenses required
- Number of modules to be implemented
- Number of sites the software will be installed at
Appendix D: Implementation Phase Check-lists and Guidelines

D – 1 Monitor Supplier Progress

1) Use the specified time frames that are established in the contract to determine whether the supplier’s development on schedule.

2) Review all work at the end of each completed development step to determine if it conforms with contract specifications.

3) Decide if the supplier’s approach is technically feasible.

4) Render timely management decisions on all alternatives presented by the supplier.

5) Once a step is approved, freeze that work step until development is complete to stabilize the base for succeeding work steps.

6) Apply acceptance testing to completed steps as well as at the end of the development effort.

7) Use the measures of reliability and quality specified in the contract during step 9 of the acquisition process to evaluate the supplier’s work.

8) Assess the supplier’s performance in terms of the satisfactory performance criteria as specified in the contract during step 9.

9) Provide some means for regular and continuous feedback to the supplier on supplier performance in terms of overall progress on handing problems.
## Appendix E: Acceptance Phase Check-lists and Guidelines

### E – 1 Test Types and Activities

The following definitions have been compiled the Software Engineering Body of Knowledge Chapter 5, with Cross references to IEEE glossary 610.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
<th>IEEE 610</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptance</td>
<td>This is testing defined, planned, and conducted by the user to ascertain the degree to which the system conforms to the requirements defined in the agreement, and forms the basis for customer acceptance. Acceptance test records are maintained by the user.</td>
<td>Acceptance testing. (1) Formal testing conducted to determine whether or not a system satisfies its acceptance criteria and to enable the customer to determine whether or not to accept the system.</td>
</tr>
<tr>
<td>Client/Server Work Flow</td>
<td>The functional and performance testing of the work flow in a client server system operating in its complete environment under various loads.</td>
<td>-</td>
</tr>
<tr>
<td>Concurrency</td>
<td>The verification that an application can support multiple users accessing the same program and or data without lockouts or deadly embraces (dead-locks).</td>
<td>Concurrent. Pertaining to the occurrence of two or more activities within the same interval of time, achieved either by interleaving the activities or by simultaneous execution.</td>
</tr>
<tr>
<td>Coexistence</td>
<td>The verification that an application can share resources with other applications running concurrently.</td>
<td>-</td>
</tr>
<tr>
<td>Functionality</td>
<td>The strict definition refers to the testing of the functional requirements. Inputs include normal and unexpected data (boundaries and limits). This term is also used to include security, compatibility with other external systems or networks and performance testing and usability.</td>
<td>Functional testing. (1) Testing that ignores the internal mechanism of a system or component and focuses solely on the outputs generated in response to selected inputs and execution conditions. Same as black-box testing. Functional testing. (2) Testing conducted to evaluate the compliance of a system or component with specified functional requirements. Functional unit. An entity of hardware, software, or both, capable of accomplishing a specified purpose. Black box. (1) A system or component whose inputs, outputs, and general function are known but whose contents or implementation are unknown or irrelevant. Black box. (2) Pertaining to an approach that treats a system or component as in (1). Black box model. A model whose inputs, outputs, and functional performance are known, but whose internal implementation is unknown or irrelevant; for example, a model of a computerized change-return mechanism in a vending machine, in the form of a table that indicates the amount of change to be returned for each amount deposited.</td>
</tr>
<tr>
<td>Integration</td>
<td>Testing conducted on a group of associated programs to ensure that inter-program communication is functioning properly. Usually run after successful Unit Testing. This is testing defined, planned, and conducted to ascertain the degree to which the software, particularly its internal interfaces, conforms to design specifications. The testing is primarily structural from a system perspective while being functional from an individual item (unit or module or product) perspective. Previously tested items are combined (integrated) in a test environment by one of several approaches until Integration. The process of combining software components, hardware components, or both into an overall system. Integration testing. Testing in which software components, hardware components, or both are combined and tested to evaluate the interaction between them. Component testing. Testing of individual hardware or software components or groups of related components. Interface testing. Testing conducted to evaluate whether systems or components pass data and control correctly to one another.</td>
<td>-</td>
</tr>
</tbody>
</table>
all software has been tested together. Sample integration approaches are described below: *big bang* all items are placed in the test environment at once; *incremental* items are added to the test environment one or a few at a time (usually in a “top down” or “bottom up” manner) with testing conducted in a step wise manner; *string/thread* items associated with a single logical process or data flow are added to the test environment together.

<table>
<thead>
<tr>
<th>Installation</th>
<th>The testing of the validity of the installation of the system (installation qualification). This includes standard set of steps to check that the installation has worked correctly.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Installation and checkout phase.</strong> The period of time in the software life cycle during which a software product is integrated into its operational environment and tested in this environment to ensure that it performs as required.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Memory</th>
<th>The analysis of an executing program and detection of run time memory errors including reading and using initialized memory, failing to free memory that has been allocated and over-reading or overwriting array boundaries.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance specification.</strong> A document that specifies the performance characteristics that a system or component must possess. These characteristics typically include speed, accuracy, and memory usage. Often part of a requirements specification. <strong>Performance testing.</strong> Testing conducted to evaluate the compliance of a system or component with specified performance requirements.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parallel</th>
<th>The running of both the old and new version of a system at the same time to identify possible differences between the two versions.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Concurrent.</strong> Pertaining to the occurrence of two or more activities within the same interval of time, achieved either by interleaving the activities or by simultaneous execution.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System</th>
<th>The testing of all aspects of a completely integrated system and its subsystems under all feasible conditions. It is the testing of all affected programs to ensure that they run correctly, that they relate to each other properly, and that the operating procedures and controls are adequate. This is primarily functional testing defined, planned, and conducted to ascertain the degree to which the entire system (hardware and software), particularly its external interfaces, conforms to all requirements (including those for <em>security</em>, <em>capacity</em>, <em>throughput</em>, etc.) defined in the agreements.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System testing.</strong> Testing conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stress</th>
<th>The use of test data chosen from the “boundaries” of input or output range classes, data structures, and procedure parameters. The choices include maximum, minimum, and trivial values or parameters.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stress testing.</strong> Testing conducted to evaluate a system or component at or beyond the limits of its specified requirements.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Usability</th>
<th>The testing of the human factors of the system: the user’s ability to interface with the system (often done using a prototype). A measure of ease of use as applied to the user interface, usually expressed in terms of the amount of training required to achieve proficiency and/or the amount of time required for a trained user to perform specific tasks.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User friendly.</strong> Pertaining to a computer system, device, program, or document designed with ease of use as a primary objective. <strong>End user computing.</strong> The performance of system development and data processing tasks by the user of a computer system. <strong>Qualification testing.</strong> Testing conducted to determine whether a system or component is suitable for operational use. <strong>Operational testing.</strong> Testing conducted to evaluate a system or component in its operational environment.</td>
<td></td>
</tr>
</tbody>
</table>
E – 2 Software Test IEEE 1062

Rate the actions needed to maintain adequate control over the software test.

1. Observe or participate in the software test.  
   important ☐ not important ☐

2. Adequately analyze the test results.  
   important ☐ not important ☐

3. Document all errors revealed by the test.  
   important ☐ not important ☐

4. Require the supplier to correct all discrepancies as a condition for final payment. (this provision must be included in the contract.)  
   important ☐ not important ☐

5. Follow up on all discrepancies to make sure they are corrected before the software is accepted.  
   important ☐ not important ☐

6. Assure that personnel responsible for the acquirer's acceptance testing of the software have adequate technical expertise.  
   important ☐ not important ☐

7. Assign qualified personnel with systems, data processing and performance evaluation expertise to test the software.  
   important ☐ not important ☐

8. If personnel with the expertise to adequately evaluate the software are not available, arrange for an independent evaluation by outside sources.  
   important ☐ not important ☐

E – 3 Software Acceptance IEEE 1062

1) Rate actions for the certification process.

   a) Identify certification steps that are consistent with satisfying the quality and maintenance objectives documented in quality and Maintenance Plans.  
      important ☐ not important ☐

   b) Make sure the acceptance criteria developed from C–4 are consistent with achieving high-quality software as planned for in the quality and Maintenance Plans.  
      important ☐ not important ☐

   c) Make sure the evaluation and tests are sufficient to satisfactorily demonstrate that all acceptance criteria can be achieved, and that the software conforms to contract specification.  
      important ☐ not important ☐

   d) Identify an individual or organization who is responsible for Determining final acceptance of the software conform to contract Specification.  
      important ☐ not important ☐

   e) Document the steps involved in certifying the software.  
      important ☐ not important ☐
include any useful procedure or check-list for recording significant result and determining final acceptance.

2) Rate all remedies needed in case the supplier fails to perform

   a) Make sure final payment is not made until the end or until certification that the software meets contract specifications and that all acceptance criteria have been satisfied.

   b) To the degree that non performance is encountered, exercise the contract provisions for withholding or reducing payments to the supplier.

   c) To minimize losses and time delays, if the contract is terminated, exercise the organization’s contingency plan.

E – 4 Data Migration Information Sheet

The information below can be recorded by the project team on their data migration requirements (Tynator, 2006).

<table>
<thead>
<tr>
<th>Source System</th>
<th>Scope of data to be converted</th>
<th>Volume of data</th>
<th>Degree of cleansing required (1)</th>
<th>Complexity of code translations required (2)</th>
<th>Type of conversion (3)</th>
<th>Responsibility</th>
</tr>
</thead>
</table>

(1) Degree of cleansing required:
1. Clean, no additional effort required
2. Automated cleansing possible
3. Majority can be automated, manual exception processing is required
4. Requires manual cleansing

(2) Complexity of code translations required:
1. Completely automated, no special programming required
2. Completely automated, special programming required
3. Majority can be automated, manual exception programming is required
4. Requires manual translation

(3) Types of conversion: automated or manual.
Appendix F: Follow-on Phase Check-lists and Guidelines

F – 1 Drivers and Scope of a user survey (See C - 3)

Drivers for the survey Before embarking on a detailed design, those responsible for conducting the survey need to understand why the survey is being conducted. Potential drivers for a survey include:

- Quality of service
- Ongoing comparisons
- Organisational change
- External requirements

Internal versus external users

There are two types of user, internal and external. Internal users are the employees of the organisation and generally use the systems provided by the IT unit at the desktop. External users are members of the general public, businesses or other organisations which use services such as websites, or which receive output from large transactional systems.

User segmentation

A user segment describes a group of users and the services they use. It should be ensured that all users and services are considered and, if any are to be omitted, the reason why recorded. This is because these might be included in the future and any omissions will need to be considered when comparing survey results.

Service versus system versus infrastructure

A survey needs to clearly identify and articulate the aspects of IT that are being tested. In many cases this will be the complete IT service and the survey will ask questions about general performance. However, if there is interest in one specific aspect of the overall IT service provision, such as email, then this will have to be clearly explained in terms that users will understand.

