



Australian Government
Information Management Office

ICT Business Case Guide

JULY 2012

AGIMO is part of the Department of Finance and Deregulation

Contents

Introduction	3
First Pass Business Case	5
1. Executive Summary	6
2. Current Situation	7
3. Proposed Response	9
4. Proposal Summary	10
5. Solution Options	11
6. Option Details	13
7. Implementation Approach	16
8. Organisational Capability	16
9. Work to Second Pass	18
10. Supporting Documentation	19
Second Pass Business Case	20
11. Executive Summary	21
12. Summary of First Pass Business Case	22
13. Options Analysis	23
14. Implementation Approach	25
15. Organisational Capability	29
16. Supporting Documentation	31
Attachments	32
A: Assumptions and Constraints	33
B: Common ICT Cost Drivers used for the Business Case	35
C: ICT Cost Estimation Guide	39
D: Benefits Categorisation	48
E: Cost Benefit Analysis	50
F: Common ICT Project Risks	54

Introduction

Purpose of this Guide

This guide will assist Australian Public Service agencies to develop sound business cases when seeking to make significant ICT investments. Business cases developed in accordance with this guide are expected to be suitable for both internal decision making and as inputs to the ICT Two Pass Review process.

Further information on the ICT Two Pass Review, Agency Capability Initiative, and attachments to this guide are available from the Department of Finance and Deregulation (Finance) website, and relevant Estimates Memorandums issued to agency Chief Financial Officers.

Purpose of a Business Case

The primary aim of a business case is to provide information on the benefits, costs and risks involved with a proposal. It forms the basis for effective decision making

A business case captures the reasoning for initiating an investment. Whenever resources are consumed, they should be in support of a specific business need. A compelling business case adequately captures both the business need and how the proposed investment meets that need.

The business case provides a basis for planning and implementation. It provides the justification for the investment, so the ongoing viability of the investment should be measured against the business case.

Business cases are evaluated to ensure:

- the investment has value, importance and relevance
- the implementation will be properly managed
- the organisation has the capability to deliver the benefits
- the organisation's resources are working on the highest value opportunities
- initiatives with inter-dependencies are undertaken in the optimum sequence

ICT Two Pass Process

Under the Two Pass process, agencies prepare an initial business case to be considered as part of government's budget deliberations for that year.

The government considers whether it agrees with the proposal in principle and whether to provide funding towards a more detailed business case. Where the government approves an initial business case, the sponsoring agency then prepares a detailed business case. When it has completed the detailed business case, the sponsoring agency provides a submission for second pass review.

First Pass Business Case

The First Pass Business Case supports the sponsoring Minister's Cabinet submission seeking first pass approval for a proposal.

The purpose of an ICT First Pass Business Case is two-fold. First and foremost, it provides sufficient level of information on the benefits, costs and risks of a proposal for Cabinet to make an informed decision on the Government's ICT investment. Agencies should take advantage of the ICT First Pass Business Case as an avenue to demonstrate, with rigor, clear business needs, sound policy development and well-considered enabling ICT investment.

The First Pass Business Case puts in place a mechanism that improves planning and review processes in an effort to reduce the risks associated with major ICT-enabled proposals and provide the Government the opportunity to consider whether the proposal meets its policy and service delivery objectives.

Second Pass Business Case

The Second Pass Business Case supports the sponsoring Minister's Cabinet submission seeking second pass approval for a proposal. An effective Second Pass Business Case will provide assurance that the planning, consideration and consultation required to improve the chance of successful delivery has been undertaken.

A Second Pass Business Case builds more detail into the cost assessments and risk mitigation strategies developed for those options agreed in principle by the government at the first pass.

The revised cost estimates require rigorous planning of the scale and features of the ICT infrastructure, applications and support required for each option. The analysis will include quality estimates from the private sector where appropriate.

Accordingly, the information (data, plans, and specifications) must be of sufficient detail not only to inform Cabinet's decision, but also to act as the basis for the implementation of the proposal.

Specific information about the Budget process and timeframes is available to government officials from their Chief Finance Officer (CFO) unit. Further information about this document is available by emailing ictinvestmentframe@finance.gov.au.



Australian Government
Information Management Office

First Pass Business Case

First Pass Business Case

At a glance:

- Your First Pass Business Case provides Cabinet with its first opportunity to consider whether to use ICT to meet its policy and service delivery objectives.
- The business case should convey to Cabinet a range of practical, indicative ICT options, together with any non-ICT solutions that may be available, including the likely costs, benefits and risks associated with each one.
- Your business case should present an objective appraisal of the relative strengths and weaknesses of each ICT option (not advocate for a single, preferred solution).

The following section of the guide steps through the structure of a First Pass Business Case.

1. Executive Summary

1.1 Summary of Options

Use the executive summary to provide a brief description of the current situation and the proposed response. Provide a summary of the options including initial cost estimates and the strengths and weaknesses of each option. Consider using a table format similar to the one below:

Figure 1: Summary of Options

Option One: Option Name Brief Description: Include a one line description of the option. Total Cost: \$XXM Option Lifespan: N years		
Strengths	Weaknesses	Recommendation
Option N: Option Name Brief Description: Include a one line description of the option. Total Cost: \$XXM Option Lifespan: N years		
Strengths	Weaknesses	Recommendation

The recommendations must be consistent with the recommendations in the Portfolio Budget Submission to Cabinet.

First Pass Business Case

Figure 2: Financial Summary

		Year One (000)	Year Two (000)	Year Three (000)	Year Four (000)	Total (000)
Option One NPV: \$XXm	Capital					
	Operational					
	Total					
Option Two NPV: \$XXm	Capital					
	Operational					
	Total					
Option Three NPV: \$XXm	Capital					
	Operational					
	Total					
Option n NPV: \$XXm	Capital					
	Operational					
	Total					

2. Current Situation

This section sets out the problem that the Proposal is responding to, or the opportunity. Also, use graphs, reference material, images to tell the story of the current situation.

2.1 Policy/ Agency Context

State the business objective that options for a new ICT-enabled investment would help to achieve. Compare the proposed investment with your agency's strategic priorities. Refer directly to the outcomes and outputs in your agency's Budget Statements, corporate plan and annual report. Include identification of any relevant agency risks that contribute to the triggering situation for the proposal.

First Pass Business Case

The agency context section compares the proposed investment with your agency's strategic priorities. It should explain how the ICT investment could assist your agency to deliver its outputs and outcomes more effectively and efficiently¹. The section must refer directly to the outputs and outcomes in your agency's Portfolio Budget Statements, corporate plan and annual report.

2.2 Current Technical Environment

For ICT enabled business cases, describe the current situation not only from a business perspective – but also from a current technical perspective. The Technical Environment section documents relevant components of your current ICT baseline. For example, the section should briefly describe:

- ICT infrastructure (both hardware and software)
- Voice and data communications facilities
- Workforce skills and numbers
- Security

The section must describe any gaps that the project must address to meet the Statement of Success and performance indicators. Gaps may be specific elements or more general service levels related to current levels of interoperability, security and efficiency.

The purpose of this step is to clarify your ICT environment as it stands and any shortfalls. It is not useful to revisit past developments and events at this point. High level environment and architecture diagrams can be helpful, but keep in mind the audience for the document when thinking about the degree of technical detail to include.

2.3 Business Problem

Your business case should begin by stating the practical business problem that options for a new ICT capability could help to overcome in achieving the government's policy and service delivery objectives.

An ICT investment may address several business problems, including:

- Supporting stakeholder priorities and business needs
- Enhancing the level of service delivered to stakeholders
- Reducing agency and whole-of-government costs
- Overcoming the limitation and constraints of a current solution

2.4 Stakeholder Impact

Describe the impact of the current situation on stakeholders.

¹ **Effectiveness.** In accounting terms, the extent to which an entity achieved the objectives established for its operations or activities, whether those objectives were expressed in terms of outputs or outcomes (AAS 29). In outcome framework terms, the extents to which outputs and / or administered items make positive contributions to the specified outcome. Effectiveness indicators are used to assess the degree of success in achieving outcomes.

Efficiency. The extent to which the entity maximised the outputs produced from a given set of inputs or minimised the input cost of producing a given level and quality of outputs (AAS 29).

2.5 Current Risks

Describe the risks that the current situation creates, and the risks of not responding to the current situation. Include both business and technical risks.

3. Proposed Response

Having identified the “Why” of the business case, the Proposed Response starts to articulate the “What” is being proposed to be done in response.

This is about identifying the desired end state or destination, rather than the detail of “How” to get there.

Include a description of the proposed response, including any evidence that this will be an effective response to the current situation. This section should focus on ‘what’ is being proposed as a response, rather than ‘how’ that response can be delivered.

3.1 Strategic Alignment

Identify how the proposed response aligns with your agency objectives listed in the policy/agency context section. Refer to your agency’s Portfolio Budget Statements to identify the outcomes that delivery of this response would support.

Identify how the proposed response aligns with whole-of-government (WofG) policies, priorities and approaches.

Where relevant provide specific reference to:

- ICT Customisation and Bespoke Development Policy
- ICT Skills Policy
- Australian Government Architecture
- Cyber Security Policy
- Cloud Computing Strategy
- Open Source Software Policy
- WofG Common Operating Environment
- Environmental Sustainability of ICT
- Gov 2.0
- Coordinated procurement
- Data Centre Strategy

Information on these can be found on the Finance website.

