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2008 Galorath User Conference

Estimating Software Enhancement Projects

Ian Brown
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Agenda

- ▶ **What is an enhancement project?**
- ▶ **Why is estimating enhancements so tricky?**
- ▶ **How to leverage SEER-SEM**
- ▶ **Estimation methodology**
- ▶ **Improving future estimates**

What is a software enhancement project?

- ▶ **Software already exists**
- ▶ **Changes to the existing software have been requested**
 - Modifications to some current functionality
 - Additions of new functionality
 - Other changes, such as platform or language migration
- ▶ **Does not include more traditional maintenance activities (that's a whole different topic)**
- ▶ **Project is responsible for delivering an updated version of the software**

You need to be able to estimate cost and schedule of that delivery in order to plan resources and manage expectations

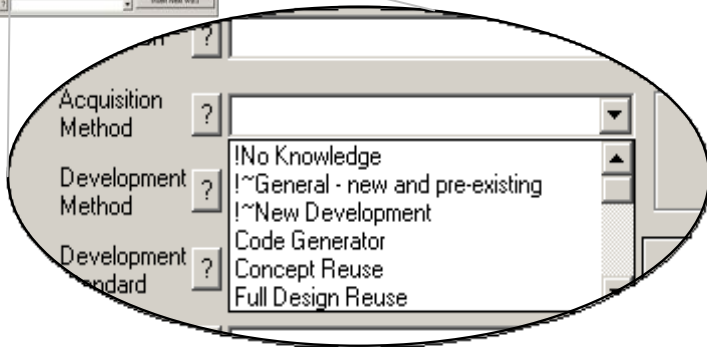
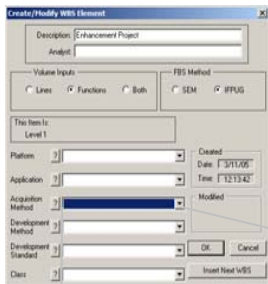
Accurate estimation of enhancement projects can be difficult

- ▶ How will the current system be impacted?
- ▶ What is the size of the expected enhancements?
- ▶ Is the additional functionality brand new or is it similar to existing functionality?
- ▶ If it is similar, can existing functionality be reused or modified to meet the requirements?
- ▶ What extent of rework will modifications require?
- ▶ Do you need to retest the entire application?
- ▶ How do all these factors translate into cost and schedule?

These questions are not easily answered, especially if no historical data exists

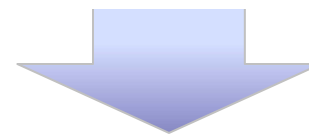
SEER-SEM's Acquisition Method knowledge base provides the foundation of a structured estimation methodology

- ▶ When no better information is available, leverage the standard definitions and settings for various acquisition methods that are included in the tool