F – 2 Areas to be addressed in a user survey

Any user satisfaction survey aimed at internal IT users should look at five main areas:

- Individual use and experience of the IT service
- How well the current IT service performs
- How good the response is when something goes wrong
- How well the IT function supports developing business needs
- Specific issues of concern to the individual organisation

<table>
<thead>
<tr>
<th>Area</th>
<th>Purpose</th>
<th>Typical Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual use and experience of the IT service</td>
<td>Attempts to gain an overall impression of the user’s requirement for IT and general satisfaction with the service.</td>
<td>How important is the IT service to you? How much do you use the IT services? What particular packages do you use? How satisfied are you with the overall IT service? Do the systems provided by the IT service meet your needs effectively? Have you had sufficient IT training for the systems you need? Can you get extra training when you want it? Do you use the departmental intranet/Internet/ from your PC? Do you access the departmental website? Can you get the information you require to do your job?</td>
</tr>
<tr>
<td>Area</td>
<td>Purpose</td>
<td>Typical Questions</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>How well the current IT service performs</td>
<td>Tests the performance of the existing IT systems.</td>
<td>✔ How reliable do you find the existing IT systems?  &lt;br&gt; ✔ Do you find the speed of the existing systems acceptable?  &lt;br&gt; ✔ How do you find the speed of the Internet?  &lt;br&gt; ✔ Are the systems available whenever you want them?  &lt;br&gt; ✔ Do you have to restart/reboot your PC frequently due to problems?  &lt;br&gt; ✔ Do you know what level of support to expect from the service desk?  &lt;br&gt; ✔ Are you aware of the Service Level Agreements (SLAs) with the service provider?</td>
</tr>
<tr>
<td>How good the response is when something goes wrong</td>
<td>Attempts to assess the effectiveness of the service desk/help-desk and any desktop-side support. One issue worth probing is the extent to which the user community rely on the 'official' help-desk and the extent to which they solve problems themselves or rely on peer support.</td>
<td>✔ Who is your first point of contact when things go wrong?  &lt;br&gt; ✔ Are there self-help documents or websites and how effective are they?  &lt;br&gt; ✔ Are you satisfied with the speed of the initial response when dealing with your problems?  &lt;br&gt; ✔ Do you find the attitude of service desk staff helpful?  &lt;br&gt; ✔ How did the service desk solve your problem (telephone/email/remotely/personal visit......)?  &lt;br&gt; ✔ Do the IT support hours meet your needs?  &lt;br&gt; ✔ How well does the help-desk solve your problems?  &lt;br&gt; ✔ How quickly does the help-desk solve your problems?  &lt;br&gt; ✔ How well are you aware of progress being made in solving your problems?  &lt;br&gt; ✔ How much time do you spend on routine IT activities, e.g. file housekeeping/printer problems etc.?</td>
</tr>
<tr>
<td>How well the IT function supports developing business needs</td>
<td>Attempts to gauge how well the IT service supports the business needs of the organisation, looking at the development of future applications and services as well as extra functionality on the desktop. It should be noted that not everyone in the organisation is likely to be involved in exploring the ways in which future business needs could be supported by IT.</td>
<td>✔ Are you consulted about future IT services?  &lt;br&gt; ✔ When thinking about future IT support, from whom do you seek advice?  &lt;br&gt; ✔ How well does the IT service provide extra functionality on the desktop when required?  &lt;br&gt; ✔ Is it easy to make changes to existing systems?  &lt;br&gt; ✔ How proactive is the IT service in looking at current and future needs?  &lt;br&gt; ✔ How effective is the process of introducing extra functionality?  &lt;br&gt; ✔ Does the IT unit provide sufficient support after a new system or enhancement is introduced?</td>
</tr>
<tr>
<td>Specific issues of concern to the individual organisation</td>
<td>There may be issues of specific concern to the organisation. These may focus on introducing a new system or service, or on ongoing problems.</td>
<td>✔ How useful is System X in your work?  &lt;br&gt; ✔ How reliable is System X?  &lt;br&gt; ✔ How responsive is System X?  &lt;br&gt; ✔ How easy to use is System X?</td>
</tr>
</tbody>
</table>
**F – 3 User Survey Design**

Survey design issues remain much the same whatever the mode of the survey undertaken. The table below outlines the main areas for consideration:

<table>
<thead>
<tr>
<th><strong>Objective</strong></th>
<th><strong>Areas for consideration</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clear and purposeful question design</strong></td>
<td>Although certain methods of data collection, such as telephone interviews, appear to be more informal than a questionnaire it is important, whatever the mode of the survey, to consider carefully the number and structure of questions asked. The questions or statements need to be clear and unambiguous, with the ability to draw out information that can be acted upon. Questions and statements should be designed, as far as possible, to give graduations of opinion, e.g. <strong>Example Question:</strong> ‘To what extent do you think…?’ (rather than, ‘Do you think.....?’) <strong>Example Statement:</strong> ‘I know what the time-scales are for resolving incidents.’ Responses such as: Strongly Agree / Agree / Neither Agree nor Disagree / Disagree / Strongly Disagree Note that although it is satisfactory to use both questions and statements, the statements may be seen to be biased towards the positive.</td>
</tr>
<tr>
<td><strong>Relevant subject matter</strong></td>
<td>Check how important each question/area is to the user. The information can then be used to prioritise action plans.</td>
</tr>
<tr>
<td><strong>Sufficient numbers of questions</strong></td>
<td>Asking too many questions may result in less fulsome responses.</td>
</tr>
<tr>
<td><strong>Alignment with SLAs</strong></td>
<td>If any Service Level Agreements (SLAs) exist, consider formulating questions so that these test the SLAs’ usefulness.</td>
</tr>
<tr>
<td><strong>Adaptability for future use</strong></td>
<td>When compiling the survey, its adaptability for future use should be born in mind. Ideally, the drivers will remain the same but the criteria may differ, e.g. new application releases may be in place.</td>
</tr>
<tr>
<td><strong>Appropriate rating terminology</strong></td>
<td>The rating terminology, i.e. the responses to the questions asked, should be identified. Although any number of choices may be used, consideration should be given to both the user’s view and the ways in which the data will be dealt with once gathered. The rating terminology needs to be appropriate to the question and can be verbal or numeric: <strong>Verbal Choices:</strong> • ‘Strongly Disagree’ to ‘Strongly Agree’ • ‘Very Dissatisfied’ to ‘Very Satisfied’ • ‘Very Poor’ to ‘Very Good’ • ‘Definitely’ to ‘No, not at all’ <strong>Numerical Choices:</strong> • Rate 1 to 5 • Rate 1 to 10 Most people are used to rating out of ten and this is the most common numerical scale. The ratings should be positioned in the same place throughout the survey so the user can avoid making the incorrect choice by mistake. The ratings to be included in the ‘Satisfied’ score should be agreed, i.e. ‘Very Good’ and ‘Good’ would be used to calculate the satisfaction score. Neutral replies would not count. Alternatively, if a numerical score is being used, the score can be converted out often into a percentage satisfaction score.</td>
</tr>
<tr>
<td><strong>Objective</strong></td>
<td><strong>Areas for consideration</strong></td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------------------</td>
</tr>
</tbody>
</table>
| **Preferred scoring mechanisms** | The scoring mechanism to be used should be identified. Although any number of choices may be used, consideration should be given to both the user’s view and the way in which the data will be dealt with once gathered.  

The most common mechanisms give four, five or ten choices. The benefit of using four options rather than five is that the user must make a definite decision and not sit on the fence. With five options it is more likely the user will rate the middle option. However, this may be preferable and may avoid abandoned surveys. With a scoring mechanism of ten the user has more choice.  

It may be relevant to include a ‘Not Applicable’ option. |
| **Employee comments** | Comments may be requested on the questionnaire. These are often very useful in determining why the user is dissatisfied. However, if not directed they may not be as helpful as they could be.  

A comment is particularly useful if the user rates a question ‘Poor’ or ‘Very Poor’. |
| **Deciding whether to run a named or anonymous survey** | Some users will prefer to remain anonymous and may not respond to a named survey.  

If the survey is to be anonymous there is no way to contact the user for more details of poor ratings. One option is to provide an anonymous survey but give the user the option of including their name if they are happy to be contacted. |

**Communication with survey participants**

**Before** conducting the survey, it should be ensured that all the stakeholders are in agreement as to the survey’s purpose and methodology. Agreement is also required concerning what information will be needed, by whom and how often. It may be relevant to involve representatives from different teams in the organisation to ensure that all aspects are covered by the questionnaire. All the team members in the organisation need to be made aware of the purpose of the survey and when it will be conducted. The survey should be publicised to users giving the reasons it is being conducted and why participation is required. Details should be given as to when and how the results will be published.

**During** the survey it may be useful to remind users of the closing date for responses, particularly if the response rate has not been high. This could be done by a follow-up email to all those invited to participate or by a bulletin on the intranet. If any of the feedback received needs urgent attention it can be communicated to the person responsible.

**After** the survey closes, a message can be posted on the intranet or an email sent thanking participants for their time and announcing when the results will be published. Once the results have been analysed and action plans agreed these should be published as described in the earlier communications.

**Sampling and Survey Timing**

If not surveying all users the recommended sample sizes from appropriate bodies should be considered, e.g. 10%. Assuming the survey is running across populations of 400+ a minimum sample should be 100. Increasing the sample above 1,000 is unlikely to alter the conclusions of the survey. However, it might be necessary to survey all staff for reasons of inclusiveness. Using market research industry practice the number of respondents which will form a representative sample can be calculated. To obtain a quick summary based on size the Sample Size Calculator (see [http://www.surveysystem.com/sscalc.htm](http://www.surveysystem.com/sscalc.htm)) may be used to calculate the sample.  

Choosing a 95% confidence level with a 5% confidence interval conforms to industry practice. The sample size will need to be increased to account for non-responses. The percentage response will need to be an assumption the first time it is calculated. A rule of thumb might assume a 50% to 60% response.
Consideration might be given as to how the sample could be rotated, to ensure that when the next survey is carried out the same sample of users is not selected.

The frequency and timing of surveys should be considered to ensure that there are no clashes with other surveys or events, and that the users do not suffer ‘survey fatigue’.

The following factors should be born in mind:
- Other surveys being conducted, e.g. employee satisfaction surveys
- IT events, e.g. new releases
- Other events, e.g. redundancies announced, school holidays
- Requirement for a regular year-on-year comparison.

**Analysis and actions**
The results can be summarised in numbers and/or percentages. It is useful to use both. They can be exported into bar charts and tables to highlight certain areas. A report can then be compiled highlighting strengths and improvement areas. Where there are issues, drilling down will determine as much information as possible, e.g. Which unit? / Which application? / Which grade of staff?

The results should be analysed and reported to the stakeholders as agreed. Drill-down information for stakeholders should be available as required, particularly where there are problem areas.

An improvement plan should be compiled and communicated to the users and other organisation team members. An update on the implementation of the improvement plan should be communicated regularly.

The results should be checked against other information available, such as a supplier performance index, to ensure that results are not out of step.