The technical environment and business environment sections that follow should describe the vision of the future state of the organisation. What will be different about the current situation from both a technical and business perspective as a result of the proposed response (not the specific options for delivering that response)?

Figure 3: Strategic Alignment

Source	Stated Strategy

3.2 Technical Environment

Describe the future state of the technical environment based on the proposed response (not the specific options). High level environment and architecture diagrams can be helpful, but keep in mind the audience for the document when thinking about the degree of technical detail to include.

3.3 Business Environment

Describe the future state of the business operational environment based on the proposed response.

3.4 Benefits

Provide a statement of the benefits that the project will achieve and indicative timing for when they will be realised. Include information on how benefits will be measured and the expected targets to be achieved for each measure.

Include interim and longer term benefits, and include any identified disadvantages.

4. Proposal Summary

The information provided about the current situation, the proposed intervention and the expected benefits may usefully be summarised in an Investment Logic Map, or similar high level visual representation.

5. Solution Options

5.1 Design Criteria

Include where possible the high level requirements that any viable solution will be expected to deliver against. These will be examined in greater detail in Second Pass.

Note high-level business requirements that the design must address – for example, consider areas such as:

- functionality;
 - security and privacy;
 - performance;
 - reliability, availability and maintainability;
 - policy, strategic, standards and architectural compliance requirements (such as the Australian Government Architecture);
 - usability, flexibility, scalability, interoperability; and
 - major external interfaces and interdependencies.
- These requirements provide the criteria for comparing options. Indications of relative value will be informative.

5.2 Identified Options

The business case must consider a range of options ranging from minimal technology upgrades to more innovative ICT business solutions, including those that may challenge prevailing inter-agency ICT planning and service delivery habits. This ensures that all options are considered objectively on their merits. The outcome will be a shortlist of options for analysis and comparison in the initial cost-benefit analysis. Normally this shortlist will include a Base case (maintaining existing arrangements), a Do Minimum case (to address only urgent and unavoidable requirements) and two to three other options.

Identify the practical options for achieving the objectives of the initiative. Also, identify discarded options and the reasons.

In the First Pass Business Case, options are high-level, covering practical ways of delivering the required outcomes. Examples of the appropriate level are:

- outsourced against in-house service delivery;
- major ICT development against increased staffing levels; and
- centralised against regional service delivery.

If after you have completed your options analysis you decide that there is only one option that is practical or preferred, you should explain why each of the other options are not feasible, or not preferred, keeping in mind that a case must always offer the decision maker appropriate discretion.

A business case for a significant ICT project with only one practical option would be exceptional and require detailed justification.

First Pass Business Case

Figure 4: Options

Option 1 - Base Case - Do Nothing	
Description	Costs
Risks	Barriers
Strengths	Weaknesses

5.3 Options Analysis

Summarise the most significant features of each option. A preliminary analysis of the Net Present Value (NPV) of the proposal should be included. The NPV analysis should summarise the value flows associated with key costs and benefits, discounted to a present value using an appropriate discount rate. Present a tabular comparison of the options against costs, design requirements listed above and risk. Note any preferences in a “Conclusions” line.

For example:

Figure 5: Options Analysis

Requirements	Option 1	Option 2	Option 3	Option 4
Benefits				
Total Costs (Over n Years)				
NPV: \$XXm				
Implementation Costs				
Ongoing Costs				
Implementation Timeframe				
Requirement 1				
Requirement 2				
Requirement 3				
Implementation Risk				
Conclusion (e.g.)	2 nd Ranking Option	Preferred Option	3 rd Ranking Option	

6. Option Details

Repeat this section of the business case for each option, including the following sub-sections:

- Description
- Stakeholder Impact
- Cost
- Benefit
- Cost-Benefit Analysis
- Risk
- Schedule

The details for each option are included as attachments to the First Pass Business Case.

The detail provided should focus on differentiating the options. Provide enough detail for each option to:

- support comparative analysis; and
- support feasibility and assumptions.

6.1 Option One Details

6.1.1 Description

Provide a description of the option.

6.1.2 Stakeholder Impact

Provide an assessment of the stakeholder impact, both positive and negative should this option be implemented.

6.1.3 Cost

ICT-related costs are expense and capital costs, including infrastructure, software, administration, maintenance and resourcing costs associated with the business transformation delivered by ICT enabled projects – including processes associated with the planning, design, development, change management, training and evaluation of the project.

To provide a common basis for planning, First and Second Pass Business Cases must apply the following definitions of ICT capital and operating costs:

- Capital costs – directly related to the creation of one or more assets (including relevant workforce costs).
- Operating costs – indirectly related to the implementation of the option and with no direct connection to the creation of an asset.

First Pass Business Case

Describe the cost associated with any high-level business process transformation required by the option. Include:

- identification of new or changed organisational units;
- identification of new or changed business processes;
- estimates of the changes in staffing levels; and
- description of the approach to organisational change, including recruitment and training.

Identify the costs for major ICT components required to support the option. For each ICT component include:

ICT development information:

- description of each ICT element;
- architectural and standards compliance; and
- identification of the service levels required

ICT BAU operations and support information:

- description of the concept for operating and supporting the ICT element; and
- estimates of the ICT operation and support costs (i.e. BAU costs).

Identify and describe the approach to implementing any other systems that relate to the option (for example, buildings and media campaigns). Highlight the interdependencies between the streams of work (e.g. agency delivery of an advertising campaign by internet may have ICT implications).

Committed estimates involving a point estimate (of say '\$50 million') plus or minus X% are required, providing government with clear advice on the likely cost of the ICT option, taking into account the potential impact of the worst-case scenario. You should also provide the logic that underpins the point estimate and worst-case components.

At first pass, the cost estimates for each option should include a significant contingency allocation, particularly for options (or elements of options) with medium-to-high technology risks. For such options, a contingency allocation of at least 30% would be appropriate.

You should build your contingency allocation by establishing the risk and corresponding dollar figure for each element (such as software development or customisation), after mitigation strategies have been considered.

Further guidance on cost estimation is provided at Attachment C.

6.1.4 Benefits

Identify the benefits expected to be delivered by each option, the timeframe expected for realisation of each benefit, how each benefit will be measured, and the broad targets for each measure.

Further guidance on benefits is provided at Attachment D, and the Performance Indicator Catalogue on the Finance website.

First Pass Business Case

6.1.5 Cost-Benefit Analysis

At first pass you are expected to provide an initial cost-benefit analysis for each of the options in your ICT business case. Focus on the benefits of each option from the perspective of end-users and of your agency. As part of your cost-benefit analysis, you should consider each option in terms of the inputs of cost, volume and time. You should also conduct a basic sensitivity analysis.

The cost-benefit analysis culminates in an overall economic assessment for each option and a comparison of the relative value of each option. This assessment is based on the net present value (NPV) method where appropriate. At first pass, you are not expected to provide a definitive NPV calculation. However, in order to submit a convincing First Pass Business Case, you are required to provide an initial NPV calculation for each option, and an initial comparison between the options even though the basis for the cost and benefit information may only be preliminary.

Further guidance on Cost-Benefit Analysis is provided at Attachment E.

6.1.6 Risk

For each option, provide a high-level risk assessment that gives an overall risk rating and identifies the main risks and treatments. Examples of high-level risks include:

- industry maturity;
- complexity; and
- external interactions and interdependencies.

6.1.7 Schedule

Provide a broad schedule linking the major cost elements, and showing the significant external influences, listing any known internal or external milestones affecting or constraining any schedule.

You should indicate how long each option is likely to take to be fully operational and deliver the planned benefits. It is important to be realistic in your planning and to explain the logic and assumptions that underpin each element of your schedule. For example, to allow sufficient time for software development, test and evaluation, and user training and acceptance, you should look to similar work performed elsewhere in your agency or in another agency recently. You should use this knowledge to question informal schedule advice from potential industry partners.

6.2 Option Two Details

Follow the same format as Option One Details for each option.

7. Implementation Approach

Having identified the problem to be solved and the options to be explored in response, this section of the business case is about confirming the Agency's capability and capacity to deliver the preferred solution.

Describe the implementation approach for delivering the investment, including the project/program management governance structures and other key control and assurance processes, describing variations for each identified option if different.

If a governance structure is not yet in place, identify the management issues that will need to be addressed, including consideration of:

- the existing internal organisation;
- stakeholder engagement;
- consultation processes; and
- approval processes.

8. Organisational Capability

The purpose of this section of the business case is to provide Cabinet with sufficient context to inform any decision it might make based on your agency's organisational capability, as reflected in your Portfolio, Program and Project Management Maturity Model (P3M3®) assessment.

For example, if the P3M3® scores are relatively low, Cabinet might decide to pursue a less complex option unless you can demonstrate that risks associated with the relatively low organisational capability can be adequately managed. Alternatively, Cabinet might choose to impose additional passes on the proposal until any areas of concern have been adequately addressed.

On the other hand, your validated P3M3® scores might be relatively high, except for one or more areas of key relevance to the proposal. In that situation you should outline how you plan to strengthen your organisational capability in those areas, and/or how you plan to manage the associated risks through project-specific risk treatments.

Report briefly on progress against your Capability Improvement Plan (CIP), any remaining weaker areas of organisational capability, and the strategies adopted to manage the risks associated with the weaknesses. These strategies will include those already outlined in the CIP, if they will improve capability in sufficient time to address the timing of the proposal, as well as any project-specific strategies where needed. Include any project-specific, organisational capability-related risk treatments in your costings.

