



Informed Funding Decisions: A Proposal for a New Costing Paradigm

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Background

- **The Costing Centre of Expertise (CCE) was created in 2014 to address Ministerial concerns with respect to insufficient cost estimating information to support decision-making**
- **The CCE has a dual mandate:**
 - Ensure departmental costing capacity to generate robust cost estimates through:
 - Training and development
 - Strengthening of policies and guidance documents
 - Strengthen the costing challenge function for Cabinet submissions
 - Independently validate cost estimates of higher risk submissions
 - “Deep dives” of sensitive submissions or initiatives
 - Develop comparative information and metrics for reasonableness assessments

Costing by its Very Nature is Uncertain

- **Doing something for the first time; making it hard to explain requirements to industry, which may not have the skills to do the work**
- **New activities do not have a strong foundation of historical information on which to base cost estimates**
- **People sell ideas which usually are not precise because they are still being developed**
- **Funding considerations may squeeze cost estimates to the point that the full scope of the project can not be delivered as planned**
- **Changes to the proposal throughout the approval process may prevent decision-makers from receiving the right information at the right time**

One Year Out: Current Challenges

- **Uneven Capacity**: Departments have an uneven ability to develop robust cost estimates
- **Informed Decision-Making**: A lack of contextual costing information at the time when decisions are made hinders decision-makers' ability to fully understand the financial risks associated with a project:
 - There is a lack of comparative information and metrics to challenge cost estimates
 - Costing, by its very nature, is based on estimates. Decision-makers are given a point estimate despite the fact that estimates will change based on a number of factors including: scope, framing assumptions, options analyzed, fluctuations in key inputs and schedule changes.

Uneven Capacity: Needs Vary

- **Not all organizations require the same capacity - SMART investment**
 - CCE using a Cost Estimating Maturity Study to determine capacity requirements and potential gaps (Annex A provides details)
- **Specific skill-sets are required for different types of cost estimating**
 - Professional qualification for complex cost estimates
 - Professional associations (i.e. CPA Canada) for advanced estimates
 - Canada School of Public Service for basic estimates
- **Restructured guidance on cost estimating (web portal approach)**
 - Directives that expand upon core concepts
 - Bulletins that are flexible and clarify specific elements (e.g. treatment of foreign exchange)
 - CFO Attestation recalibration underway to incorporate lessons learned after one year of implementation

Informed Decision-Making: Comparative Information

- **Developing comparative information is underway to build metrics and standard costs for reasonableness testing**
 - Ongoing challenge with many false starts
 - Linkage to broader performance measurement strategy
 - Need to move forward requires use of imperfect information that is directionally correct but precisely inaccurate
- **Lessons learned in the process**
 - Publicly available data is better than many think
 - Keep it simple and you need to build as you go
 - Start moving!
- **Initial findings**
 - Departments cluster primarily on the basis of size and complexity
 - Internal Service costs are primarily some form of labour

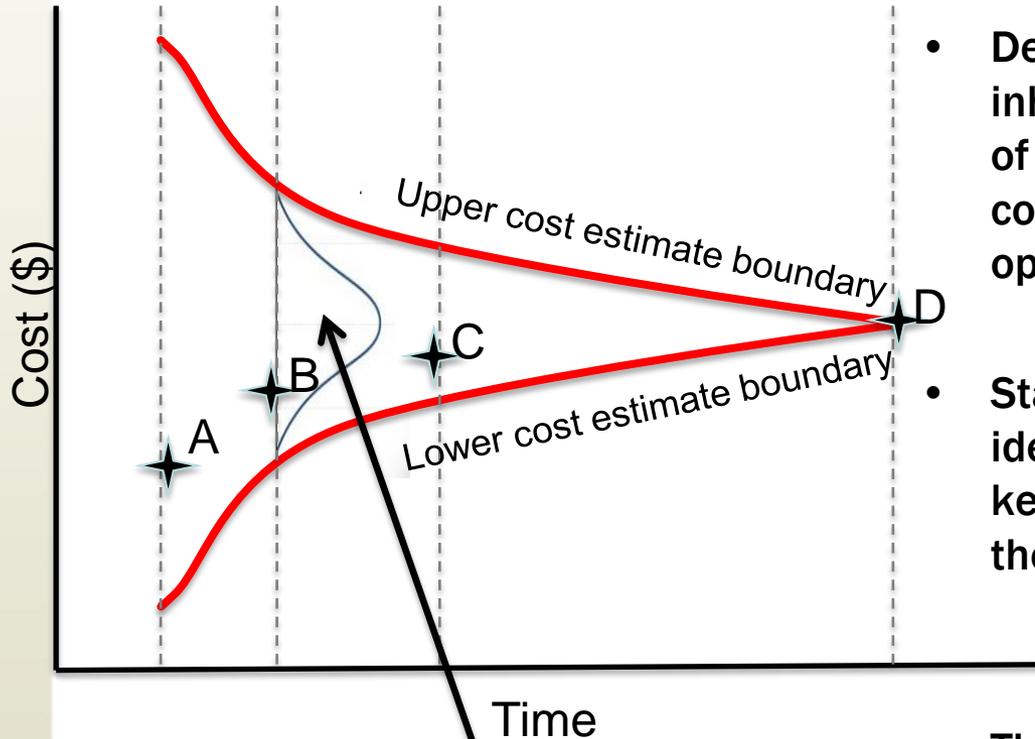
Informed Decision-Making: The Fallacy of Cost Certainty