As with any project, a post-survey review is useful to determine what has been learnt and what needs to be done.
Appendix G: Improvement Phase Check-lists and Guidelines

This Appendix lists the best practices for use in the acquisition of products and services and is based on the CMMI for Acquisition (CMMI-ACQ) model for process improvement. For more information about Process Management and high maturity process areas, see the CMMI-ACQ model at:
http://www.sei.cmu.edu/publications/documents/07.reports/07tr017.html

G – 1 CMMI-ACQ Process Areas

The CMMI-ACQ groups the process areas into the following process area categories:

1. Process Management (i.e., organizational management) which includes:
   - Project Planning
   - Project Monitoring and Control
   - Integrated Project Management
   - Requirements Management
   - Risk Management

2. Acquisition (i.e. requirements and agreements with supplier) which includes:
   - Solicitation and Supplier Agreement Development
   - Agreement Management
   - Acquisition Requirements Development
   - Acquisition Technical Management
   - Acquisition Verification
   - Acquisition Validation

3. Support (i.e. processes and tools for project management) which includes:
   - Configuration Management
   - Decision Analysis and Resolution
   - Measurement and analysis
   - Process and Product Quality Assurance

G – 2 CMMI-ACQ Generic Practices

The model includes 12 generic practices that should be included in every process area, in addition to the specific practices that appear in each process area description. These generic practices are designed to improve the power of a process by ensuring that the specific practices are executed and that there is appropriate planning of the process to ensure that it is feasible and well supported and that stakeholders are properly involved.

1. Establish and maintain an organizational policy for planning and performing the process.
2. Establish and maintain the plan for performing the process.
3. Provide adequate resources for performing the process, developing the work products, and providing the services of the process.
4. Assign responsibility and authority for performing the process, developing the work products, and providing the services of the process.
5. Train the people performing or supporting the process as needed.
6. Place designated work products of the process under appropriate levels of control.
7. Identify and involve the relevant stakeholders of the process as planned.
8. Monitor and control the process against the plan for performing the process and take appropriate corrective action.
9. Objectively evaluate adherence of the process against its process description, standards, and procedures, and address non-compliance.
10. Review the activities, status, and results of the process with higher level management and resolve issues.
11. Establish and maintain the description of a defined process.
12. Collect work products, measures, measurement results, and improvement information derived from planning and performing the process to support the future use and improvement of the organization’s processes and process assets.
 Templates
**Template – 1 Project Analysis Worksheet**

A. General Information
Provide basic information about the project including: Project Title – The proper name used to identify this project; Project Working Title - The working name or acronym that will be used for the project; Proponent Secretary – The Secretary to whom the proponent agency is assigned or the Secretary that is sponsoring an enterprise project; Proponent Agency – The agency that will be responsible for the management of the project; Prepared by – The person(s) preparing this document; Date Prepared - The date this document is initially prepared.

**Project Title:** ______________________

**Project Working Title:** ______________________

**Proponent Secretary:** ________________

**Proponent Agency:** _________________________

**Prepared by:** _______________________

**Date Prepared:** ____________________________

B. Project Purpose
Explain the business reason(s) for doing this project.

1. Business Problem
The Business Problem is a question, issue, or situation, pertaining to the business, which needs to be answered or resolved. State in specific terms the problem or issue this project will resolve. Often, the Business Problem is reflected as a critical business issue or initiative in the Agency’s Strategic Plan or Information Technology Strategic Plan.

__________________________________________________________________________________

__________________________________________________________________________________

2. Project Business Objectives
Define the specific Business Objectives of the project that correlate to the strategic initiatives or issues identified in the Commonwealth or Agency Strategic Plan. Every Business Objective must relate to at least one strategic initiative or issue and every initiative or issue cited must relate to at least one project Business Objective.

<table>
<thead>
<tr>
<th>Agency Strategic Plan – Critical Issues</th>
<th>Project Business Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

3. Core Business Activity Impacted
Core Business Activities are agency defined cross-functional processes that produce the agency's primary products and services, or support their production. List the Core Business Activities impacted by the project and identify the impact.

<table>
<thead>
<tr>
<th>Agency Core Business Activity</th>
<th>Impact on Core Business Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

4. Constraints
Constraints are items that by their nature restrict choice. Identify constraints that will influence the selection of a solution to resolve the business problem. Constraints can include but are not limited to: time, funding, personnel, facilities, and management limitations.

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________
C. Preliminary Project Description
Provide a preliminary description of the project approach, the customer(s) served, and expected benefits. The approach is the overall strategy for solving the business problem. The Preliminary Project Description is derived from the Project Description Statement and Section B, Project Purpose. (This description establishes the framework for identifying potential solutions.)

__________________________________________________________________________________
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D. Solution(s) Analysis – Part I
Describe each potentially viable solution, and evaluate the solution against the decision criteria described below in D.1 through D.2.e. Duplicate the Evaluation Process (D.1 through D.2.e) for each solution being considered.

1. Description of Solution
Provide an identifier and a brief title of the potential solution. The description should include enough detail to provide a clear understanding of the solution and should differentiate it from the other potential solutions. Also, describe how the solution will resolve the Business Problem defined in Section B of this document.

Solution Identifier _______________________
Short Solution Title _______________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

2. Decision Criteria
The following Decision Criteria are recommended for evaluation of each potential solution. All potential solutions must be evaluated against the same set of Decision Criteria. Additional Decision Criteria may be used, if needed.

a) Business Process Impact
Describe how the potential solution will impact current Business Processes and the degree of organizational change and stakeholder resistance anticipated.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

b) Technical Feasibility
Describe any special technical considerations that would be required to implement the potential solution, such as technical experience required for project team members. Also, describe the level of technical complexity of the solution.

__________________________________________________________________________________
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b) Maturity of Solution
Describe the level of technical maturity for the potential solution. The description should address questions such as “Is the potential solution technically proven or a recent innovation? Has the technology solution being proposed fully matured? Is it nearing obsolescence? Are services and expertise required to support the potential technical solution readily available?”

__________________________________________________________________________________
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d) Resource Estimate
Estimate all the resources required to implement the solution. Resources include funding, personnel, facilities, customer support, equipment, and any other resources needed to implement the solution.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Requirement(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding</td>
<td></td>
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<tr>
<td>Project Team</td>
<td></td>
</tr>
<tr>
<td>Customer Support</td>
<td></td>
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<tr>
<td>Facilities</td>
<td></td>
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<tr>
<td>Equipment</td>
<td></td>
</tr>
<tr>
<td>Software Tools</td>
<td></td>
</tr>
<tr>
<td>Other (Be specific)</td>
<td></td>
</tr>
</tbody>
</table>

e) Constraints Impact

Describe how the solution fits within the constraints identified in Section B. Specifically address any time or schedule constraints.

__________________________________________________________________________________
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__________________________________________________________________________________

Based on decision criteria 2.a-2.e, is the potential solution a viable solution?  ____YES  ____NO

If yes, continue to Section E (Solution(s) Analysis – Part II). If no, discard solution.

E. Solution(s) Analysis – Part II

Solution has been proven viable. Perform a Cost Benefit Analysis for the solution and calculate the Return on Investment. Provide a summary of the results below. A Cost Benefit Analysis and Return on Investment must be performed for each viable solution. Duplicate Solution(s) Analysis – Part II (Section E) for each solution being considered.

Solution Identifier ____________________________  Short Solution Title __________________________

1. Cost Benefit Analysis Summary

Summarize the results of the Cost Benefit Analysis for this solution.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

2. Return on Investment (ROI) Summary

Summarize the estimated return achieved as a result of the investment made and explain the ROI method used. There are several ways to calculate ROI. Any method is acceptable but the same method must be used for each solution analysed.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

F. Comparison of Solutions

Based on the analysis performed, rate how each solution measured up against each decision criterion. A recommended Rating Scale is: 1 = Very Poor, 2 = Poor, 3 = Fair, 4 = Good, 5 = Very Good. Compare the rating results to determine which solution to recommend. Enter in the Solution Identifier in Boxes that are shaded.
### Decision Criteria

<table>
<thead>
<tr>
<th>Decision Criteria</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Process Impact</td>
<td></td>
</tr>
<tr>
<td>Technical Feasibility</td>
<td></td>
</tr>
<tr>
<td>Maturity of Solution</td>
<td></td>
</tr>
<tr>
<td>Resources Required</td>
<td></td>
</tr>
<tr>
<td>Constraints Impact</td>
<td></td>
</tr>
<tr>
<td>Cost Benefit Analysis</td>
<td></td>
</tr>
<tr>
<td>Return on Investment</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
<tr>
<td><strong>Total Score</strong></td>
<td></td>
</tr>
</tbody>
</table>

#### G. Preliminary Recommendation

Describe the Recommended Solution and provide a summary of the rationale for selecting it.

1. **Recommended Solution**

   Specify the Recommended Solution selected as a result of the analysis. Use the description previously provided in Section D of this document.

   **Solution Identifier** _____________________________  **Short Solution Title** ____________________________

   ____________________________________________________________________________________
   ____________________________________________________________________________________
   ____________________________________________________________________________________

2. **Recommended Solution Justification**

   Explain why the Recommended Solution was chosen over the other solutions considered.

   ____________________________________________________________________________________
   ____________________________________________________________________________________
   ____________________________________________________________________________________

#### H. Decision

Document the project sponsor’s or designated agency manager’s decision regarding the Recommended Solution. If the Recommended Solution is accepted, a Project Proposal is developed.

__Accepted__  __Rejected__  __On Hold__  __Requesting More Information__

**Approved By:**

**Name:** ____________________________

**Title:** ____________________________

**Date:** ____________________________
**Template – 2 Project Proposal**

**A. General Information**

Provide basic information about the project including: Project Title – The proper name used to identify this project; Project Working Title - The working name or acronym that will be used for the project; Proponent Secretary – The Secretary to whom the proponent agency is assigned or the Secretary that is sponsoring an enterprise project; Proponent Agency – The agency that will be responsible for the management of the project; Prepared by – The person(s) preparing this document; Date Prepared - The date this document is initially prepared.

**Project Title: Project Working Title: __________________________**

Proponent Secretary: ____________________________

Proponent Agency: ____________________________

Prepared by: ___________________________________

Date Prepared: _______________________________

Answer the following questions by marking Yes or No and provide a brief response as appropriate.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is this an updated Project Proposal Document? If yes, what is the reason for this update?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is this a follow-on to a previous project? If yes, what is the project name and date of completion?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name of previous project:</td>
<td></td>
<td></td>
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<tr>
<td>Date completed:</td>
<td></td>
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<tr>
<td>Is the Project Initiation Phase effort funded? If yes, what is the amount of funding?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the Project Planning Phase effort funded? If yes, what is the amount of funding?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Points of Contact**

List the principal individuals who may be contacted for information regarding the project.

<table>
<thead>
<tr>
<th>Position</th>
<th>Title/Name/Organization</th>
<th>Phone</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Sponsor</td>
<td></td>
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<tr>
<td>Program Manager</td>
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<tr>
<td>Project Manager (Assigned)</td>
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<tr>
<td>Proponent Cabinet Secretary</td>
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<tr>
<td>Proponent Agency Head</td>
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<tr>
<td>Customer (User) Representative(s)</td>
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<tr>
<td>Other</td>
<td></td>
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</tbody>
</table>

**B. Project Purpose**

Explain the business reason(s) for doing this project. If the Project Analysis Worksheet was completed, the Project Purpose (Section B) from the worksheet provides information to support completion of this section.