First Pass Business Case

When considering Portfolio and Program Management risks, consider the potential scope and integration impacts of your proposal on shared capability required for concurrent/parallel initiatives already underway.

Include in this section details of your validated P3M3® assessment, including date completed and evidence of independent validation. Provide details of maturity levels in this format:

Figure 6: P3M3® Assessment Results

P3M3® Process Perspective	Portfolio Management (P3M3)		Program Management (PgM3)		Project Management (PjM3)	
	A	B	A	B	A	B
Management Control						
Benefits Management						
Financial Management						
Stakeholder Management						
Organisational Governance						
Risk Management						
Resource Management						
Generic Attributes						
Overall						
A – Levels at most recent validated assessment B – Target levels in Capability Improvement Plan						

Attach a full copy of your most recent validated assessment report, together with a copy of your CIP, which should include:

- your agency’s target levels of capability across each process perspective under each model; and
- a list of specific improvement initiatives with timeframes for their planned completion.

9. Work to Second Pass

Agencies should provide an accurate costing, risk assessment and schedule for the work needed to develop a rigorous business case for second pass, including for any joint planning, prototype work or studies that should be conducted with industry.

Identify funding required to develop the Second Pass Business Case. Substantiate any funding request with a breakdown of the work elements required.

The work-to-second-pass section distinguishes between items that could be funded by your agency, and those for which you are seeking extra funds (such as technical feasibility studies, and prototype development, testing and demonstrations by industry).

A table outlining the costs to second pass, similar to Figure 7, can be included.

Figure 7: Costs to Second Pass

Phase One Completion Month Year	Item	Indicative Cost (\$000)
	Project Manager	
	Financial Modeller	
	Business Analyst	
	Technical Writer/Project Admin	
	Architects (Solution & Data)	
	Developers	
	Business Users	
	SMEs	
	Market Approach	
	Phase One Total	
Phase Two Completion Month Year	Item	Indicative Cost (\$000)
	Project Manager	
	Business Analyst	
	Technical Writer/Project Admin	

First Pass Business Case

	Business User Involvement	
	Vendor/SMEs	
	Hardware (Test/Develop Environ.)	
	Hardware Maintenance and Support	
	Phase Two Total	
	Work to Second Pass Total	

10. Supporting Documentation

The following is a list of potential supporting documents that may be relevant to a specific first pass business case. The list is not intended to be exhaustive, and there may be more or fewer attachments depending on the risk and complexity of the proposal.

- Project Management Plan
- Risk Management Plan
- Risk Register
- Benefits Management Plan
- Solution (Architecture) Design
- Requirements Specification (Business Process Model)
- P3M3® Assessment
- P3M3® Capability Improvement Plan
- Independent Validation of Agency Capability
- Quality Plan
- Procurement Strategy
- Governance Plan



Australian Government
Information Management Office

Second Pass Business Case

Second Pass Business Case

At a glance:

- The steps for a Second Pass Business Case are the same as for the first pass, but require greater rigour and assurance, particularly in the areas of cost, benefits, risk and schedule.
- Analysis during the second pass stage will include measures such as proof-of-concept tests and formal market approaches to provide greater precision and confidence in estimates.
- The analysis concentrates on those options selected by the government for second pass treatment.
- The procurement plan must show how each ICT option could be acquired and delivered gradually at lowest risk.
- The governance plan should explain how progress will be monitored and measured in your organisation, how any emerging risks will be addressed, and when regular progress reports will be provided to the government.

The following section of the guide steps through the structure of a Second Pass Business Case.

11. Executive Summary

A key consideration in the development of the Second Pass Business Case is the question of complexity. Several factors contribute to the complexity of a proposal, the degree of change proposed, the number of required components in the proposed solution, the range of cross agency and cross government interaction required, the dollar value, technical complexity and novelty and so on.

In determining the complexity of a proposal – and therefore the range and level of detail of information required in the business case, keep in mind that the business case needs to provide information sufficient for the decision being sought.

11.1 Recommendations

The recommendations must be consistent with the recommendations in the Cabinet submission as detailed in Cabinet Circular No.1 each year, available from your agency Cabinet Liaison Officer.

12. Summary of First Pass Business Case

Much of the material that makes up the background for the Second Pass Business Case may be drawn from the First Pass Business Case. As is the case all through the Second Pass Business Case, agencies should provide additional, more detailed or updated information.

12.1 Policy Context

State the business objective that options for a new ICT-enabled investment would help to achieve. Compare the proposed investment with your agency's strategic priorities. Refer directly to the outcomes and outputs in your agency's Budget Statements, corporate plan and annual report.

12.2 Business Problem

Briefly reiterate the business problem the proposal addresses in the context of the agency's roles and responsibilities. Note any factors that are critical to achieving the objectives (Critical Success Factors – CSFs).

12.2.1 Proposed Response

Include a description of the proposed response, including any evidence that this will be an effective response to the current situation. This section should focus on 'what' is being proposed as a response, rather than 'how' that response can be delivered. Consider using visual representations of Blueprints, Visions or Strategic Intention for the proposal where possible.

12.3 Outcome of First Pass

Provide a statement of the outcome of the first pass Cabinet endorsement, including:

- selection of options for second pass review;
- caveats;
- deviations from initial proposals; and
- additional functions required.

12.4 Changes since First Pass

Provide a brief summary of key developments in the organisation, policy space or broader government context since the approval of First Pass, as well as providing an overview of the work undertaken to produce this Second Pass Case.

Describe any significant changes that have occurred since endorsement of the first pass proposal that will affect the information (type, detail, availability, applicability) the sponsoring agency is providing for second pass.

Second Pass Business Case

Examples include (but are not limited to) changes to:

- External environment
- Government policy and/or regulatory requirements
- Governance profile;
- ICT elements;
- Security risks;
- Ongoing support model;
- Procurement plans;
- Identified risks and risk treatment; and
- Customer/client base.

Mention any significant deviation from the planned work to second pass identified in the First Pass Business Case.

13. Options Analysis

The Options Analysis section is one where additional information may be required based on the relative complexity of the proposal. Consider adding more detailed information about cost drivers, costing approaches and include a more detailed description of the costing model. Consideration may also be given to third party verification of the costing model and any assumptions made during the development of the costing.

A definitive analysis of the Net Present Value (NPV) of the proposal should be included. The NPV analysis should summarise the value flows associated with key costs and benefits, discounted to a present value using an appropriate discount rate. Refer to Attachment E: Cost-Benefit Analysis.

Where more than one option is being proposed for consideration, a comparative table contrasting the options may be useful.

13.1 Options Summary

This section provides a summary comparison of the chosen options from a business perspective. A subsequent section requests project details about each option.

Second Pass Business Case

Use a tabular presentation such as:

Figure 8: Options Summary

	Option One	Option Two	Option N
Benefits	The quantifiable business benefits that are expected to be realised for each option from the successful delivery of the outcome. These should be categorised as either financial or non-financial benefits.		
Disadvantages	A disadvantage is an outcome perceived as negative by one or more stakeholders. Disadvantages are actual consequences of an activity (whereas, by definition, a risk has some uncertainty about whether it will materialise).		
Timescale	What is the overall timeframe for implementation? Over what period will the project costs be incurred? Over what period will the benefits be realised?		
Cost	Summarise the costs (derived from Project Details and Plans below) and the supporting assumptions, including contingencies for risks. The aggregated costs shown here should also include details of the ongoing operational and maintenance costs, and their funding arrangements. Factor in the cost of periodic security assessments and any decommissioning of systems and asset disposal. Detailed costing information should be provided in attachments.		
NPV	What is the Net Present Value, calculated in the cost-benefit analysis, over the life of the asset?		
Major Risks	Provide a summary of the aggregated risk ratings, highlighting the major risks and their possible effect on the business objectives and benefits (therefore, covering both the project delivery and the ongoing operations and maintenance).		

13.2 Cost-Benefit Analysis

The cost-benefit analysis culminates in an overall economic assessment for each option and a comparison of the relative value of each option. This assessment is based on the net present value (NPV) method where appropriate. At second pass, you are expected to provide a definitive NPV calculation.

With the information in the business case, it is possible and necessary to compare the development, operations and maintenance costs with the value of the benefits over a period of time – i.e. cost-benefit analysis. The investment period may be the useful life of the products or a fixed number of years, but must include at least the Budget year and three forward years. The period must also include all development years.

Second Pass Business Case

The cost-benefit analysis must cover project costs, ongoing operations and maintenance costs (including disposal costs if appropriate to the time frame). The cost-benefit analysis technique (e.g. Net Present Value – NPV) must be consistent across all options and should be sufficient to test the vulnerability of the options to risk, and variability in costs and benefits.

Provide costing information using the standard Departmental Costing template, issued by the Department of Finance and Deregulation with attachments detailing ICT costs.

For further detail, refer to:

- Attachment E: Cost-Benefit Analysis
- Handbook of Cost-Benefit Analysis, on the Finance website.

13.3 Conclusion

The conclusion, summaries options, outlines the limitations, risks, costs and analysis undertaken. Reasons for selecting preferred options can be summarised here, in addition to highlight the benefits for the organisation.

14. Implementation Approach

Proposal complexity may have an impact on the range of implementation approaches available for consideration. In-house against outsourced, phased implementation against ‘big-bang’ change approach, incremental improvement against wholesale innovation will be informed by the complexity of the proposal and the importance and urgency of the business need. As with funding, the degree of detail provided in the implementation approach should be commensurate with the complexity of the proposal.