- **Point estimates are used to communicate cost estimates; the only thing we know for certain is that the number presented is wrong**
- **What do decision-makers want?**
 - Decisions are primarily made on the basis of perceived certainty because people do not like uncertainty
 - When making decisions, people rely on personal experience to resolve uncertainty in their minds. This approach may not be appropriate in all circumstances
- **Need to shift the paradigm to provide contextual information to decision-makers**
 - need to understand sensitivity to framing assumptions and key inputs
 - need to understand interplay of risks between different inputs

Informed Decision-Making: Better Understanding of Financial Risks

- **What we have typically provided decision-makers**
 - Decision-makers are typically only provided with a point estimate that fits our perceived understanding of affordability
 - Sensitivity analysis may be provided to support the risk assessment
- **Sensitivity analysis is usually from a Project Manager's perspective**
 - Scope
 - Schedule
 - Costs } “What ifs” to determine cost sensitivity to key factors
- **Statistical models help us understand the financial risks of a project**
 - There is always uncertainty in a cost estimate; it reduces over time
 - Costs cluster, but outliers can distort average costs
 - Risks cannot be fully captured in a point estimate

Informed Decision-Making: Statistical Modeling – A potential solution



Statistical model of a cost estimate
at a decision point (dotted line)

- Decision points have different levels of inherent risk. The cost estimate range of an idea (A) will be broader than the cost estimate range of a fully analyzed option proposed for implementation (C).
- Statistical models can be used to identify likely cost outcomes and the key inputs with the greatest impact on the potential cost of the proposal
- The decision points are:
 - A – Budget Proposal
 - B – Memorandum to Cabinet (policy)
 - C – Treasury Board Submission (funding)
 - D – Project Close Out

Desired Outcomes: From What to Why?

- **With statistical modelling, decision-makers are provided with information to assess:**
 - Impact of changes in price or volumes on cost estimates
 - Potential impact of schedule delays on cost estimates
 - Sensitivity of the cost estimate to risk (key input changes)
- **Increased understanding of risk sensitivity will allow project managers to strengthen cost estimates between decision points:**
 - Targeted work to refine cost estimates – reduce time and options analysis costs while increasing confidence in information presented
 - Risk mitigation strategies identified for the specific inputs of most significance to the overall cost estimate
- **Target follow-up reporting, reduce reporting burden on project teams**

Conclusion and Next Steps

- **Office of the Comptroller General has made significant progress, but much remains to be done**
 - Importance of departmental capacity commensurate with the complexity of their proposals cannot be overstated
 - Departmental engagement in developing standard costs is essential to ensure cost clustering conclusions are valid
 - Contextual information, including a sophisticated presentation of financial risk, is key to better informed decision-making
- **However, this approach requires a paradigm shift in terms of how decisions are made:**
 - Telling the ‘story’ of a project’s costs requires more context
 - For complex proposals the funding approach may need to change
 - Significant training and change management are required