**1. Business Problem**

The Business Problem is a question, issue, or situation, pertaining to the business, which needs to be answered or resolved. State in specific terms the problem or issue this project will resolve. Often, the Business Problem is reflected as a critical business issue or initiative in the Agency’s Strategic Plan or IT Strategic Plan.

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

**2. Project Business Objectives**

Define the specific Business Objectives of the project that correlate to the strategic initiatives or issues identified in the Commonwealth or Agency Strategic Plan. Every Business Objective must relate to at least one strategic initiative or issue and every initiative or issue cited must relate to at least one Project Business Objective.
### 3. Core Business Activity Impacted

Core Business Activities are agency defined cross-functional processes that produce the agency’s primary products and services, or support the production of the products or services. List the Core Business Activities impacted by the project and identify the impact.

<table>
<thead>
<tr>
<th>Agency Core Business Activity</th>
<th>Impact on Core Business Activity</th>
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</tbody>
</table>

### 4. Constraints

Constraints are items that by their nature restrict choice. Identify Constraints that will influence the selection of a solution to resolve the Business Problem. Constraints can include but are not limited to: time, funding, personnel, facilities, and management limitations.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

### C. Project Description

Describe the project approach, the specific solution, customer(s) served, and expected benefits. The approach is the overall strategy for solving the Business Problem. The solution should identify in specific terms how the project is accomplished and include information about the general timing and cost of major procurements or purchases. If the Project Analysis Worksheet was completed, the Preliminary Project Description (Section C) and the Recommendation (Section G) on the worksheet provide information to support development of the Project Description.

__________________________________________________________________________________
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### D. Strategic Justification

Identify how the project is consistent with the Commonwealth and Agency Strategic or IT Strategic Plan. If the project is not consistent, explain why the project is being proposed.

**Answer the following questions in the space provided. Attach detailed explanations and analysis as appendices.**

1. Briefly, describe how this project supports or is consistent with the Commonwealth of Virginia Strategic Plan for Technology. If it does not support the Commonwealth of Virginia Strategic Plan for Technology, explain why this project proposal is being submitted.

2. Explain where and how this project is identified in the Agency IT Strategic Plan most recently approved by the Secretary of Technology. If it is not identified in the plan, explain why this project proposal is being submitted.

3. Briefly, describe how the planned solution complies with Commonwealth Enterprise Architecture Standards. If it does not comply with the Commonwealth Enterprise Architecture Standards, explain why this project proposal is being submitted, and identify which Commonwealth Enterprise Architecture Standard(s) are not being met.
F. Financial Estimate

Provide an economic justification for the project based upon the Cost Benefit Analysis and the expected return on investment. Identify the estimated funding resources required to complete the project and then identify the funding requirements to operate or maintain the product(s) or service(s) developed from the project.

1. Cost Benefit Analysis Summary

Answer the following questions in the space provided. Attach detailed explanations and analysis as appendices.

a. Summarize the results of the Cost Benefit Analysis. Explain why the expected monetary and non-monetary benefits validate the expenditure of resources for this project. Attach the Cost Benefit Analysis as Appendix A.

b. Summarize the results of the Return on Investment Analysis. If the project does not have a positive expected return on investment, explain why this project proposal is being submitted. Attach the detailed Return on Investment Analysis as Appendix B.

2. Estimate of Execution Expenditures and Funding

Provide an Estimate of the Expenditures and Funding required for execution and close out of the project.

<table>
<thead>
<tr>
<th>Estimated Expenditures (SDG000 or $000)</th>
<th>FY_201_</th>
<th>FY_201_</th>
<th>FY_201_</th>
<th>FY_201_</th>
<th>Total</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Internal Staff Labour</td>
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<tr>
<td>Services</td>
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<td>Software Tools</td>
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<td>Hardware</td>
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<td>Materials and Supplies</td>
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<td>Facilities</td>
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<td>Telecommunications</td>
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<td>Training</td>
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<td>Contingency (Risk)</td>
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<tr>
<td>Total</td>
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</tbody>
</table>

This estimate is accurate to: 50% [ ] 60% [ ] 70% [ ] 80% [ ] 90% [ ]

Explanation:

<table>
<thead>
<tr>
<th>Anticipated (proposed) Funding Source (SDG000 or $000)</th>
<th>FY_201_</th>
<th>FY_201_</th>
<th>FY_201_</th>
<th>FY_201_</th>
<th>Total</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>General Fund</td>
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<tr>
<td>Non-General Fund</td>
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<td>Federal</td>
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<td>Other</td>
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<tr>
<td>Total</td>
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</tr>
</tbody>
</table>

This estimate is accurate to: 50% [ ] 60% [ ] 70% [ ] 80% [ ] 90% [ ]

Explanation:
3. Estimate of Operations Expenditures and Funding
Provide an Estimate of the Expenditures and Funding for Operations and Maintenance of the asset(s) delivered upon project completion.

<table>
<thead>
<tr>
<th>Estimated Expenditures (SDG000 or $000)</th>
<th>FY_201_</th>
<th>FY_201_</th>
<th>FY_201_</th>
<th>FY_201_</th>
<th>Total</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Staff Labour</td>
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<tr>
<td>Services</td>
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<td></td>
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<tr>
<td>Software Tools</td>
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<td>Hardware</td>
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<td>Materials and Supplies</td>
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<td>Telecommunications</td>
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<td>Training</td>
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<td>Contingency (Risk)</td>
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<td>Total</td>
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<td>This estimate is accurate to:</td>
<td>50% [ ]</td>
<td>60% [ ]</td>
<td>70% [ ]</td>
<td>80% [ ]</td>
<td>90% [ ]</td>
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</tbody>
</table>

Explanation:

<table>
<thead>
<tr>
<th>Anticipated (proposed) Funding Source (SDG000 or $000)</th>
<th>FY_201_</th>
<th>FY_201_</th>
<th>FY_201_</th>
<th>FY_201_</th>
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<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>General Fund</td>
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<td>Non-General Fund</td>
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<td>Federal</td>
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<td>Other</td>
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<td>Total</td>
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<tr>
<td>This estimate is accurate to:</td>
<td>50% [ ]</td>
<td>60% [ ]</td>
<td>70% [ ]</td>
<td>80% [ ]</td>
<td>90% [ ]</td>
<td></td>
</tr>
</tbody>
</table>

Explanation:

G. Project Risk
After completing a Preliminary Risk Analysis Worksheet for this project, determine the level of risk for the project and the risk score. On the chart below, circle the resulting risk level and record the risk score for each risk item. Attach the Preliminary Risk Analysis Worksheet as Appendix C.

<table>
<thead>
<tr>
<th>Risk Item</th>
<th>Risk Level</th>
<th>Risk Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget Risk</td>
<td>High (18–25)</td>
<td></td>
</tr>
<tr>
<td>What level of risk does the proposed</td>
<td>Medium (9-17)</td>
<td></td>
</tr>
<tr>
<td>budget represent to the project?</td>
<td>Low (1-8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>None (0)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Item</th>
<th>Risk Level</th>
<th>Risk Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Dependencies Risk</td>
<td>High (11–15)</td>
<td></td>
</tr>
<tr>
<td>How dependent is the project on other</td>
<td>Medium (6-10)</td>
<td></td>
</tr>
<tr>
<td>projects or work efforts?</td>
<td>Low (1-5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>None (0)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Item</th>
<th>Risk Level</th>
<th>Risk Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Risk</td>
<td>High (11–15)</td>
<td></td>
</tr>
</tbody>
</table>
What level of risk does the organization’s project management capability represent?

<table>
<thead>
<tr>
<th>Mission Critical Risk</th>
<th>Low (1-5)</th>
<th>Medium (6-10)</th>
<th>High (11–15)</th>
<th>None (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How critical is the project success to the success of the organization?</td>
<td>Low (1-5)</td>
<td>Medium (6-10)</td>
<td>High (11–15)</td>
<td>None (0)</td>
</tr>
</tbody>
</table>

Failure Risk
What is the risk of failure?

<table>
<thead>
<tr>
<th>Complexity Risk</th>
<th>Low (1-5)</th>
<th>Medium (6-10)</th>
<th>High (11–15)</th>
<th>None (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How complex is project?</td>
<td>Low (1-5)</td>
<td>Medium (6-10)</td>
<td>High (11–15)</td>
<td>None (0)</td>
</tr>
</tbody>
</table>

Preliminary Risk Assessment
What is the overall risk of the project?

<table>
<thead>
<tr>
<th>Total Risk Score:</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (73–100)</td>
</tr>
<tr>
<td>Medium (36-72)</td>
</tr>
<tr>
<td>Low (1-35)</td>
</tr>
<tr>
<td>None (0)</td>
</tr>
</tbody>
</table>

H. Approvals

Obtain the Project Sponsor’s and Agency Head’s signatures indicating approval to submit this Project Proposal for investment consideration. If the Agency Head’s signature is the only signature provided, the Agency Head is assumed to also be the Project Sponsor.

<table>
<thead>
<tr>
<th>Position/Title</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Sponsor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agency Head</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Template – 3 Project Charter

A. General Information
Provide basic information about the project including: Project Title – The proper name used to identify this project; Project Working Title – The working name or acronym that will be used for the project; Proponent Secretary – The Secretary to whom the proponent agency is assigned or the Secretary that is sponsoring an enterprise project; Proponent Agency – The agency that will be responsible for the management of the project; Prepared by – The person(s) preparing this document.

Project Title: ____________________________ Project Working Title: ____________________________
Proponent Secretary: ____________________________ Proponent Agency: ____________________________
Prepared by: ____________________________

Points of Contact
List the principal individuals who may be contacted for information regarding the project.

<table>
<thead>
<tr>
<th>Position</th>
<th>Title/Name/Organization</th>
<th>Phone</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Sponsor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proponent Cabinet Secretary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proponent Agency Head</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer (User) Representative(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. Executive Summary
An Executive Summary is required when Sections C through G of the charter are excessively long. In two or three paragraphs, provide a brief overview of this project and the contents of this document.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

Explain the business reason(s) for doing this project. The Project Purpose (the Business Problem and Project Business Objectives) is in the Project Proposal, Section B.

1. Business Problem
The Business Problem is a question, issue, or situation, pertaining to the business, which needs to be answered or resolved. State in specific terms the problem or issue this project will resolve. Often, the Business Problem is reflected as a critical business issue or initiative in the Agency’s Strategic Plan or IT Strategic Plan.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

2. Project Business Objectives
Define the specific Business Objectives of the project that correlate to the strategic initiatives or issues identified in the Commonwealth or Agency Strategic Plan. Every Business Objective must relate to at least one strategic initiative or issue and every initiative or issue cited must relate to at least one project business objective.