This section presents implementation details for each option. Reviewers will use the information requested here to verify the robustness of the project design and delivery.

Where more than option is being presented, this section of the business case may be repeated for each option in attachments.

14.1 Technical Design Report

Include a high level Business Process Model, and ICT Architecture diagrams, in the document and provide more detailed versions of these models and architectures as attachments.

For each option, provide a detailed technical design report that includes:

- the scale and complexity of the technical architecture and design;
- how the architecture and technical elements would help to achieve the benefits of the overall policy proposal, based on the Statement of Success agreed by government;
- the extent of software development and integration work;

Second Pass Business Case

- compliance with policies and standards, particularly security and interoperability;
- how any positive or negative technical issues realised since first pass should be addressed;
- the tasks and timing for high cost, non-technical elements including program management, change management, workforce planning and user acceptance and training;
- how the skills and experience required in your project management team will be provided or built; and
- processes and requirements for ongoing maintenance and support.

For solutions that will rely on the agency ICT infrastructure, the report will address:

- How you will implement the ICT project component within your agency architecture.
- The interoperability of the new option with existing, legacy or external systems.

The technical report should also describe the extent to which the design of each ICT option would support whole-of-government architecture principles through:

- collaboration with other agencies in the development of the service
- re-use of existing cross-agency or whole-of-government services and facilities
- how services and facilities developed for the project can be re-used by other agencies.

14.2 Agency Capability impacts for this Option

Describe the specific implications that identified strengths and weaknesses from the P3M3® assessment process will have on this implementation approach.

Describe the impact of the agency's organisational capability, in terms of its strengths and weaknesses as identified in the P3M3® assessment that relate to the implementation for this option including governance.

Identify the most significant areas of lower capability in portfolio, program and/or project management that present sources of risk to the implementation of this option.

In the risk analysis section below, identify the risks and describe how these risks will be treated in the planning, execution and post-implementation of the project, including any relevant risk treatment measures in the capability improvement plans.

14.3 Project/Program Plan

If elements of the plan are the same regardless of the specific option, repeat those sections of the plan for each option. This should include a Work or Product Breakdown structure, master schedule and a sourcing plan.

14.4 Governance and Control

Roles, responsibilities, authorisation hierarchy, escalation procedures, control and assurance processes.

14.5 Review Points

Identify key points in the project schedule for planned reviews including stage gate (or Gateway) reviews of quality, benefits realisation and the status of the business case, including potential 'exit' points for the project.

Second Pass Business Case

14.6 Risk Analysis

Details of major risks (including workforce risks), risk ratings, mechanisms employed to arrive at these ratings, risk treatments. This should include significant security risks and risk treatments.

14.7 Benefits Realisation Plan

Include:

- details of the benefits to be achieved through the implementation of the project;
- how benefits will be measured and key assumptions or dependencies;
- key project activities required to assure realisation of benefits; and
- details of when benefits are expected to be realised.

14.8 Procurement Plan

Describe the intended procurement strategy (EOI, RFT), sourcing options, procurement stages, use of whole-of-government procurement facilities and instruments and the capability of the market to deliver.

As with any procurement process, market testing for proposals and proof-of-concept prototypes must be conducted in accordance with your agency's Chief Executive Instructions (CEIs) or equivalent. Adherence to CEIs will ensure compliance with the Commonwealth Procurement Guidelines (CPGs).

Approaches to industry for proposals and for proof-of-concept work to support second pass analysis should involve an open market approach and should cover each of the ICT options approved by Government at first pass. These market approaches must indicate that:

- a decision to proceed with the prototype work before second pass gives no explicit or implicit guarantee of future contracts;
- the Commonwealth retains all intellectual property relating to the prototype development and tests;
- the Commonwealth retains the right to discontinue any part of the work at predefined exit points within the project schedule and associated contract; and
- an outcome of the prototype work includes providing the Commonwealth with full documentation and information sufficient for a subsequent approach to market.

The CPGs allow for the direct sourcing of prototypes, although agencies should still consider the value for money benefits of a competitive procurement process.

14.9 Cyber Security Policy

Provide a summary of the security design and delivery requirements of the project, including likely impacts on physical and personnel security requirements, roles and responsibilities and assessment (including certification) and accreditation. Explain how the option aligns with the Government's policies on cyber security and information security.

The Business Cases for ICT-enabled proposals also need to reference and explain how the proposal will comply with the mandatory requirements of the Protective Security Policy Framework (PSPF) and the ICT requirements of the Information Security Manual (ISM) through the various stages of the proposed systems development lifecycle.

14.10 Organisational Change Plan

Describe the intended organisational design (people, processes, tools) and change management approach (training, recruitment, transition).

14.11 Human Resources Plan

Identify the process to be used to supply human resources for the project, including an indication of the following:

- key skills and personnel and the points at which they will be required over the life of the project;
- where new staff (internal and external) will be sourced from;
- consideration of market supply conditions for certain skills;
- training requirements for existing and new staff;
- consideration of dynamic resourcing and any sharing of staff from external agencies or other parts of the agency, especially in the case where high demand ICT skills are required; and
- Identify the impact of any staff movements on other programs.

Agencies should develop human resource plans in compliance with current agency and APS skills policies, including those developed in response to the ICT Reform (Gershon Review) recommendations. Work force planning adjustments arising from new projects should aim to enhance the internal ICT skills base in government.

14.12 Detailed Costing

Reflect the proposed design (using a project WBS) and the proposed skill set requirements. Cost categories include:

1. Costed WBS;
2. Maintenance cost schedule;
3. Operational service delivery;
4. Program/project management;
5. Travel, training and consultancy; and
6. Post pilot/prototype cost results.

If available, make reference to comparable implementation costs at other sites.

Costs must include implementation and ongoing support and maintenance. For comparison purposes, show costs over the same period for all options. The period must include at least the Budget year and three forward years, and must include the full development and implementation period.

Reasonable provision for residual risks should be costed, and described in detail.

15. Organisational Capability

15.1 P3M3® Assessment

The purpose of this section of the business case is to provide Cabinet with sufficient context to inform any decision it might make based on your agency's organisational capability, as reflected in your P3M3® assessment.

Include progress against the Capability Improvement Plan; remaining weaker areas of organisational capability; and strategies to manage the risks associated with the weaknesses (including capability improvement strategies in the medium to longer term, and project-specific strategies to address specific high risk areas in the short term).

For example, if the P3M3® scores are relatively low, Cabinet might decide to pursue a less complex option unless you can demonstrate that risks associated with the relatively low organisational capability can be adequately managed. Alternatively, Cabinet might choose to impose additional passes on the proposal until any areas of concern have been adequately addressed.

On the other hand, your validated P3M3® scores might be relatively high, except for one or more areas of key relevance to the proposal. In that situation you should outline how you plan to strengthen your organisational capability in those areas, and/or how you plan to manage the associated risks through project-specific risk treatments.

15.2 Capability Improvement Plan

Report briefly on progress against your Capability Improvement Plan (CIP), any remaining weaker areas of organisational capability, and the strategies adopted to manage the risks associated with the weaknesses. These strategies will include those already outlined in the CIP, if they will improve capability in sufficient time to address the timing of the proposal, as well as any project-specific strategies where needed.

When considering Portfolio and Program Management risks, remember to consider the potential scope and integration impacts of your proposal on shared capability required for concurrent/parallel initiatives already underway.

Second Pass Business Case

Include in this section details of your validated P3M3® assessment, including date completed and evidence of independent validation. Provide details of maturity levels in this format:

Figure 9: P3M3® Process Perspective

P3M3® Process Perspective	Portfolio Management			Program Management			Project Management		
	A	B	C	A	B	C	A	B	C
Management Control									
Benefits Management									
Financial Management									
Stakeholder Management									
Organisational Governance									
Risk Management									
Resource Management									
Generic Attributes									
Overall									
A – Levels at most recent validated assessment; B – Target levels in Capability Improvement Plan; and C – Capability level as at most recent assessment.									

Attach a full copy of your most recent validated assessment report, together with a copy of your CIP, which should include:

- your agency’s target levels of capability across each process perspective under each model; and
- a list of specific improvement initiatives with timeframes for their planned completion.

16. Supporting Documentation

The following is a list of potential supporting documents that may be relevant to a specific second pass business case. The list is not intended to be exhaustive, and there may be more or fewer attachments depending on the risk and complexity of the proposal.

- Work Breakdown Structure (WBS) Cost Model and Estimate Project Management Plan
- Project Management Plan
- Risk Management Plan
- Risk Register
- Benefits Management Plan
- Solution (Architecture Design)
- Requirements Specification (Business Process Model)
- P3M3® Assessment
- P3M3® Capability Improvement Plan
- Independent Validation of Agency Capability
- Quality Plan
- Procurement Strategy
- Governance Plan
- Change Management Plan
- Training Plan



Attachments

A: Assumptions and Constraints

Estimated Costs or Benefits constraints that you should address will include:

- complexity of business requirements
- user numbers
- degree of user support required
- interdependence with other systems
- timing of events
- IT skills availability and location
- the scalability of a technical option and any service limits that may apply

For example, an assumption relating to the number of users may be that an online service will have 20,000 logged-on users per day and no more than 5,000 at any given time.

A constraint relating to the number of users may be that the system has a maximum capacity of 100,000 logged-on users at a given time.