Core Requirements for Cost Estimating

- **While capacity needs vary, the core requirements for cost estimating are consistent:**
 - Evidence: data and evidence standards
 - Verifiable evidence with clearly identified assumptions exists
 - Tools: appropriate industry standard approaches
 - Tools appropriate to the cost estimating challenge are appropriately applied
 - Skill-sets: appropriately skilled analysts build the cost estimate
 - People with skill-sets commensurate with the complexity of the proposal are engaged in developing the cost estimate
 - Process(es): steps used to develop the cost estimate
 - Consistent processes are used across the entity of government, recognizing differences in application

Illustrative Example

- **An organization proposes to acquire a COTS IT solution with a total cost of \$530,450 including a contingency of \$15,450**
 - Initial acquisition price: \$100K
 - Licenses: \$0.5K/user (170 users)
 - Implementation Costs
 - Configuration: \$1K/day (50 days)
 - Salaries: 3 staff for \$250K
 - Training development: \$20K
 - Training delivery: \$1K/day (10 sessions)
 - Overhead can be absorbed within existing levels

Illustrative Example: A Typical Point Estimate

Based on a Project Manager's Cost Estimate

Acquisition Costs

Software			\$	100,000
Licences	170 licences	\$500 each	\$	85,000
Total Acquisition Costs				\$ 185,000

Implementation Costs

Staff	3 staff		\$	250,000
Professional Services	50 days	\$1000 day	\$	50,000
Training Development	20 days	\$1000 day	\$	20,000
Training Delivery	10 days	\$1000 day	\$	10,000
Total Implementation Costs				\$ 330,000
Contingency (3%)				\$ 15,450
Total Project Costs				\$ 530,450

Illustrative Example: As a Sensitivity Analysis

Based on a Program Manager's Sensitivity Analysis	Best Case	Most Likely	Worst Case
Acquisition Costs			
Software	\$ 96,000	\$ 100,000	\$ 120,000
Licences	\$ 76,800	\$ 85,000	\$ 151,200
Total Acquisition Costs	\$ 172,800	\$ 185,000	\$ 271,200
Implementation Costs			
Staff	\$ 240,000	\$ 250,000	\$ 300,000
Professional Services	\$ 39,360	\$ 45,000	\$ 75,600
Training Development	\$ 18,800	\$ 20,000	\$ 26,000
Training Delivery - Costs	\$ 7,680	\$ 9,000	\$ 14,400
Total Implementation Costs	\$ 305,840	\$ 324,000	\$ 416,000
Contingency (3%)	\$ 14,359	\$ 15,270	\$ 20,616
Total Project Costs	\$ 492,999	\$ 524,270	\$ 707,816

Illustrative Example: As a Statistical Model

Based on data for each cost element

Lower Data Point	Most Likely	Upper Data Point
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Acquisition Costs

Software	\$ 96,000	\$ 100,000	\$ 120,000
Licences - Cost/Licence	\$ 480	\$ 500	\$ 600
Licences - Number needed	160	170	252
Total Acquisition Costs	\$ 172,800	\$ 185,000	\$ 271,200

Implementation Costs

Staff	\$ 240,000	\$ 250,000	\$ 300,000
Professional Services - Costs	\$ 960	\$ 1,000	\$ 1,200
Professional Services - Days	41	45	63
Training Development	\$ 18,800	\$ 20,000	\$ 26,000
Training Delivery - Costs	\$ 960	\$ 1,000	\$ 1,200
Training Delivery - Days	8	9	12
Total Implementation Costs	\$ 305,840	\$ 324,000	\$ 416,000
Contingency* (0%)	\$ -	\$ -	\$ -
Total Project Costs**	\$ 478,640	\$ 509,000	\$ 687,200

* contingency is built into the model

** Estimates are only as good as the analysis/assumptions used for each data point

A Comparison of the Methodologies

- **Typical cost estimate (Base Case (BC))** **\$530,450**

- **Sensitivity analysis (3 what-if scenarios)**
 - Best Case \$492,999 93% of BC
 - Most Likely \$524,270 99% of BC
 - Worst Case \$707,816 134% of BC

- **Statistically modeled (1M times) using random numbers within probability distributions**
 - Best Case \$530,450 (very unlikely) 100% of BC
 - Most Likely less than \$559,630 106% of BC
 - Worst Case less than \$585,365 110% of BC