<table>
<thead>
<tr>
<th>Agency Strategic Plan – Critical Issues</th>
<th>Project Business Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
D. Assumptions
Assumptions are statements taken for granted or accepted as true without proof. Assumptions are made in the absence of fact. List and describe the assumptions made in the decision to charter this project.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

E. Project Description, Scope and Management Milestones

1. Project Description
Describe the project approach, specific solution, customer(s), and benefits. The Project Description is located in the Project Proposal, Section C.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

2. Scope
The Project Scope defines all of the products and services provided by a project, and identifies the limits of the project. In other words, the Project Scope establishes the boundaries of a project. The Project Scope addresses the who, what, where, when, and why of a project.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

3. Summary of Major Management Milestones and Deliverables
Provide a list of Project Management Milestones and Deliverables (see Section E of the Project Proposal Document). This list of deliverables is not the same as the products and services provided, but is specific to management of the project. An example of a Project Management Milestone is the Project Plan Completed.

<table>
<thead>
<tr>
<th>Event</th>
<th>Estimated Date</th>
<th>Estimated Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Charter Approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Plan Completed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Plan Approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Execution – Started</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Execution Completed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Closed Out</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F. Project Authority
Describe the authority of the individual or organization initiating the project, any management constraints, management oversight of the project, and the authority granted to the Project Manager.

1. Authorization
Name the project approval authority that is committing organization resources to the project. Identify the source of this authority. The source of the approval authority often resides in code or policy and is related to the authority of the individual’s position or title.

__________________________________________________________________________________

2. Project Manager
Name the Project Manager and define his or her role and responsibility over the project. Depending on the project’s complexities, include how the Project Manager will control stakeholders organizations and employees.
3. Oversight
Describe the Commonwealth or Agency Oversight controls over the project.

G. Project Organization

1. Project Organization Chart
Provide a graphic depiction of the project team. The graphical representation is a hierarchical diagram of the project organization that begins with the project sponsor and includes the project team and other stakeholders.

2. Organization Description
Describe the type of organization used for the project team, its make-up, and the lines of authority.

3. Roles and Responsibilities
Describe, at a minimum, the Roles and Responsibilities of all stakeholders identified in the organizational diagram above. Some stakeholders may exist who are not part of the formal project team but have roles and responsibilities related to the project. Include these stakeholders’ roles and responsibilities also.

H. Resources
Identify the initial funding, personnel, and other resources, committed to this project by the project sponsor. Additional resources may be committed upon completion of the detailed project plan.

<table>
<thead>
<tr>
<th>Resources</th>
<th>Allocation and Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding</td>
<td></td>
</tr>
<tr>
<td>Project Team (Full and Part Time Staff)</td>
<td></td>
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<tr>
<td>Customer Support</td>
<td></td>
</tr>
<tr>
<td>Facilities</td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td></td>
</tr>
<tr>
<td>Software Tools</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

I. Signatures
The Signatures of the people below document approval of the formal Project Charter. The Project Manager is empowered by this charter to proceed with the project as outlined in the charter.

<table>
<thead>
<tr>
<th>Position/Title</th>
<th>Signature/Printed Name/Title</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proponent Cabinet Secretary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(as required)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proponent Agency Head</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Sponsor (required)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Manager (required)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Stakeholders as needed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The purpose of this template is to guide the preparation of an Acquisition plan (AP) based in this recommended practice.

The AP should contain the content as described in B.8. The user of this template may adopt any format and numbering system for the AP. The AP section numbers listed in this template are provided to assist the readability of this template and are not mandatory for the user.

1. Introduction
2. References
3. Definitions
4. Software acquisition overview
   4.1 organizations
   4.2 schedule
   4.3 Resource summary
   4.4 Responsibilities
   4.5 Tools, Techniques
5. Software acquisition process
   5.1 planning organizational strategy.
   5.2 implementing the organization process
   5.3 Determining the software requirement
   5.4 Identifying potential suppliers
   5.5 preparing contract document
   5.6 Evaluation proposals and selecting the suppliers
   5.7 managing supplier performance
   5.8 Accepting the software
   5.9 Using the software
6. Software acquisition reporting requirements
7. Software acquisition management requirements
   7.1 Anomaly resolution and reporting
   7.2 Deviation policy
   7.3 Control procedure
   7.4 Standards, practices and convention
   7.5 Performance tracking
   7.6 quality control of plan
8. Software acquisition documentation requirements

Figure B.1 – Example Acquisition plan outline

B.1 (AP Section 1) Introduction
The AP should describe the specific purpose, goals, and scope of the software acquisition effort, including deviations from this recommended practice. The software acquisition for which the plan is being written and the specific software processes and products covered by the software acquisition effort should be identified. The requirements and planned employment of the items to be acquired should be described, usually by reference. The type of contract to be used should be identified. The support concept to be used should be identify or referenced. Date of plan issue and status should be provided. Plan issuing organization and approval authority should be identified. (Initiation and Planning Phases).

B.2 (AP Section 2) references
The AP should identify the documents placing constraints on the acquisition, documents referenced by the AP, and any supporting documents supplementing or implementing the AP, including other plans or task description the elaborate details of the plan.

B.3 (AP Section 3) Definitions
The AP should define or reference all terms required to understand the AP. All abbreviations and notations used in the AP should be described.
B.4 (AP Section 4) Software acquisition overview
The AP should describe organization, schedule, resources, responsibilities, tools, techniques and methods necessary to perform the software acquisition process.

B.4.1 (AP Section 4.1) organization
The AP should describe the organization of the acquisition effort. The AP should describe the lines of communication with the acquisition effort, the authority for resolving issues raised in the acquisition, and the authority for approving acquisition products.

B4.2 (AP Section 4.2) Schedule
The AP should describe how the acquisition steps will be grouped into work packages, the sequencing and relationships for steps and relationship to a master schedule (if appropriate), and how work packages are assigned to organizational elements.

B4.3 (AP Section 4.4) Resource summary
The AP should summarize the acquisition resources, including staffing, facilities, tools, finances, and special procedural requirements (e.g., security, access rights, and documentation control). Estimates of the cost and other resource requirements should be provided.

B4.4 (AP Section 4.4) Responsibilities
The AP should identify an overview of the organizational element(s) and responsibilities for acquisition steps.

B4.5 (AP Section 4.5) tools, techniques. And methods
The AP should describe the special documents, tools, techniques, methods, and operating and test environment to be used in the acquisition process. Acquisition, training, support, and qualification information for each tool, technology, and methodology should be included. The AP should document the metrics to be used by the Acquisition process and should describe how these metrics support the acquisition process.

B.5 (AP Section 5) Software acquisition process
The AP should identify actions to be performed for each of the software acquisition steps described in this recommended practice, and should document those actions. View the acquisition phases.

B.5.1 (AP Sections 5.1 through 5.9) Software acquisition process
The AP should include 5.1 through 5.9 of this recommended practice for software acquisition phases as shown in the AP outline (see Figure B.1).

The AP should address the following topics for each software acquisition step:
   Step input. What is needed to perform the step.
   Step output. What results when the steps is performed.
   Steps process. The details of what a step is expected to do.
   Steps controls. What is to be performed to control the results of the steps.

NOTE- The user of this template should examine the phases of this recommended practice for process details.

B.6 (AP Section 6) software acquisition reporting require mints
The AP should describe how information will be collected and provided for each reporting period, including work packages completed, work packages in work, and work packages started. Also, risks should be identified, along with their mitigation approach.

B.7 (AP Section 7) Software acquisition reporting requirements
The AP should describe the anomaly resolution and reporting; deviation policy; control procedure; standard,
practices, and convention; performance tracking; and quality control of the plan.

**B.7.1 (AP Section 7.1) the anomaly resolution and reporting**
The AP should describe the method of reporting and resolving anomalies, including the criteria for reporting an anomaly, the anomaly distribution list, and authority for resolving anomalies.

**B.7.2 (AP Section 7.2) Deviation policy**
The AP should describe the procedure and forms used to deviate from the plan. The AP should identify the authorities’ responsible for approving deviation.

**B.7.3 (AP Section 7.3) control procedures**
The AP should identify control procedures application during the acquisition effort. This procedure should describe how software products and acquisition results should be configuration, protected, and stored.

**B.7.4 (AP Section 7.4) Standard, practices, and conventions**
The AP should identify the standard, practices, and convention that govern the performance of acquisition Action including internal organization standard, practices, and policies.

**B.7.5 (AP Section 7.5) performance tracking**
The AP should describe the procedure for tracking performance through all software acquisition phases for each work item.

**B.7.6 (AP Section 7.6) Quality control of the plan**
The AP should describe how the plan is reviewed, and approved to ensure correctness and currency.

**B.8 (AP Section 8) Software acquisition documentation requirements**
The AP should describe the procedure to be followed in recording and presenting the outputs each acquisition step.
إذا حصلت مطالبات متميزة بحق الملكية الفكرية، فإن الطرف الثاني الفعال عالج حق الملكية الفكرية المتصل، وفي حالة التحدي Finds них، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.

1- يعترف الطرف الثانى الفعال بحق الملكية الفكرية لأي طرف ثالث في أية برامج متميزة بحق الملكية الفكرية، وفي حالة التحدي Finds، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.

2- يتعين على الطرف الأول الفعال تغطية عقلي أو تعديل عقلي أو تعديل عقلي، وتمسك برامج متميزة بحق الملكية الفكرية لأي طرف ثالث، وفي حالة التحدي Finds، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.

3- يتعين على الطرف الأول الفعال أن يعترف بحق الملكية الفكرية لأي طرف ثالث في أية برامج متميزة بحق الملكية الفكرية، وفي حالة التحدي Finds، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.

4- يتعين على الطرف الأول الفعال تغطية تعديل عقلي أو تعديل عقلي، وتمسك برامج متميزة بحق الملكية الفكرية لأي طرف ثالث، وفي حالة التحدي Finds، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.

5- يتعين على الطرف الأول الفعال أن يعترف بحق الملكية الفكرية لأي طرف ثالث في أية برامج متميزة بحق الملكية الفكرية، وفي حالة التحدي Finds، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.

6- يتعين على الطرف الأول الفعال أن يعترف بحق الملكية الفكرية لأي طرف ثالث في أية برامج متميزة بحق الملكية الفكرية، وفي حالة التحدي Finds، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.

7- يتعين على الطرف الأول الفعال أن يعترف بحق الملكية الفكرية لأي طرف ثالث في أية برامج متميزة بحق الملكية الفكرية، وفي حالة التحدي Finds، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.

8- يتعين على الطرف الأول الفعال أن يعترف بحق الملكية الفكرية لأي طرف ثالث في أية برامج متميزة بحق الملكية الفكرية، وفي حالة التحدي Finds، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.

9- يتعين على الطرف الأول الفعال أن يعترف بحق الملكية الفكرية لأي طرف ثالث في أية برامج متميزة بحق الملكية الفكرية، وفي حالة التحدي Finds، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.

10- يتعين على الطرف الأول الفعال أن يعترف بحق الملكية الفكرية لأي طرف ثالث في أية برامج متميزة بحق الملكية الفكرية، وفي حالة التحدي Finds، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.

11- يتعين على الطرف الأول الفعال أن يعترف بحق الملكية الفكرية لأي طرف ثالث في أية برامج متميزة بحق الملكية الفكرية، وفي حالة التحدي Finds، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.