A list of assumptions and constraints will help you to modify your analysis if they change. Documenting your original and revised assumptions will also help to justify any changes to the cost and schedule estimates that are likely to occur after first pass approval has been obtained.

Known Costs or Benefits

These costs or benefits are known and are likely to be unchangeable over the period of the analysis. An example may be the rent on a project office of a known size, for a known period of time and at a known rate. Generally, most cost-benefit models will not have a high proportion of known costs.

Estimated Costs or Benefits

These costs or benefits use a relationship with another piece of information as the basis for estimation. It may be that some aspect of the cost or benefit is known (e.g. cost), but another aspect is unknown (e.g. volume). This creates the need to estimate the unknown factor through the extension of some predictable relationship. For example, if the development hours per function point are unknown, a method for predicting total development costs would be to research development effort on projects using similar development languages, platforms and developer capabilities. You could then extend the average development hours per function point for those projects to your own project. You can also use costing or measurement data from comparable projects or similar entities.

Expert Estimated Costs or Benefits

These costs or benefits are those not able to be estimated using the above two methods. These types of costs and benefits should only be included if there is a degree of credibility in the expert's opinion of costs or benefits and should only be used if there are no other alternatives. This method may also be used when the cost of estimating the costs would be prohibitive.

B: Common ICT Cost Drivers used for the Business Case

Software

Software development and integration are good examples of cost drivers. Where a decision is made regarding the language used in the development of a particular type of in-house application, this will affect the time it will take to develop the particular application. This in turn may affect the costs associated with developing the application through an increase in programmer costs (i.e. hourly rate x number of hours).

As the programming cost increases, total cost also increases. If there is no resultant effect on the agency benefits, the net present value (NPV) of the investment in the new application will ultimately be reduced. This example illustrates that while a cost may be estimated, the actual outcome is influenced by several factors, most of which are not financial and may or may not be estimated using traditional estimation methods.

Focusing on cost drivers concentrates your investigations on specific key information, rather than minor cost aspects. For example, if the space required for a project team to implement a particular solution is known (i.e. it cannot occupy more or less space due to current lease restrictions and the building rent is fixed), then there is no use in gathering information about rent rates in the CBD, estimating the space required and averaging the rent to develop a cost estimate.

If the main determinant for software development design and programming costs is the level of language complexity, then any changes in the development language will always drive the cost.

Systems Development and Integration

Software development is one of the most difficult cost components to accurately predict. This makes an understanding of assumptions-based modelling and cost driver analysis extremely important to developing reasonably accurate cost estimates for software development projects. As discussed above, assumptions are based on one or more broad categories.

Using information from similar projects is a good way to make credible assumptions about the size, cost and duration of a software development project. There are limitations, as rapid technological advances often render previous projects obsolete. While the outcome of the project may be similar, advances in systems level software and integration make new technologies more attractive and more scalable over the medium to long term. If you can apply a previous project's costing, you will probably need to make alterations to account for:

- improvements in technology

- increases (or decreases) in the hourly rates for technical and project staff
- differences in scope, e.g. extension of the project to other agencies, increased functionality, changes in integration and support systems
- changes in the IT services industry, e.g. spare capacity, skill availability, attractiveness of the project, etc

You will most likely need to estimate some costs using the cost estimator relationship – particularly for purpose-built or customised government ICT projects. Most software estimation techniques based on some form of a cost estimator relationship use one or two major drivers on software development cost and measure and adjust those drivers on the overall cost of the software. Major drivers traditionally include:

- source lines of code (SLOC)
- function points
- object points
- use case points

Depending on the software estimation technique, secondary drivers are applied to the main input (or main driver), which eventually assists in determining the total estimated cost for the project. Some of these drivers – such as cost of staff, complexity of the application, integration or development language – are reasonably obvious. However other drivers such as specification level and the required level of documentation are less obvious. The table below provides a list of some primary and secondary cost drivers in the software development estimation process.

Primary Drivers (or Sizing Methods)	Secondary Drivers	
Source lines of code	<ul style="list-style-type: none"> • Complexity of architecture, interfaces, development language, integration • Technology maturity • Specification level • Effort uniqueness • Reusability • Breakage • Scheduling issues • Number of locations 	<ul style="list-style-type: none"> • Personnel skill level • Internal & external interfaces • Labour rates • Overtime • Overheads • Personnel turnover • Cost of money • Inflation
Function points		
Object points		
Use case points		

This list is designed to help you in the initial stages of sizing software and estimating costs. However, you will need to conduct a more robust analysis of cost drivers to undertake the estimation for second pass.

Software Maintenance Costs

Estimating maintenance costs for new systems or software can be difficult. The level of maintenance required depends on a number of factors that are often difficult to predict prior to the completion of the development activities. Even when the system

or software is implemented, estimates and budgets for maintenance costs and effort can often prove to be seriously inaccurate.

Typically, maintenance costs are driven by the following factors:

- The size of the software;
- The quality of the software;
- The complexity of the software;
- The service levels that must be met; and
- The levels of interoperability with other systems.

A typical approach to estimating software maintenance costs includes the maintenance-to-development cost ratio. Most external IT-based research companies develop maintenance benchmarks based on this model or a variation of it. You can contact these companies to obtain useful rules of thumb, e.g. [XX%] per year for maintenance and [XX%] per year for enhancements for [XX] type of application.

ICT Capital and Operating Costs

Capital cost categories in your business case costing model:

Hardware	Servers Storage Peripherals (printers, multifunction) Desktops/Mobile Computers Network Infrastructure Other Hardware
Systems Integration / Development	Project Management Architect Designing and Configuring Programming Testing Technical (data, storage, hardware etc) Security Other Systems Integration/Development
Fit Out	Fit-out Other Fit-out Expense
Other Capital costs	Defined by Business Case Author

Operating cost categories in your business case costing model:

Employee Expenses	Salary Costs Salary On-Costs Non-Salary Benefits Training and Assistance Other Employee Expenses
Property Operating Expenses	Property Operating Expenses
Specific Supplier Expense	Cloud Computing Financing Insurance Legal Marketing Research Training Delivery Other Specific Supplier Expense
General Supplier Expenses	General Supplier Expense
Corporate Support	Corporate Support Expense

Software Licensing	Applications Software Development and deployment tools System Infrastructure Software Other Software Licensing Expense
System Maintenance and Support	Hardware Maintenance Software Maintenance Other System Maintenance and Support
Other Operating Expenses	Defined by business case author

C: ICT Cost Estimation Guide

Overview

The purpose of the ICT Cost Estimation Guide is to assist agencies develop in-house cost estimates and review industry price estimates. This brief guide outlines general principles for costing ICT proposals as part of the whole-of-government ICT two-pass approval process. Application of the Guide is voluntary but will improve the overall quality of proposals, reduce avoidable uncertainty and risk, and improve the likelihood of timely approval.

Separate costing guidance is provided to the Department of Defence where it applies the ICT Two Pass Review.

The evidence and methods used to derive cost estimates must be appropriate to the nature of the proposal, including the products and services to be acquired, procurement strategy to be implemented and options to be presented to government. In all cases, assumptions and methods used must be traceable and defensible under Finance evaluation and scrutiny.

In order to implement the Guide's recommended principles and practices, the project office will need expertise to conduct and manage a robust cost estimation process to satisfy Government and its appetite for risk and reward. This may include statistical expertise and modelling.

The project office should involve Finance early on in the cost estimation process to ensure the approach, evidence and costing methods are appropriate to the proposal. Early engagement will reduce the time it takes Finance to verify and agree to a proposal's cost estimates.

Costs will be compared against the measurement of benefits. Guidance of benefits management can be found at Attachment D and E, as well as the Finance publication Handbook of Cost-Benefit Analysis (January 2006).

First Pass Business Case: Quality of Cost Estimates

First pass costs should provide a rough order of magnitude estimate for implementing a broadly defined project scope. Cost estimates should be supported by a project management cost development process or standard, such as PMBOK or Prince2. The process should be capable of supporting cost estimate maturation for activities to second pass approval, as more detailed cost information becomes available and as the project scope is better understood. Multiple sources of data should be used in developing estimates: general industry engagement, market surveys, internal and external databases and/or quantitative estimation tools. Cost estimates should be supported by the proposal's First Pass documentation, including:

- Business Case,
- Project Management Plan, and

- Any initial technical documents.

Cost estimates should only be presented formally to Finance once all internal stakeholders have agreed to the estimates.

Second Pass Business Case: Quality of Cost Estimates

Second pass costs - including a combined first and second pass approval, a funding comeback for scope changes and a Real Cost Increase - should provide a tender quality estimate for implementing a detailed and previously agreed project scope from First Pass. Second Pass cost estimates should be presented as a Work Breakdown Structure (WBS) and should be verified against independent sources (Requests For Information, recent tenders, Coordinated Procurement pricing or AusTender data) and supported by the project's technical documentation, including:

- Business Case,
- Project Management Plan,
- Solution Design, and
- Requirements Specification.

Cost estimates should only be presented formally to Finance once all internal stakeholders have agreed to the estimates.

Staff Costs

The decision to use internal or external project staff is usually associated with the availability of appropriately skilled resources - firstly within the agency, and then externally. If internal staff are not available, the cost of external staff should be based on current quoted rates, factoring likely costs for:

- Recruitment;
- Additional performance management;
- Longer periods of induction and orientation;
- Longer periods to fill the vacancy especially in a full employment economy; and
- Overheads.