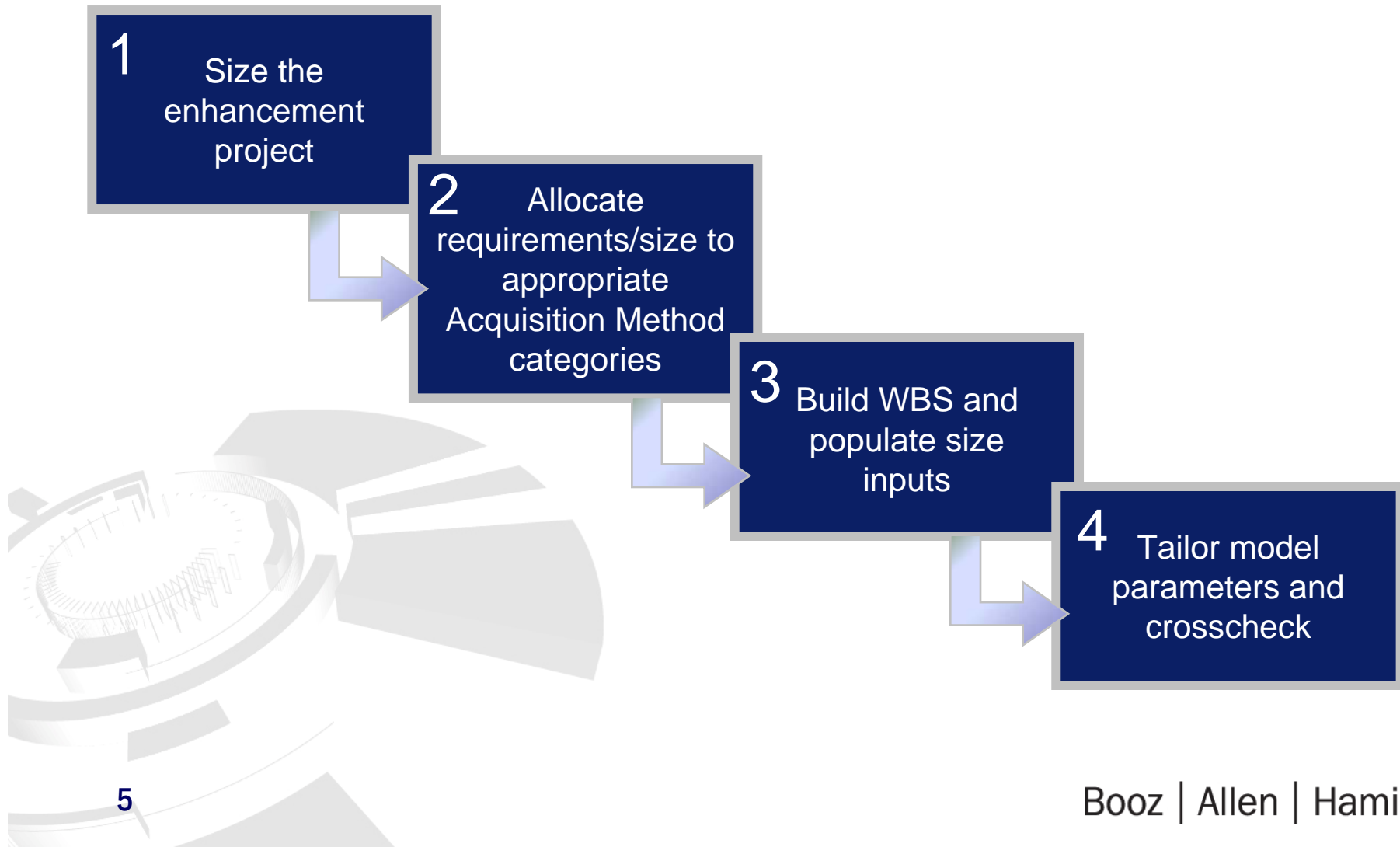
!~General - both new & preexisting
 !~New Development
 Code Generator
 Concept Reuse
 Full Design Reuse
 Integrate As-Is
 Integrate with Configuration
 Language Conversion, Automated
 Language Conversion, Manual
 Maintenance, Complete
 Maintenance, Sustaining
 Modification, Major
 Modification, Minor

Modification, Major
Acquisition Method Knowledge Base
 (mod-maj.end) - This knowledge base should be used for major modifications to existing software. This situation typically involves existing software being used for a new application or mission and often involves a target environment change. This knowledge base assumes the fundamental programming language will not change.



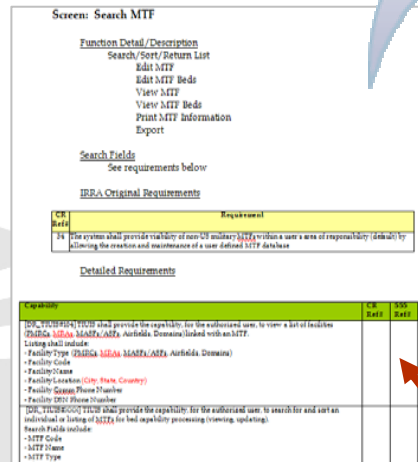
Redesign required	10.00%	25.00%	91.00%
Reimplementation required	6.00%	11.00%	22.00%
Retest required	38.00%	59.00%	100.00%

Methodology Overview



Step 1: Size the Enhancement

- ▶ Any robust software estimation methodology includes some means of estimating and measuring software size
- ▶ Many different ways to define size
 - Source lines of code
 - Objects
 - Function points