12- يتعين على الطرف الأول الفعال أن يعترف بحق الملكية الفكرية لأي طرف ثالث في أية برامج متميزة بحق الملكية الفكرية، وفي حالة التحدي Finds، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.

13- يتعين على الطرف الأول الفعال أن يعترف بحق الملكية الفكرية لأي طرف ثالث في أية برامج متميزة بحق الملكية الفكرية، وفي حالة التحدي Finds، يتعين عليه تجنب انتهاك مادة (برامج المرخصة) لحقوق الملكية الفكرية لأي طرف ثالث.
1. Product Identification
   a. Name
   b. Version number, rev number, patches installed, etc.

2. Vendor Contact Information

3. Product Description
   [Summary of what the product does and what it is being considered for/how it is used in the system.]

4. Product Status
   [Current state of decisions made regarding use of the product, whether it has been selected, is being used, actively maintained, or being replaced/retired.]

5. State of Evaluation, Testing, Certification

6. Vendor Data (includes raw and processed information)
   a. Financial
   b. Business
   c. Engineering

7. Product Data (includes raw and processed information)
   a. Basic characteristics
   b. Standards
   c. Hardware/software configuration required
   d. Functional capabilities
   e. Non-functional capabilities [usability, supportability, interoperability, reliability, security, etc.]
   f. Interactions and behaviour
   g. Performance
   h. Documentation
   i. Licensing
   j. Architecture
   k. Noted discrepancies between the product and its documentation

8. Product Limitations
   a. Product deficiencies
   b. Limitations on product use

9. System Relationships, Tailoring, and Modifications (includes raw and processed information)
   a. System configuration
   b. System adaptation
   c. System integration
   d. Product and system tailoring and modification
   e. Design strategies for using product

10. Product Usage History
   a. Dates considered, used, retired
   b. Bugs/problems reported
   c. Disposition of bugs/problems
   d. Queries to vendor or third parties for support
   e. Changes/updates to configurations and tailoring [capture rationale, changes, and results]
   f. Preventative/other maintenance performed

11. Dossier Usage History
   a. Who, what, and why record of access to Dossier components
   b. Errata or inconsistencies found [additional information required]
Template – 7 Evaluation Record

1. Charter
   1.1. Background
      a. Date of effort
      b. Evaluation team members and qualifications
      c. Facilities and resources used

   1.2. System Stakeholders

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Requirements</th>
<th>Sponsorship, administration</th>
<th>Contractual information</th>
<th>Technical information</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

   1.3. Approach
      a. Depth
         — complexity
         — risk of failure
      b. First fit versus best fit
      c. Number and type of filters
      d. Other

2. Criteria Record

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Negotiability</th>
<th>Capability Statement</th>
<th>Measurement Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Very negotiable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Negotiable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Barely Negotiable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hard Requirement</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Results Record

<table>
<thead>
<tr>
<th>Criterion</th>
<th>&lt;product1 name&gt;</th>
<th>&lt;product2 name&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Measurement Results</td>
<td>Repair Strategy(s) and Cost of Fulfilment</td>
</tr>
<tr>
<td></td>
<td>Measurement Results</td>
<td>Repair Strategy(s) and Cost of Fulfilment</td>
</tr>
</tbody>
</table>

4. Assessment of Evaluation Effort
   a. Limitations or deficiencies
   b. Rationale for all decisions made
Toolboxes
Toolbox – 1 Information Gathering and Communication Tools

1.1 Information Gathering:
- Brainstorming sessions
- Request for Information (RFI)
- Vendor demonstrations
- Formal executive meetings
- Stakeholder meetings and interviews
- Interviews with subject matter experts

1.2 Communication Tools for involving stakeholders:
- Memos – explain details of specific decisions/plans to managers
- Posters – outline key points and progress to end users
- Newsletters – review progress and plans; and share success stories to all stakeholders
- Web page – provide summary of project to all stakeholders with internet access
- Meetings – provide status (typically through formal presentation with feedback) to all stakeholders (together or in separate groups).
- Briefings – provide status to senior management

Toolbox – 2 Comparison Methods
Selection of a recommended solution is based on the comparison of how well each solution meets the same established criteria. Various techniques can be used in making this comparison:
- Pro versus con comparison
- Plus or minus comparison
- Numerical grading
- Ranking

A decision table utilising any of the above techniques for comparison and analysis of solutions. The steps below incorporates the numerical method:

Step 1 – Establish a rating scale for the criteria evaluated.
Example a scale of 1-5. A rating of 1 equates to Very Poor meaning the solution minimally meets the required level. A rating of 5 equates to Very Good meaning the solution exceeds the required level. The values of 2, 3, and 4 equate to varying levels of meeting the established criteria.

Step 2 – Weigh critical criteria.
If any specific criterion is critical, weighting each criterion with a numerical factor will give an increased value to the scores for those criteria. It is best to weight only the most important criteria. Simple multipliers like 2 or 3 are best for this purpose. For example, a factor of 2 is applied to the criterion X and a particular solution scores a 3 for X, the weighted score is 3x2 or 6.

Step 3 – Rate solutions.
Example give solutions that meet the required level a 3, while solutions that are just below the required level get a 2. A 4 is given to those just above the required level. If the highest rated solution is not the recommended solution, it important to provide the rationale for selecting a lower ranked solution. The explanation should identify the overriding factors that caused the solution to be selected.

Toolbox – 3 Requirements Definition
A requirement is a statement of need, something that some class of user or other stakeholder wants while a function or capability is something that a system or subsystem does (because of a requirement). Another important distinction between types of requirements is functional and non-functional requirements where functional requirements are the specific functions that are implemented to address a user need, and non-
functional requirements are the characteristics/quality that the system must exhibit in operation and the constraints that limit the way the system can be designed and constructed (see 4.1 for software quality characteristics).

The step of determining software requirements starts after establishing the general description of the capabilities required (business objectives in the project charter) as well as the organisation's acquisition strategy and process (in the first two steps of the planning phase). The information produced during this final step include a reconciled set of requirements with available products, a set of criteria that will be used for proposal evaluations and a list of products that can be targeted with invitations to submit proposals. The step also marks the end of the planning phase and the start of the contracting – the actual procurement.

There are two sets of processes that are required during this step. The requirements elicitation process is concerned with gathering information on system requirements from stakeholders, while the negotiation process is concerned with matching the requirements with available functionality in the commercial software marketplace.

3.1 Elicitation Process:
The context diagram as well as the list of system stakeholders developed during the initiation phase represent the starting point for this process that involves the following activities:
1. Gathering requirements from stakeholders. The purpose of this activity is to account for the needs of the different stakeholders by identifying their roles in the systems and the interactions between them.
2. Organising requirements. The purpose of this activity is to arrange the different requirements in groups and show how they fit together.

Useful techniques for gathering and organising requirements:
- Interviews, workshops, experiencing life as a user, observing users at work, acting out what needs to happen, and prototypes can be used to gather information from system stakeholders and the context in which it operates.
- Other sources of requirements' information include problem Reports, help desk and support team, trainers and consultants, customer suggestions and complaints, improvements made by users to old system, unintended uses of old system, comparable products, old designs and specifications.
- Sketches, diagrams, photos, models, can be used to clarify requirements, illustrate ideas and to model the context of the future system. Use cases (a requirements elicitation technique) is considered appropriate in the context of COTS and MOTS based system development because they are user-centred; proceed from general requirements to specific; and view system as a “black box”

3.2 Negotiation Process:
This activity starts with a set of requirements that were gathered from the context of the new system and involves the following activities:
1. Matching objectives. The purpose of this activity is to discover which of the required capabilities can be satisfied by available packages and what other capabilities offered in the market of interest that can be helpful or unwanted.
2. Balancing objectives. The purpose of this activity is to refine the capabilities list to obtain an optimum set of requirements that are mandatory (and knowledge of implemented standards, required adaptations, or new capabilities that are useful), which can be used to develop the request for proposals.

Useful tools for performing requirements negotiation activities:
- Literature analysis, including diverse sources as references from other users, market segment analyses from companies such as the Gartner Group, and Standards and Poor's reports for vendor financial information. Other techniques for gathering information about products include request for information and vendor demonstrations.
- Gap Analysis, to determine both the requirements that are or not met by available products, and products' features that go beyond current requirements.
- Product (or component) identification tools such as the internet or Agora (e.g. Robert et al 1998) for identifying products or components available in the market.
ATA (Architecture Trade-off Analysis) for analysing architectures and SAAM (Software Architecture Analysis Method, SEI 1998) for evaluating software product architectures

Knowledge engineering techniques such as card sorting and laddering which are useful when acquiring information about categories of products, suppliers, contracts and hierarchical information about product properties and customer requirements

Requirements engineering methods such as Volere (Robertson, 2006) for aiding the requirements engineering process; requirements acquisition techniques such as ACRE (e.g. Maiden & Rugg, 1996) for acquiring customer requirements

More costly ways of gathering information such as testing the product can be performed at a later stage when few products emerge from the matching/balancing objectives activities (step 10).

**Toolbox – 4 Evaluation Criteria Lists**

Evaluation requirements are stated in terms of needs, e.g. “Information transfer shall be protected from unauthorized access”, while criteria are stated in terms of capabilities to satisfy those needs, e.g. “support for secure sockets or equivalent security mechanism”. Criteria are quantifiable, evaluation requirements may not. There are two ways to define criteria that are driven by requirements: by reusing pre-existing criteria (to cover aspects that are not system specific from product features and organisational check-lists – see examples in 4.1 and 4.2) or generating new criteria (to cover system specific requirements). Another way (feature driven) to define criteria is to review products to compile a list of features. These features are analysed to determine the risk associated with the presence or absence of that feature in a product – the risk statement is the explicit mapping of a product feature to a system need.

### 4.1 Quality Models

Comprehensive evaluation criteria can be derived from well known quality models and related standards.

A quality model for COTS products have been proposed by (Rawashdeh, 2006). It incorporates a number of quality models e.g. ISO 9126 Model, Dromey Model and Boehm’s. The table below illustrates the quality components of the model and stakeholders/evaluators for each quality characteristic. The characteristics are split into two categories; one set supports the development process (the process) and the second one supports the operational state on the production area (the product). See 4.3 for a classification of these characteristics.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Sub-characteristics (Product)</th>
<th>Sub-characteristics (Process)</th>
<th>Stakeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functionality</td>
<td>Accuracy, Security</td>
<td>Suitability, Interoperability, Compliance, Compatibility</td>
<td>End user, analysts, quality assurance</td>
</tr>
<tr>
<td>Reliability</td>
<td>Recoverability</td>
<td>Maturity</td>
<td>End user, analysts, quality assurance</td>
</tr>
<tr>
<td>Usability</td>
<td></td>
<td>Learnability, Understandability, Operability, Complexity</td>
<td>End user, analysts, quality assurance</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Time behaviour, Resource behaviour</td>
<td></td>
<td>End user, analysts, quality assurance</td>
</tr>
<tr>
<td>Maintainability</td>
<td>Changeability, Testability</td>
<td></td>
<td>Project manager or business owner</td>
</tr>
<tr>
<td>Manageability</td>
<td>Quality Management</td>
<td></td>
<td>Project manager</td>
</tr>
</tbody>
</table>

are offered on the market and delivered to customers. Programs and data are primarily tested for compliance with the product description and user documentation. Only the quality characteristics (quality requirements and the requirements for test documentation, in Clauses 5 and 6 respectively) which can be perceived to the outside are therefore relevant for inspection (so not, for example, the documentation of the source code).