In addition to qualitative factors (e.g. fresh ideas, skills and knowledge, staff morale etc.) agencies need to carefully consider the state of the labour market as it relates to the particular skill required.

Budget Considerations

The proposal's sponsor should consider offering budget offsets to cover all or part of the proposal's implementation and ongoing support costs. The inclusion of offsets increases the proposal's likelihood of approval.

A proposal's cost estimate should be out turned in accordance with Budget Group issued indices at first pass approval. At second pass approval the project office may use indices contained in contracts, otherwise Budget Group indices apply. Costs are out-turned only once. The project office should consult with Budget Group where there is doubt on which index to use and on which cost items may not be out-turned.

Adjustment of cost estimates from constant costs to out-turn costs is represented by the following formulae:

- Out-turn cost estimate = Constant cost estimate \times Price index; Where Price Index = $1 + (\text{parameter} / 100)$

Contingency

Cost estimates should include a contingency allocation to account for cost estimate uncertainty. A contingency allocation is defined as a budgeted allowance for unplanned changes that result when risks identified in the project's risk register are realised. The contingency allocation is not used to fund changes to project scope. Contingency can be used to fund minor project specification changes, for instance to a work package.

Contingency should be allocated on an annual basis, as guided by the risk register and configuration management plan. Government occasionally may decide to fund only part of the contingency allowance.

The contingency allocation is calculated as a percentage of the proposal's total cost estimate, or preferably on line items within the cost estimate in concert with the risk register. Past experience has demonstrated that a first pass business case has a contingency of 30 per cent, which falls to 10 to 15 per cent of the cost estimate as risk is retired as a consequence of work to second pass approval. Where assessments indicate higher risk, consideration should be given to staging funding approvals over time.

If a project has access to multiple sources of data, a standard deviation calculated using the three-point cost estimation technique - outlined in this Guide - can be used for deriving the contingency allocation.

Cost Estimation Principles

The focus of this Guide is on costing applications, while having general applicability to costing other types of ICT proposals. The reason for this focus is to reflect the type of two-pass proposals received. For Budget 2011-12, the main ICT component for over 90 per cent of proposals brought forward in the whole-of-government ICT two-pass process were for new or reconfigured software applications. The 2009-10 ICT Benchmarking Report for 27 large government agencies also found that expenditure on applications was the largest at 36 per cent amongst Service Tower categories.

Twelve best-practice principles have been developed for improving software cost estimation. The principles are designed to reduce subjective estimation bias, support the estimation process and provide feedback for improved future estimation performance. The principles are:

1. Evaluate estimation accuracy as part of a project's performance criteria;
2. Avoid conflicting estimation goals between an optimistic estimate from a proposal champion and more realistic estimates from an experienced project manager;
3. Ask the internal and external estimators to justify and criticise their estimates;
4. Avoid irrelevant and unreliable estimation information, such as a general expectation of a low final cost estimate;
5. Use documented data from previous development tasks;
6. Find cost estimation experts with relevant experience, for separately estimating effort (quantities), prices and risk;

7. Independently estimate using a 'top-down' technique such as a parametric model, and compare against the proposal's WBS, especially for high risk complex projects in which identifying numerous individual work tasks is difficult;
8. Use estimation checklists to avoid overlooking a required activity, ensure estimation consistency and increase the use of computational methods, or to consider options not presented;
9. Combine estimates from different experts (3 to 5) using different estimation methods;
10. Assess the uncertainty of the estimate using a quantitative technique, even if it is subjective in nature;
11. Provide feedback on estimation accuracy and development task relations; and
12. Provide estimation training opportunities.

Like any general principle, exceptions may be made based upon unique circumstances. The project office should exercise discretion in this regard.

Cost Estimation Process

Agencies should adopt a standard, robust process for generating cost estimates for in-house development work and reviewing price estimates issued by industry. The table below provides an example of a process.

Steps	Cost Estimation Process
Establish	
1	Establish the project scope and technical and functional requirements.
2	Build a work breakdown structure, identifying work item assumptions and constraints.
Find and Select	
3	Scope data sources and select cost estimation methods.
4	Select, source and clean data.
Calculate	
5	Size the product and calculate and schedule activity costs.
6	Quantify risks and estimate contingency.
Review	
7	Validate the bottom-line estimate total with a 'top-down' estimation method.
8	Seek a review of the estimates from outside the project.
Approve and Monitor	
9	Present the estimates for internal stakeholder approval.

Steps	Cost Estimation Process
10	Track, report and update the estimates for changes to scope, prices and schedule performance.

When a pricing request is made to industry as a part of a tender process, the project office should still develop its own cost estimate. This serves two purposes:

- Provides an early indication of the potential budget demand of the project, and
- Makes the project office an informed customer for reviewing industry cost estimates and in seeking agreement on costs with Finance.

Product Metrics

The project office will need to source cost drivers before product cost estimation can occur. A cost driver is a quantity measure that drives cost growth. A software cost driver can take two main forms:

- Size related: lines of code, object code or pages of system documentation; or
- Function related: function points, object points or use-case points.

A project office may need to seek training or specialist expertise to establish software cost drivers. Estimating cost driver data is critical for performing IT cost estimation techniques, especially parametric costing. Sizing data can also help guide expert judgement on costs.

Cost drivers for infrastructure projects are more straightforward, such as: counts of server, processors, memory, desktops and cabling, etc.

Cost Estimation Techniques

Expert Judgement is one of the most common methods for estimating software costs. It involves subject-matter experts coming together to estimate quantities and costs by consensus. This technique is often accepted where there is an appetite for high risk and/or where an indicative cost estimate is sufficient in the interim. It may be appropriate where data is scarce or when new technologies are being implemented, such as an application written in a new language with heavy systems integration. Expert judgement has been formalised by the Wideband Delphi Technique - framed around a WBS - as follows:

- A coordinator presents each expert with a specification and an estimation form;
- Experts discuss estimation issues with the coordinator and each other;
- Experts fill out forms anonymously;
- A summary of the estimates, on an iteration form, are distributed;
- The experts discuss points where their estimates varied widely; and
- Experts fill out forms anonymously, and Steps 4 to 6 are iterated until cost estimates converge with an acceptable degree of confidence.

Parametric estimating involves using algorithms - calculated on historical data to establish statistically significant cost driver relationships - to derive a future cost estimate from a unique set of project data, including: cost drivers such as use or

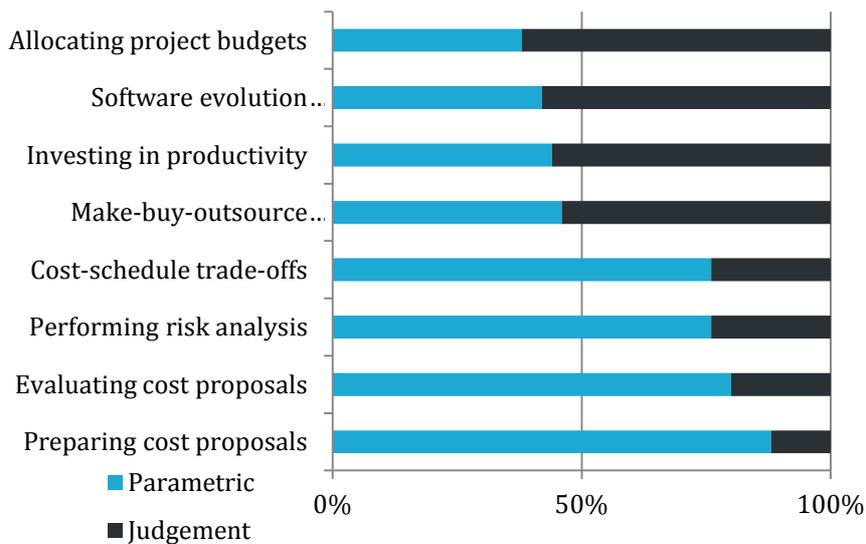
function points, type of programming code, type of hardware, team size, personnel experience and/or organisational type. This technique may be appropriate where data is available and technologies are mature and known, such as a commercial-of-the-shelf application requiring configuration or a well known in-house developed application. Parametric estimating may not be appropriate where there is an ill-defined cost relationship with an activity, such as business intelligence or database work.

Various databases and estimation programmes exist to support a project is software cost estimation efforts, including: COCOMO II, SEER-SEM, TruePlanning and the ISBSG database and tool set. Each model has its own unique data requirements, equations and processes, and requires varying levels of analytical effort on the part of the user. For example, the COCOMO II early-design algorithm for estimating software Person-Months (the hours a person works per month) is expressed as follows:

- $\text{Person Months} = \text{Constant Factor} \times \text{Size}^B \times \text{Effort Multiplier}$; Where the Constant Factor is a productivity factor based on the type of software code to be used. Size represents a software cost driver, such as lines of code or function points. B is a subjective exponential figure, between 1 and 1.5, that assumes costs are not linearly related to the application size. Effort Multiplier represents a combination of modelled and intuitive factors likely to impact the length of time to develop or configure an application, such as:
 - Product reliability, complexity and degree of programming reuse,
 - Hardware/platform performance and stability,
 - Personnel expertise and continuity, and
 - Project and schedule constraints.
- $\text{Development Cost} = \text{Person Months} \times \text{Monthly Rate}(\$)$

Expert judgement versus parametric estimating. Both estimation methods have both positive and negative features. For instance, expert judgement can be highly subjective, while parametric estimation can complicate decision making. Depending upon the complexity and scope of the proposal and project office access to quality data, a combination of expert judgement and parametric estimation may be the best approach for developing a cost estimate.