Identifier	Name	Type	Enhance	Cmplx	UFP
Function Point Workbench TRANSACTION AND FILE LIST TRAC2ES Baseline Count 01-2005					
IRRA Functional Enhancements Enhancement Project					
1.5 MTF					
1.5.1	Create MTF	EI	CHANGE	AVE	4
1.5.3	Search MTF	EO	CHANGE	AVE	5
1.5.5	View MTF (facility info)	EQ	CHANGE	LOW	3
1.5.6	Edit MTF facility info	EI	CHANGE	AVE	4
1.5.15	View MTF facility linking info	EI	CHANGE	LOW	3
1.5.16	Edit MTF facility linking info	EI	CHANGE	LOW	3
1.5.17	View MTF assigned med specs	EQ	ADD	AVE	4
1.5.18	Edit MTF assigned med specs	EI	ADD	LOW	3
1.5.19	View MTF med spec info	EQ	ADD	AVE	4
1.5.20	Edit MTF med spec info	EI	ADD	AVE	4
1.5.21	View non-conting bed reporting	EQ	ADD	AVE	4
1.5.22	Edit non-conting bed report	EI	ADD	AVE	4
1.5.23	View contingency bed reporting	EQ	ADD	AVE	4
1.5.24	Edit contingency bed report	EI	ADD	AVE	4

Requirements **Function Point Size**

IFPUG standard function points work best with this methodology

Step 2: Allocate requirements to appropriate Acquisition Method categories

2 Allocate requirements/size to appropriate Acquisition Method categories

► This step involves working sessions between cost analysts, developers, and system analysts who are knowledgeable of existing functionality as well as the requested enhancements

- Identify what Acquisition Method categories are applicable to the given project
- Use the detailed definitions provided in SEER-SEM help as guidance for the discussion
- Link requirements with the Acquisition Method category that best describes the type of work necessary to make the enhancement work

Function Point Workbench
TRANSACTION AND FILE LIST
TRAC2ES IRRRA Functional Enhancements
Baseline Count 01-2005 Enhancement Project



Identifier	Name	Type	Enhance	Cmplx	UFP	Develop/Reuse
1.5 MTF						
1.5.1	Create MTF	EI	CHANGE	AVE	4	Minor Mod
1.5.3	Search MTF	EO	CHANGE	AVE	5	Minor Mod
	View MTF (facility info)	EQ	CHANGE	LOW	3	Minor Mod
	Edit MTF facility info	EI	CHANGE	AVE	4	Minor Mod
	View MTF facility linking info	EI	CHANGE	LOW	3	Major Mod
	Edit MTF facility linking info	EI	CHANGE	LOW	3	Major Mod
	View MTF assigned med specs	EQ	ADD	AVE	4	New
	Edit MTF assigned med specs	EI	ADD	LOW	3	New
	View MTF med spec info	EQ	ADD	AVE	4	New
	Edit MTF med spec info	EI	ADD	AVE	4	New
	View non-conting bed reporting	EQ	ADD	AVE	4	New
	Edit non-conting bed report	EI	ADD	AVE	4	New
	View contingency bed reporting	EQ	ADD	AVE	4	New
	Edit contingency bed report	EI	ADD	AVE	4	New

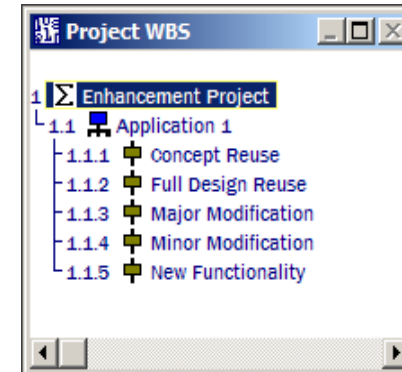
	App 1	App 2	App 3	App 4
New	172	-	-	36
Concept Reuse	52	350	-	-
Full Design Reuse	16	-	87	-
Major Mod	110	86	4	-
Minor Mod	42	159	6	44

Engaging in this dialogue helps the technical staff think about the problem and approach in a way that is meaningful to the cost analyst

Step 3: Build the SEER-SEM WBS and populate the size parameters

3
Build WBS and populate size inputs

- ▶ If more than one application is included in the project, insert separate  Program WBS elements for each
- ▶ Insert a  Component WBS element for each Acquisition Method category
- ▶ Enter allocated size estimates into respective WBS elements
 - If functionality is completely new, enter function points as NEW functionality
 - If functionality is modified/reused, enter function points as PRE-EXISTING functionality (either designed for reuse or not designed for reuse)