4.2 Examples of factors that may be important to project and organisation

<table>
<thead>
<tr>
<th><strong>Project</strong></th>
<th><strong>Organisation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographical location of the supplier</td>
<td>Compatibility with other COTS products in use</td>
</tr>
<tr>
<td>Supplier’s performance records on similar work</td>
<td>Adaptability, flexibility, reliability, maintainability</td>
</tr>
<tr>
<td>Engineering capabilities</td>
<td>Impact on system integrity</td>
</tr>
<tr>
<td>Staff and facilities available to perform the work</td>
<td>Impact on system integration</td>
</tr>
<tr>
<td>Prior experience in similar situations</td>
<td>Vendor support</td>
</tr>
<tr>
<td>Customer satisfaction with similar products delivered by the supplier</td>
<td>Training</td>
</tr>
<tr>
<td>Cost of the COTS products</td>
<td>Documentation</td>
</tr>
<tr>
<td>Cost and effort to incorporate the COTS products into the project</td>
<td>Licenses</td>
</tr>
<tr>
<td>Security requirements</td>
<td></td>
</tr>
<tr>
<td>Benefits and impacts that may result from future product releases</td>
<td></td>
</tr>
</tbody>
</table>

4.3 Evaluation criteria classification

**Vendor Characteristics**
- Organizational stability
- Financial stability
- Nationality
- Ease of access
- Independence
- Reputation
- Support infrastructure
- Engineering approach
- Maintenance approach
- History

**Standards**
- Government standards
- Industry standards
- Organizational standards
- Confidence in adherence to standards

**Supportability**
- Self diagnostics
- Disclosure of subcontractors
- Effort of upgrade
- History of upward compatibility
- Site installation support
- Site operation support
- Tool support required
- Analyzability

**Product Characteristics**
- First shipment date
- Install base
- Market share
- Market trend
- Customer references
- End-of-life plans
- Availability of training
- Access to hotline
- Availability of consultants
- Delivery method

**Hardware Configuration**
- Type
- Memory requirements
- Disk requirements
- Other storage media
- Communications

**Software Configuration**
- Operating system
- Communications
- Database
- Related applications
- Known compatibility problems

**Functionality**
- Suitability
- Accuracy
- Security
Installability
Replicability
Preventive maintenance

**Documentation**
Availability of design and maintenance documents
Customization
Quality

**Training**
Materials
Courses
Customization
Policy on reproduction

**Licenses**
Standard use and maintenance licenses
Site licensing
Quantity discounts
Transferability of license
Development/runtime licensing
License bases (per seat, CPU, other)
Data rights
Escrow
Rights granted on discontinuation of product

**Usability**
Intended use and users
General operability
Skill level required
Responsiveness
Robustness
Help capabilities
Error assist/recovery
Understandability
Learnability

**Interoperability**
Data model/format
Support for data access
Support for control by other applications
Infrastructure utilized
Infrastructure commonality

**Reliability**
Test regimen
Test coverage
Types/frequency of faults
Recovery from faults
Mean time between failures

**Performance**
Benchmarking results
Time-related behaviour
Resource behaviour
Surge capacity

**Adaptability/Flexibility**
Customization approach
Customization effort
Portability
Scalability

---

**Toolbox – 5 Evaluation Methods**

This step starts with a definition of the software required, a list of candidate products and information obtained on them through market research and response to RFP, evaluation criteria and contractual requirements. As discussed in the previous section, a COTS-based approach requires a carefully reasoned selection of alternatives from among the various options and trade-offs. These options and trade-offs by and large affect the set of requirements that were chosen for evaluating products, the set of criteria that are used to evaluate the product, the elements of the RFP and the contractual terms and conditions. The evaluation is proposed to follow the PECA process model developed by the SEI (derived in part from ISO 14598*). The process is iterative, where it is repeated several times, gathering more information and eliminating or adding alternatives each time, until a viable solution remains. The process model was named for the four main activities that make up the process:

---

1) **Planning the evaluation**: involves creating a charter for the evaluation, selecting an evaluation approach, and estimating resources and schedules.

The components of an evaluation charter include: Goals and Scope of the evaluation; Names of the team members and their roles; Statement of commitment from both evaluators and management; Summary of factors that limit selection; and Summary of decisions that have already been made. Some of this information can be derived from outputs from previous steps.

Selecting an evaluation approaches involves – determining the depth of the evaluation according the complexity and risk factors, and deciding on method of selection e.g. first fit, best fit, filtering.

Estimating time and resources – these estimations concern the specific evaluation activities (guided by the evaluation approach selected, the number of products under evaluation, experience available, and the overall estimates of project time and resources).

2) **Establishing the criteria**: involves establishing evaluation requirements and evaluation criteria.

Establishing evaluation requirements – sources of evaluation requirements include Architecture/interface constraints, programmatic constraints, operational environment, stakeholders expectations, as well as requirements derived from the marketplace or previous evaluations. These requirements are then split into mandatory and negotiable lists.

Establishing evaluation criteria involve using a techniques such as Goal Question Metric (GQM) technique to derive a criteria (capability statement) and its associated metric from an evaluation requirement. The derived set of criteria can be prioritised and assigned their respective weights. Examples of techniques used for weighing criteria include unstructured weighting, Delphi technique and pair-wise comparison.

3) **Collecting the data**: involves selecting techniques for data collection and conducting the collection.

Techniques for data collection include literature reviews, vendor appraisals, and hands-on techniques such as test beds experiments, product probes (e.g. error and stress testing), prototypes, and scenario-based evaluations, benchmarking, product insertion and demonstrations. Different stages of evaluation require different rigour therefore choice of approach depends on stage (example for evaluating an initial list of potential suppliers) or at the stage of selecting between 2 or 3 products. Also, constraints such as budget, schedule or experience available, influence choices on whether to choose a cheap but less rigorous approach (e.g. literature review) or a more demanding approaches like product insertion.

Vendor appraisal techniques include *Conferences* which are back-to-back meetings, and are held with all of the suppliers demonstrating their products in succession. Conferences can foster competition and they can make it easier to make comparison. The level of product knowledge and confidence of the supplier representative and their willingness to answer tough questions can be an indicator of our future relationship with them. Another indicator of future support is whether the supplier presents a “canned” demo or has spent the time to customize their demo to specifically address our business needs and requirements. Also for many COTS products, *evaluation copies* are available as mechanisms for demonstrating the software functions/capabilities and for eliciting user buy-in. Check sheets, like the following example for a software configuration management tool, can be created for use by the acquisition team when evaluating the software product.

One of the recommended methods for evaluating COTS products is to employ scenario-based testing methods. With this method a portfolio of scenarios is created. Note that the scenarios represent typical operating procedures for the system that is to be constructed, not for the COTS product under test. Test procedures are developed based on the scenarios and each candidate is evaluated against the criteria. In this case the initial scenarios are reasonably easily established using the preliminary operational requirements definitions. The results of this type of testing will be confirmation that the qualified candidates perform appropriately in the system context.

Another method that has been suggested is the use of fault injection techniques. This is particularly effective when access to the internal operations of a product is restricted. The method consists of inserting erroneous values into the data and/or control stream and observing the results. This technique is a good example of evaluating for discovery, that is, to determine
unknown or unexpected reactions of the product under evaluation.

4) **Analysing the data:** involves selecting techniques for consolidating and analysing, and conducting the analysis.

   Techniques for consolidating data include the all-to-dollar techniques that converts evaluation data into costs (represented by product deficiencies) and benefits (represented by product excesses); and the weighted aggregate method adopted from quantitative decision-making which involving grouping the criteria into categories (parent criterion), calculating the score of a parent criterion (the sum of the scores of the child criteria times the weights of the child), and deriving the fitness of a product by adding the scores or parent criteria.

   Techniques for analysing data include gap analysis using a yes/no matrix or measures of fitness on selected criteria, and cost of fulfilment (requires specialised expertise to understand and estimate the cost of the assumptions made about the operational environment and maintenance).

   The Comparative Evaluation Process (CEP) is presented in detail in (Cavanaugh, 2002). The COTS evaluation method is based on a spreadsheet model which assists decision maker when comparing similar COTS products based on the discrimination criteria. The decision model is based on the decision theory model of simple weighted averages that is applied to each evaluation criterion. This first involves defining the importance weight (local weight) of the criteria categories and the importance weight (local weight) of every criterion in each criteria category; and determining the credibility score of every criterion for each product is determined. The credibility score of a criterion is determined by the sources of information for the COTS product, about the features of the product associated with the evaluation criterion.

   Other techniques include the MCDM (Multi-Criteria Decision Making) techniques such as AHP (Saaty 1990); Out Ranking method (Fenton, 1994) to aid in the decision making process during the complex product ranking and selection process; and argumentation techniques (e.g. Parsons, 1996) to record and aid the decision-making process.

The outputs of the PECA process is the Product Dossier and the Evaluation Record. Implementers must consult the original resource material for a complete description of the PECA process, the approaches mentioned above, and listing of evaluation criteria.