An industry survey has calculated average percentages for when software project managers and cost estimation professionals are more likely to choose parametric estimation over expert judgement:



This graph indicates that a sound decision for final funding approval, as required at Second Pass, is best underpinned by using parametric methods for initial estimates and supplemented with expert judgement, especially for decision-making trade-offs.

Three-point estimation

Involves using three cost estimates to calculate an expected estimate and contingency. This method uses a positively skewed triangular probability distribution on the assumption that initial cost figures often under-estimate the realised cost. This method may be useful where there is significant cost uncertainty - individual cost items or for a total cost estimate - for modelling multiple cost estimates from expert judgement. This method is associated with the Program Evaluation and Review Technique, as referenced by PMBOK.

The method is calculated as follows:

- Expected estimate = (optimistic + 4 most likely + pessimistic) / 6

The definition for each of the cost estimates are as follows:

- Most Likely is the most realistic estimate that attracts the greatest confidence,
- Optimistic is a best-case scenario estimate – the lowest estimate, and
- Pessimistic is a worst-case scenario estimate – the highest estimate.

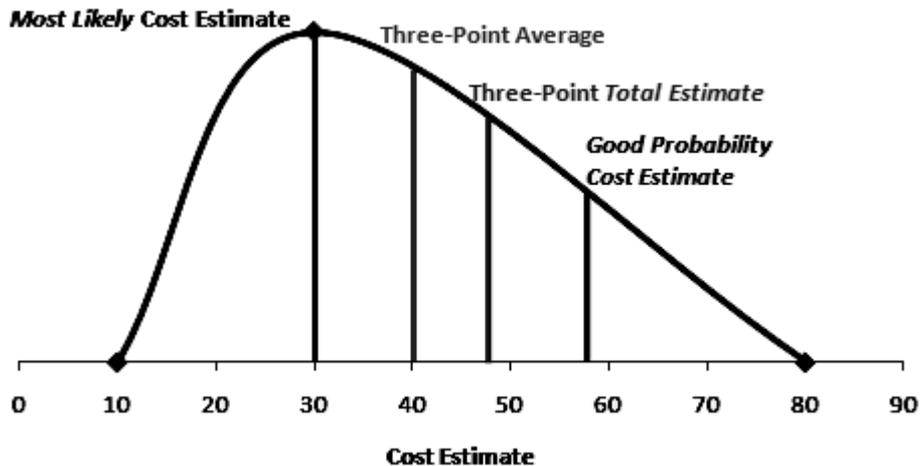
Three-point estimation can also be used to derive a standard deviation and hence a contingency figure that can be added to the expected estimate to give a total estimate, as follows:

- Contingency = (pessimistic – optimistic) / 6
- Total estimate = expected estimate + contingency

For cost assurance at a 95 per cent probability, the following formula can be used:

- Good probability cost estimate = Expected estimate + 2 Contingency

A three-point estimate is represented by the following skewed triangular distribution, where the most likely estimate is \$30, the optimistic estimate is \$10 and the pessimistic estimate is \$80:



If the project office determines that the Good probability cost estimate results in an unrealistically high cost estimate, the use of a Beta probability distribution may be more appropriate. In this example, a cost estimate at 95 per cent probability using a triangular probability distribution is \$58.3, with a beta probability distribution it is \$55.8. This can be calculated in Excel as follows:

Beta cost estimate at 95% = `BETA.INV(95%,Shape A, Shape B, Optimistic, Pessimistic)`

Shape A = $\frac{((\text{Expected estimate} - \text{Optimistic}) / (\text{Pessimistic} - \text{Optimistic})) \times$

$((\text{Expected estimate} - \text{Optimistic}) \times (\text{Pessimistic} - \text{Expected estimate}) / (\text{Contingency}^2 - 1))$

Shape B = $\frac{(\text{Pessimistic} - \text{Expected estimate})}{(\text{Expected estimate} - \text{Optimistic}) \times \text{Shape A}}$

Vendor bid analysis or price to win, involves selecting a cost estimate based on an industry price. While vendor bid analysis is a common source of costs, from an agency perspective it is not a cost estimation method.

Vendor bid analysis can be a source of future cost overruns, as a vendor can price down to win work because the project office has limited information about costs. Otherwise known as the 'winner's curse', best-practice procurement practices typically mitigate the 'curse' by limiting the number of vendors permitted to participate in a tender, providing clear procurement and requirements documentation to vendors, making price one amongst other evaluation criteria and engaging outside assistance. Two issues to consider are:

A vendor with a mature understanding of and experience in implementing a proposal's software requirements usually provides a higher price estimate than less knowledgeable vendors²; and

Simulation research has demonstrated that software vendors selected based on price alone, required more project office monitoring and in-house development to achieve the project's requirements. Essentially effort and therefore cost were transferred from the vendor to the project office³.

Work Breakdown Structure (WBS)

Proposal cost estimates should be based around a WBS, as prescribed by the agency's project management methodology⁴. PMBOK defines a WBS as: "...a deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables, with each descending level of the WBS representing an increasingly detailed definition of the project work. The WBS organises and defines the total scope of the project, and represents the work specified in the current approved project scope statement."⁵ The detail of the WBS will depend upon the maturity of the proposal and stage of approval.

The Service Reference Model from the Australian Government Architecture (AGA) provides a generic baseline of ICT terms for products and services for potential use in a WBS⁶. While not mandated, consulting with the AGA will generally assist many proposals in developing a WBS using standard Commonwealth agency terminology.

For proposals dealing with the extension, configuration and/or the integration of an application, the WBS should detail and cost the following critical processes.

Phase	Processes ⁷	% ⁸
Plan	Establish the project scope, conduct initial studies and write the business case	.09
Specify	Develop and review the solution (system) architecture design and requirements (process) specification	.11
Design	Develop and review a detailed external and internal design of the software	.15
Build	Write (construct or re-use), inspect, review and rework code	.43
Test	Conduct system wide performance and verification testing to ensure the quality of the solution	.16
Implement	Install and release the solution, prepare and issue user documentation, and conduct training and user follow-up	.06

² Jørgensen, M. "How to Avoid Selecting Providers with Bids Based on Over-Optimistic Cost Estimates", *IEEE Software* (May/June) 26(3), pp. 79-84.

³ Jørgensen, M. and Carelius, G. "An empirical study of software project bidding." *IEEE Transactions on Software Engineering*, 2004 30(12): pp. 953-969.

⁴ A WBS is called a Product Breakdown Structure in Prince2.

⁵ PMBOK® Guide, p. 116.

⁶ <http://www.finance.gov.au/e-government/strategy-and-governance/aga-rm/srm.html>

⁷ ISO/IEC 12207:2008, Systems and software engineering - Software life cycle processes, Section 7.

⁸ An industry average of time-based effort. Refer: ISBSG Release 10 Data, 2008.

D: Benefits Categorisation

Method

The following method involves evaluating ICT business case options using three categories:

- End Users – Refers to any external financial impacts on users, other agencies and other indirectly affected entities in terms of increased cost savings or increased revenue
- Agency Costs and Benefits – Refers to the internal financial impacts on the agency in terms of capital and operating expenditure, savings and costs over a project whole-of-life basis
- Qualitative – Refers to non-financial benefits that can be measured including strategic and policy results, governance value and social/service delivery value.

The business case should identify and categorise the benefits for each option across the whole project life, according to the categories outlined in the table below.

Category	Sub-category	Description
End Users	Increased user benefits	Any cost savings or increased revenue accruing to external users of the new technology or system.
	Increased other agency benefits	Any costs savings or increased revenue accruing to other agencies as a result of the implementation of the project.
Agency Costs and Benefits	Existing funding	Includes any existing funding that will be applied to the proposed project.
	Identified cost savings/revenue	Includes direct operating or capital cost reductions accruing to the agency as a result of the implementation of the proposed project and any increased revenue.

Category	Sub-category	Description
	Use of cash reserves	Any cash offsets, i.e. use of current reserves to fund the proposal.
Qualitative	Social value	Social benefits have an impact on the community. This category includes the project's contribution to governance generally, including community participation, transparency of process and accountability.
	Service delivery value	Includes any service delivery benefits delivered to stakeholders as part of the delivery of the project. This may include saving time and effort for citizens.
	Whole-of-government policy alignment	Includes legislation and policy that should be complied with by ICT projects including the Australian Government Interoperability Framework and Security Requirements.
	Whole-of-government strategy alignment	Measurable alignment of the whole-of-government strategic and ICT priorities.
	Agency policy/ objective alignment	Measurable alignment with internal agency policies and objectives.
	Stakeholder support	Support of key stakeholders such as internal agency, industry, other agencies and users.
	Environmental implications	Any environmental impacts including support for ICT initiatives such as eco-labelling and recycling.
	Other relevant information	Any other qualitative factors considered important to the detailed analysis of options.

E: Cost Benefit Analysis

This guide clarifies the steps in estimating the value of the benefits of each option in your ICT business case. The method will help you clarify the value of each benefit in two main sets:

- costs and benefits to end users
- agency costs and benefits

The method will also help you complete a comparative rating of your options against each set. The highest score should reveal the greatest return on investment for each benefit per dollar of capital investment.

However, the result will only be as useful as the quality of the assumptions you make and the information you obtain.

Costs and Benefits to End-Users

It is important for government decision-makers to understand the impact that an investment decision will have on the end users of the goods or service that would be delivered by a proposal. End users may include consumers, other agencies, or any entities that may benefit indirectly from the proposal.