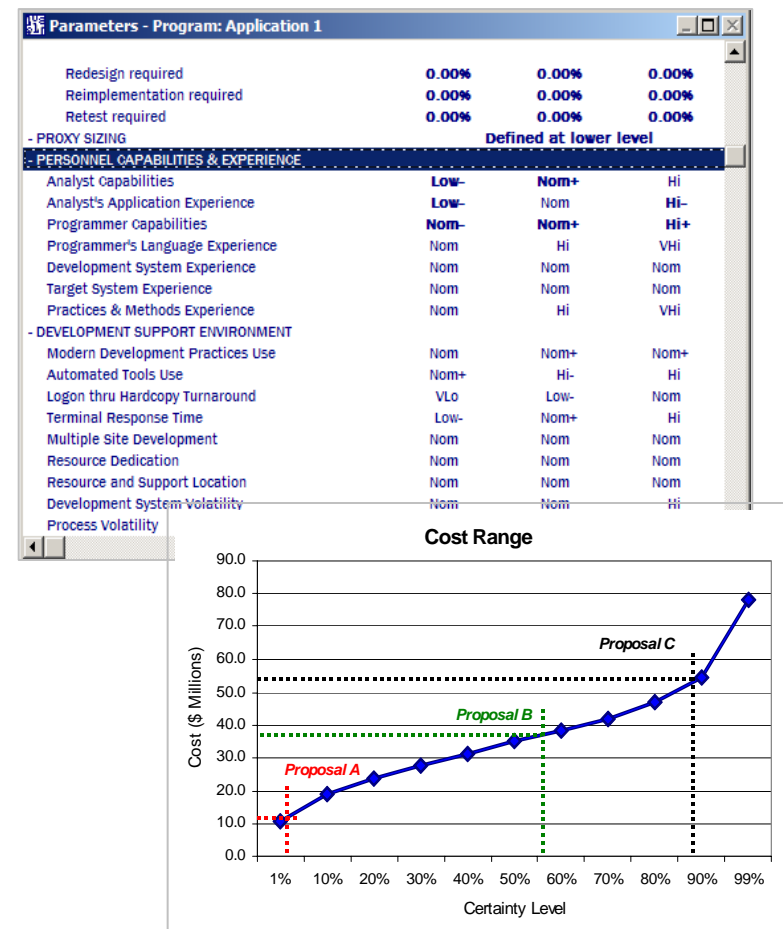


- FUNCTIONS (Classic)			
- NEW			
New Functions	172	172	172
Software phase at estimate		Requirements	
- Pre-exists, not designed for reuse	0	0	0
Pre-existing functions	0	0	0
Funcs to be deleted in pre-exstg	0	0	0
Software phase at estimate		Requirements	

- FUNCTIONS (Classic)			
- NEW			
New Functions	0	0	0
Software phase at estimate		Requirements	
- Pre-exists, not designed for reuse	21	37	85
Pre-existing functions	110	110	110
Funcs to be deleted in pre-exstg	0	0	0
Software phase at estimate		Requirements	

Step 4: Tailor model parameters and crosscheck

- ▶ Review the other SEER-SEM input parameters to make sure settings are appropriate
 - If the initial application was estimated in SEER-SEM, start with the parameter assumptions in that model and make modifications from there
 - Key parameters: Personnel Capabilities & Experience and Development Support Environment to identify any differences in the enhancement project
- ▶ Crosscheck results with benchmarks, analogies, second estimates, or actuals from past projects to gauge realism of estimate
 - Risk Report and Charts facilitate value-added crosschecks



Improvements to the methodology and accuracy of the estimates can be made by tracking project actuals

- ▶ **Conduct project reviews upon completion**
 - Compare estimates to actuals
 - Size
 - Effort
 - Cost
 - Schedule
 - Track changes to requirements throughout project life cycle and update cost and schedule estimates accordingly
 - Review labor mix for labor rate assumptions
 - Review Acquisition Method allocations to see how accurate assumptions were in terms of level of rework
- ▶ **Document lessons learned, update process documents and guidance**
- ▶ **With actual project data, rework percentage assumptions can be tailored and stored in a Class Knowledge Base**

Contact Information

Ian Brown, CFPS
Senior Associate

Booz | Allen | Hamilton

8255 Greensboro Drive
McLean, VA 22102
Tel (703) 902-4971
brown_ian@bah.com