Use sample templates:

- **Template – 6 Product Dossier & Template – 7 Evaluation Record**

**Toolbox – 6 Methods of Collection in User Surveys**

<table>
<thead>
<tr>
<th>Method</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paper / email questionnaire</strong></td>
<td>High volume quantitative analysis for relatively low cost.</td>
<td>Understanding reasons behind survey scores</td>
<td>Questionnaires can contain qualitative questions but analysis can be time consuming and is not always reliable</td>
</tr>
<tr>
<td></td>
<td>Identifies what is good and not so good.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web based questionnaire</td>
<td>High volume quantitative analysis for relatively low cost.</td>
<td>Understanding reasons behind survey scores, however greater drilling-down potential can improve upon above.</td>
<td>If the host web site is not heavily trafficked some form of promotion will be required. Can be an effective and low cost method of regularly sampling opinion.</td>
</tr>
<tr>
<td><strong>Suggestion box</strong></td>
<td>Giving employees/customers a feeling of having their say.</td>
<td>Good, objective, statistically significant information.</td>
<td>Unlikely to seriously contribute to customer satisfaction measurement. Can be unfocussed on service issues and open to abuse.</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Telephone interview</strong></th>
<th>Used in conjunction with questionnaires or web surveys, this will provide valuable insights into reasons behind the quantitative results. Can also be used pre-questionnaire to help word questionnaire to measure likely issues.</th>
<th>Labour intensive nature makes it unsuitable for high volume analysis. Subjects for interviews need to be carefully sampled to eliminate bias.</th>
<th>Care needs to be taken to avoid the interviewer selecting or pursuing questions based on personal bias.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Face-to-face interview</strong></th>
<th>Similar to telephone survey but can be used to give greater richness to results and to handle more sensitive issues. Can be used post questionnaire to assess qualitative support or pre-questionnaire to help word questionnaire to measure likely issues.</th>
<th>Highly labour intensive. Would need to be employed with other techniques to give statistical significance.</th>
<th>Care needs to be taken to avoid the interviewer selecting or pursuing questions on personal bias.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Focus group</strong></th>
<th>People spark off each other. Gives greater richness of insights into opinions. Can give insights on solutions. Can be used post questionnaire to assess qualitative support or pre-questionnaire to help word questionnaire to measure likely issues.</th>
<th>Highly labour intensive. Would need to be employed with other techniques to give statistical significance.</th>
<th>This can be done using teleconferencing, which is likely to ease logistics significantly and reduce costs in a distributed organisation. The group may be too easily steered by a dominant individual.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Account manager</strong></th>
<th>Given sufficient organisation cover these can provide excellent real time feedback from customers.</th>
<th>Organisations without account manager functions will not justify introducing them for feedback purposes only.</th>
<th>The objectivity of account managers may not always be guaranteed.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Blog (weblog)</strong></th>
<th>Getting objective feedback from a blog relies on its being reliable, well used and professionally moderated. Can provide valuable early indicators of issues that may merit further investigation.</th>
<th>Unlikely to provide good, objective, statistically significant information.</th>
<th>A successful blog needs a high level of commitment from an informed and professional moderator.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Interactive chat</strong></th>
<th>Similar to blog except that responses tend to be in real-time.</th>
<th>Similar to blog.</th>
<th>Similar to blog.</th>
</tr>
</thead>
</table>

**Toolbox – 7 CMMI-ACQ Implementation Questions**
The questions included in the CMMI-ACQ model are designed to facilitate review and improvement of the organisation's acquisition processes. They address whether or not strategy development, planning, and estimating activities occur. In large part, these early activities determine the success of an acquisition process from the outset. The questions also focus on risk identification, management practices, capabilities definition and requirements generation, and the existence of repeatable processes that enable organizations to institutionalize best practices.

### 1. Processes in General

<table>
<thead>
<tr>
<th>Questions</th>
<th>CMMI-ACQ Process Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. What are the content and source of your acquisition processes?</td>
<td>Project Planning, Integrated Project Management</td>
</tr>
<tr>
<td>b. What mechanisms do you use to monitor, control, and improve your acquisition processes?</td>
<td>Project Monitoring and Control, Measurement and Analysis, Process and Product Quality Assurance</td>
</tr>
<tr>
<td>c. How do you know that your project is adhering to your acquisition processes?</td>
<td>Project Monitoring and Control, Process and Product Quality Assurance</td>
</tr>
</tbody>
</table>

### 2. User Requirements

<table>
<thead>
<tr>
<th>Questions</th>
<th>CMMI-ACQ Process Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Is there a process in place to define, verify, and validate customer and contractual requirements?</td>
<td>Acquisition Requirements Development</td>
</tr>
<tr>
<td>b. How do you manage users’ involvement in the requirements process?</td>
<td>Project Planning, Integrated Project Management, Acquisition Requirements Development</td>
</tr>
<tr>
<td>c. How do you ensure a clear understanding of user needs by relevant stakeholders?</td>
<td>Requirements Management, Acquisition Requirements Development, Integrated Project Management</td>
</tr>
<tr>
<td>d. What role does your organization play in establishing the project requirements?</td>
<td>Acquisition Requirements Development, Requirements Management, Requirements Management</td>
</tr>
<tr>
<td>e. What is your strategy for keeping up with the evolving operational environment (e.g., threat, concept of operations, and technology readiness)?</td>
<td>Integrated Project Management, Requirements Management</td>
</tr>
</tbody>
</table>

### 3. Acquisition Strategy

<table>
<thead>
<tr>
<th>Questions</th>
<th>CMMI-ACQ Process Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. How did you determine the most appropriate acquisition strategy for this acquisition?</td>
<td>Project Planning, Decision Analysis and Resolution, Risk Management</td>
</tr>
<tr>
<td>b. How does your selected acquisition strategy mitigate the risks you have identified?</td>
<td>Project Planning, Risk Management</td>
</tr>
<tr>
<td>c. Which stakeholders were involved in establishing the acquisition strategy?</td>
<td>Project Planning, Integrated Project Management</td>
</tr>
</tbody>
</table>

### 4. Acquisition Planning

<table>
<thead>
<tr>
<th>Questions</th>
<th>CMMI-ACQ Process Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. How do your acquisition plans reflect and implement the acquisition strategy?</td>
<td>Project Planning, Integrated Project Management, Decision Analysis and Resolution</td>
</tr>
<tr>
<td>b. How do you determine and document the scope of the project, including acquisition project activities, supplier activities, and other related activities (operational testing, user activities, etc.)?</td>
<td>Project Planning, Solicitation and Supplier Agreement Development</td>
</tr>
<tr>
<td>c. How do you determine the magnitude of the development effort?</td>
<td>Project Planning</td>
</tr>
<tr>
<td>Questions</td>
<td>CMMI-ACQ Process Areas</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>d. How do you determine resource needs for each element of the project?</td>
<td>Project Planning</td>
</tr>
<tr>
<td>e. How do you determine the critical path?</td>
<td>Project Planning, Integrated Project Management</td>
</tr>
<tr>
<td>f. How are plans coordinated with relevant stake-holders at both the management and working levels?</td>
<td>Project Planning, Integrated Project Management</td>
</tr>
<tr>
<td>g. How do you ensure that you have adequate staff with the necessary experience and training to execute your plans?</td>
<td>Project Planning</td>
</tr>
<tr>
<td>h. How do you ensure that the supplier has the resources and tools needed to complete the project?</td>
<td>Project Planning, Solicitation and Supplier Agreement Development, Agreement Management</td>
</tr>
<tr>
<td>i. How do you ensure that the supplier has the domain experience and process capability needed to complete the project?</td>
<td>Project Planning, Solicitation and Supplier Agreement Development, Agreement Management</td>
</tr>
</tbody>
</table>

### 5. Cost, Schedule, and Performance Baselines

<table>
<thead>
<tr>
<th>Questions</th>
<th>CMMI-ACQ Process Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. How do you ensure that the cost, schedule, and performance baselines are integrated, realistic and executable?</td>
<td>Project Planning, Integrated Project Management</td>
</tr>
<tr>
<td>c. How do you ensure that all the life-cycle costs are included in the baselines (e.g., testing, training, sustainment, and support)?</td>
<td>Project Planning, Integrated Project Management, Acquisition Requirements Development, Requirements Management</td>
</tr>
<tr>
<td>d. How do you plan to track cost, schedule, and performance of the project throughout its life-cycle?</td>
<td>Project Monitoring and Control, Measurement and Analysis</td>
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<tr>
<td>e. How do you accommodate risks and engineering changes in your baselines?</td>
<td>Project Planning, Risk Management, Requirements Management</td>
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<td>f. How do you manage changes to baselines?</td>
<td>Configuration Management, Project Monitoring and Control, Requirements Management</td>
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<tr>
<td>g. How do you evaluate the impact of changes in cost and schedule on supplier’s development efforts?</td>
<td>Project Monitoring and Control, Solicitation and Supplier Agreement Development, Requirements Management</td>
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</table>

### 6. Risk Identification and Management

<table>
<thead>
<tr>
<th>Questions</th>
<th>CMMI-ACQ Process Areas</th>
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<tbody>
<tr>
<td>d. How do you ensure that you understand the cost risk of obtaining the required capability?</td>
<td>Project Monitoring and Control, Measurement and Analysis</td>
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<tr>
<td>e. How do you identify risks related to supplier execution?</td>
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<td>f.</td>
<td>How do you identify risks that are outside your control?</td>
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<td>g.</td>
<td>How do you assess the likelihood and consequence of project risks?</td>
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<td>h.</td>
<td>How do you monitor mitigation efforts for identified risks?</td>
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<tr>
<td>i.</td>
<td>Which risk management tool(s) do you employ?</td>
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<tr>
<td>j.</td>
<td>Who is involved in project risk assessment (e.g., users, the supplier,</td>
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<td></td>
<td>and independent subject matter experts)?</td>
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<tr>
<td>k.</td>
<td>How do you build in sufficient reserves for risk mitigation and</td>
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<td>absorbing the impact of realized risks?</td>
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### 6. Risk Identification and Management

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<tr>
<td>b.</td>
<td>How do you identify risks related to your acquisition strategy and plans?</td>
<td>Project Planning, Risk Management</td>
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<tr>
<td>c.</td>
<td>How do you identify risks associated with cost and schedule?</td>
<td>Project Planning, Integrated Project</td>
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<td>Management, Risk Management</td>
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<td>How do you ensure that you understand the cost risk of obtaining the</td>
<td>Project Planning, Risk Management,</td>
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<td>required capability?</td>
<td>Requirements Development</td>
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<td>How do you identify risks related to supplier execution?</td>
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<td>Solicitation and Supplier Agreement</td>
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<td>Integrated Project Management, Risk</td>
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### 7. Supplier Monitoring

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>a. How do you assess the mechanisms the supplier uses to encourage execution of their organization’s processes from the beginning of the project?</td>
<td>Agreement Management, Acquisition Technical Management, Risk Management</td>
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<tr>
<td>b. Is there a process in place to define, verify, and validate requirements and architectures for the product?</td>
<td>Acquisition Requirements Development, Acquisition Technical Management</td>
<td></td>
</tr>
<tr>
<td>c. How will the status of development be monitored?</td>
<td>Project Monitoring and Control, Measurement and Analysis, Agreement Management</td>
<td></td>
</tr>
<tr>
<td>d. How will the supplier demonstrate the performance and stability of their development environment and tools?</td>
<td>Agreement Management</td>
<td></td>
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</tbody>
</table>

### 8. Non-developmental Items

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>a. What is your strategy for incorporating non-developmental products (e.g., commercial off-the-shelf [COTS], reuse, and product lines) into the project?</td>
<td>Project Planning, Decision Analysis and Resolution, Acquisition Requirements Development</td>
</tr>
<tr>
<td>b. What percentage of the software is planned to be non-developmental?</td>
<td>Project Planning, Measurement and Analysis</td>
</tr>
<tr>
<td>c. How do you determine that you can achieve the planned percentage of non-developmental software use on this project?</td>
<td>Project Planning, Risk Management, Verification, Validation, Decision Analysis and Resolution</td>
</tr>
<tr>
<td>d. How do you determine that the planned non-developmental products will provide the required functionality and performance?</td>
<td>Project Planning, Risk Management, Verification, Validation, Decision Analysis and Resolution</td>
</tr>
<tr>
<td>e. How do you determine that the interfaces for non-developmental products are defined</td>
<td>Acquisition Technical Management</td>
</tr>
<tr>
<td>f. How do you account for the effort required to test and integrate non-developmental products?</td>
<td>Acquisition Requirements Development, Acquisition Technical Management, Validation</td>
</tr>
</tbody>
</table>