The analysis of benefits to the end users also assists in assessing the relative value of each option against other options. The option that achieves the greatest level of economic efficiency for end users will be more likely to receive funding.

The summary below defines the key variables in costing the benefits to the end users and explains how to enter these variables into your business case costing model.

Incidence

Incidence is a volume metric where the particular cost saving or revenue increase is based on a total number of transactions, demand or other driver.

Value

The incidence value is the average value of savings or revenue generated per unit of volume. Where there is no incidence value, it is the total estimated saving or revenue generated.

Increased cost savings (incidence x value)

Increased cost savings relate to savings accruing as a result of the project. For example an e-government services project for electronic payments would replace over-the-counter transactions and may save users a transaction fee. Similarly a project may benefit another agency where there are inter-agency transactions that will be affected by a new system.

Increased revenue (incidence x value)

Increased revenue refers to any increased income accruing to external stakeholders. For users this may be a program that promotes awareness of a subsidy and facilitates the online distribution of that subsidy.

Total wealth generated (increased cost savings + increased revenue)

Total wealth generated is calculated as the total sum of increased costs savings plus increased revenue generated.

The results of your analysis of the end user benefits of the options in your business case will be separate from any calculations you may undertake using the net present value method (see the section on overall appraisal below).

Agency Costs and Benefits

This category involves the internal financial impacts on your agency in terms of capital and operating expenditure, savings and costs over the whole life of an ICT option. This information should be included in the overall appraisal of options (see the section on overall appraisal below).

Agency costs and benefits are estimated using slightly different methods for the various elements. For example:

- Employee expenses (operating) are estimated by defining salary costs and on-costs (e.g. superannuation), and determining the number of staff at each level who would perform certain functions at each stage of the project. Agencies should refer to the standard costing template prepared by the Department of Finance and Deregulation for assessing employee and related costs.
- Hardware is calculated either by estimating a total cost for each hardware category or by estimating quantities and costs for individual items or groups of items.
- Non-hardware related capital costs (e.g. server installation, systems development, integration, and fit-out) are subject to a different depreciation treatment subject to the latest guidance from Finance. Once the hardware is deemed to be in use, these costs can be capitalised and therefore depreciated.
- Offsets involve cost savings, increased revenue, current funding for a particular option or the use of cash reserves associated with the implementation of a certain option. Information on offsets will not be used to determine the financial viability of your proposal. But the information will

reduce the amount of funding you should seek from government for the proposal.

Overall Appraisal

Your business case must include a discounted cash flow for each option using net present value (NPV). The calculation of NPV applies the principles of discounted cash flow where future cash flows are multiplied by a discount rate to obtain present values. Non-cash costs such as depreciation do not form part of a discounted cash flow calculation.

You should confirm the appropriate discount rate with the relevant Agency Advice Unit in Budget Group in the Department of Finance and Deregulation. A positive NPV is not necessarily required because in some cases significant benefits are non-monetary and not reflected in the economic appraisal. However an option's NPV value remains a key indicator when assessing options.

A NPV calculation for a single option appears below:

Financial Year	1	2	3	4
Internal (Agency) Costs [A]				
External (user/societal) Costs [B]				
Internal (Agency) Benefits [C]				
External (User/societal) Benefits [D]				
Net Value Flows [E = C+D-A-B]				
Discounted Value Flows (X% discount rate for this project)				
NPV (Sum of discounted value flows)				

Timing and Cash Flow

The timeframe for analysing the cash flow implications of each option should be discussed with the relevant Agency Advice Unit in the Department of Finance and Deregulation. The emphasis should be on the early years when significant benefits should be realised.

It is important to accurately reflect the timing of cash flows and the years in which benefits are expected to accrue. The timing of benefits could be affected, for example, by delays due to the system not being fully operational, or in the take-up of

IT-enabled business process improvements, or in the realisation of savings from staffing efficiencies.

Sensitivity Analysis

This analysis is fundamental to the evaluation of options. It is used to test the vulnerability of the options to unavoidable uncertainties. You should complete this for all options. The analysis should indicate how much a cost would have to increase or a benefit would have to decrease in order to make the investment not worth undertaking. Examples of the types of variables that are subject to a large degree of variability are wages, demand, labour savings and system and development costs.

Scenario Analysis

This is the process of analysing a series of variables that are included in discrete options. To make the analysis useful, you can develop scenarios that have a relationship to each other. For example, Scenario 1 might include labour savings decreasing by 10% and system development cost decreasing by 5%, while Scenario 2 includes labour savings decreasing by 20% and system development costs decreasing by 10%.

F: Common ICT Project Risks

“Risk is the possibility of an event or activity impacting adversely on an organisation, preventing it from achieving organisational outcomes. Risk management comprises the activities and actions taken to ensure that an organisation is conscious of the risks it faces, makes informed decisions in managing these risks, and identifies and harnesses potential opportunities. Managing risk well requires careful consideration of the key concepts of minimising loss, maximising opportunity and preparing for uncertainty.” Better Practice Guide to Risk Management.

No list of potential risks claim to be exhaustive or exclusive, the following are provided as prompts for consideration in the development of a risk management strategy for your business case:

- Loss of key project staff
- Delays in decision-making
- Acquisition delays, probity concerns or inadequate contractual agreements to protect the organisation’s interests
- Unforeseen expertise requirements (include subject matter experts)
- Unforeseen system failure during development (such as hardware, software, development tools, financial)
- Unable to secure an implementation partner
- Failure to achieve the anticipated project benefits
- Underestimation of technology capacity requirements (workstation, server, LAN, WAN, M/F, etc.)
- System development model not followed through the project
- System development model not suitable for delivery of the system
- Insufficient control over infrastructure delivery delaying project implementation or increasing costs
- Insufficient documentation supplied to maintain the system (once in production)
- User requirements not clearly, or inadequately, defined (scope changes including scope creep)

- Incorrect scope defined that does not match user requirements
- Unauthorised changes to scope by implementation partner following sign off
- Development tools do not suit the system development
- Logic errors in programming
- Failure to comply with the organisation's programming standards
- Loss of program modules being developed/changed due to infrastructure failure or human error/intentional action
- Incompatibilities between products cause interface difficulties
- Delays to system delivery caused by interface difficulties
- Interfaces not complete in time for go-live date (lagging development)
- Systems to be interfaced impact go-live of this development
- User acceptance testing (UAT) delayed due to development problems
- Unable to commit users to user acceptance testing
- UAT fails due to development problems
- UAT fails due to inadequate performance
- UAT scripts fail to test the full functionality and usability of the system
- UAT does not cover system performance and volume testing
- UAT does not cover system restart/recovery processes
- Production environment build hampered by unforeseen problems
- Production environment not ready for go-live
- Backend processes not tested/stable at go-live (batch processes, back up, archiving, log review, etc.)
- System/environment not fully tested at go-live
- User training delayed or hindered by technical/environment problems
- Unable to commit users to training
- Training materials or environment not ready at commencement of training
- Untested changes are made to the production environment during implementation
- Unforeseen problems with system porting delays go-live
- Inadequate training and documentation for operations staff
- Data corruption during migration
- Data loss during migration

- Incomplete data capture from the old system
- Unauthorised changes to data during migration
- Data is rejected at migration
- Security of working files compromised during migration
- Data migration failure prior to go-live
- Insufficient testing of migrated data prior to go-live results in downtime or loss of processing in production
- Incorrect data manipulation prior to migration leads to loss or misinterpretation of data during migration
- Lack of management support for the project
- Lack of intended user support for the project
- Lack of intended support staff for the project
- Blow out of financial resources required
- Failure to complete the project by the specified implementation date
- Failure to achieve the anticipated project benefits
- Failure to satisfy user requirements, or the user interface and screen flow is unacceptable to users
- Failure to organise required policy or legislative changes to support the proposed system or procedural changes within the required time frame
- Failure to take into account other internal or external activity occurring at the same time which could disrupt this project's development or implementation activities
- Lack of attention to the resource implications of the cut-over from the old arrangements to the new system, including the impact on production work of training and other cut-over disruptions and the build up of backlogs of production work
- Use of unproven technology
- Underestimation of workstation or IT infrastructure capacity requirements
- Unacceptable system performance, both in relation to availability and response times
- Lack of staff with the skills required to undertake the project or components of the project

- Unexpected loss of corporate knowledge in relation to key aspects of the project part way through the project
- The possibility of industrial action within the agency, especially in relation to organisational and procedural changes
- Occupational health and safety problems
- Failure to identify all of the required project activities
- Failure to adequately plan the commencement and staffing of the various key phases of the project
- Failure of a contracted third party to deliver an acceptable project in the time frame required
- Failure of a contracted third party to provide a robust, documented and easily maintainable product which is consistent with the agency's preferred application development/maintenance tool set and quality standards
- Lack of attention to proper tendering procedures and practices for suppliers or products
- Dependence on other environmental, industrial or third party performance beyond the control of the agency, or on other projects within the agency
- Failure to organise the timely performance of actions required to be undertaken by third party providers such as the communications carrier
- Failure to adequately secure commercial or cabinet-in-confidence documents (hard copy or electronic copy) relating to the project
- Breach of Privacy Act constraints
- Failure to comply with legislative requirements, such as Finance regulations
- Failure to achieve compatibility with the strategic business direction of the agency
- Failure to achieve compatibility with the agency's IT strategic direction.