Challenges with Sizing and Estimating Enterprise Information Systems

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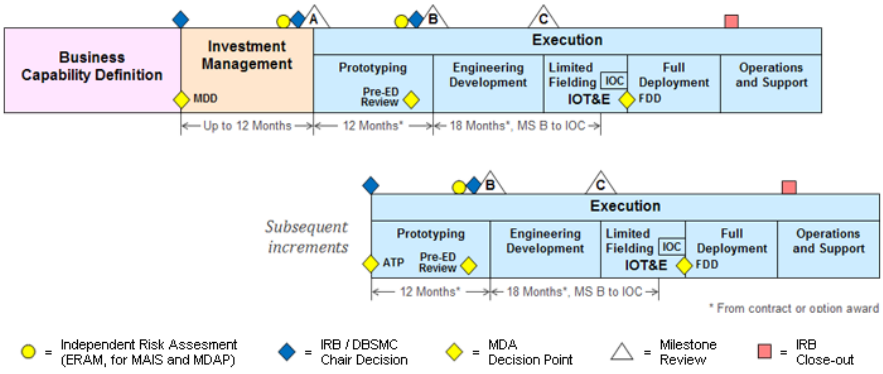
Business System Acquisition Framework



The Business Capability Lifecycle model depicts the process for the acquisition of Defense Business Systems (DBS) and the framework for the definition, development, testing, production, deployment, and support of DBS. The principles of the model apply to the initial release and subsequent increments.

— DTM 11-009, *Acquisition Policy for Defense Business Systems*

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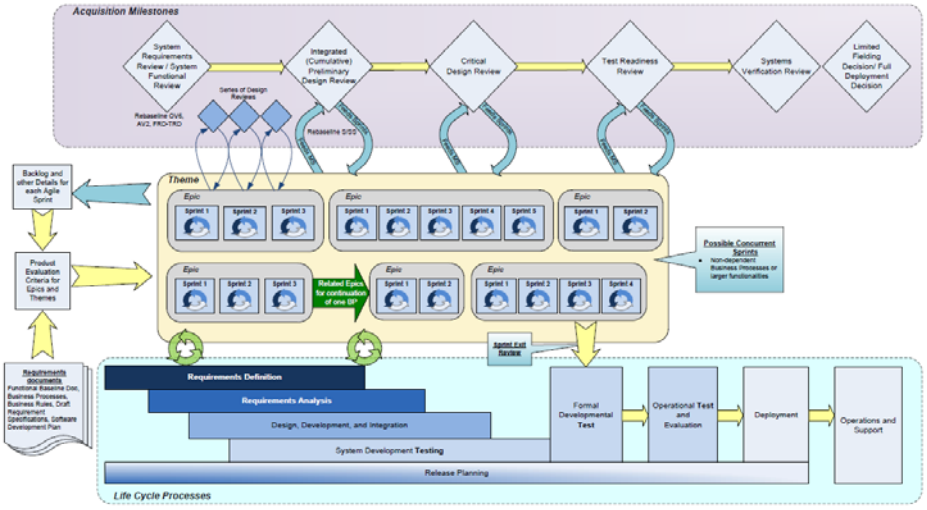
What we are seeing...



Testing of Key Estimation Concepts

Estimation Key Concepts

- Use a measure that allows correlation of size and effort (i.e., a good estimator for effort)
- Select a size measure that may be used to estimate across the life cycle
- Use practical sizing methods based on the software development process & artifacts

EIS Challenges

- Significant effort is expended on unplanned course corrections versus planned development activities
- EIS software evolves during development & operations; typically the end system is not the system initially envisioned or funded
- COTS integration involving package configurations and extensions do not use conventional size measures
- Agile development limits early lifecycle sizing beyond high level requirements (hindering detailed sizing prior to post-MS B)

EIS Characteristics & Size Usage

	Proj Alpha	Proj FED	Proj LOG	Proj MIL	Proj Golf
Software Development Characteristics:					
• Lifecycle Phase	MS A	FD	MS C	MS B	FDD
• Waterfall					
• Incremental		X	X	X	x
• Agile	?			x	X
• Core COTS Product	Undecided	SAP	SAP	PeopleSoft	SAP
Size Measure Usage:					
• ESLOC					
• Function Points					
• RICEFW / Configurations	**X**	**X**	**X**	**X**	**X**
• Requirements	x				

Package Implementation - Business Processes Configurations & RICEFW Objects

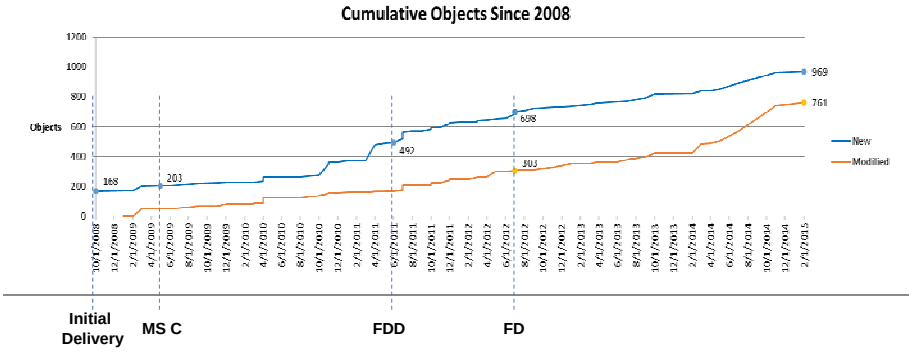
- Count the number (size) of business processes delivered by the package (i.e., configurations)
  - High Level Business Processes or "Scenarios"
  - Detailed Business Processes
- Identify and count the custom development portion needed
  - RICEFW Objects
    - Reports
    - Interfaces
    - Conversions
    - Extensions
    - Forms
    - Workflows

	Gear	R1.1	IU	R1.2	IU
BUSINESS PROCESSES					
Simple Business Scenarios	300		0		0
Average Business Scenarios	600		0		0
Complex Business Scenarios	1200	3	3600	3	3600
Total		3	3600	3	3600
CONFIGURATION DESIGNS					
Simple Configuration Designs	80	152	12160	17	1360
Average Configuration Designs-160	160	195	31200	36	5760
Complex Configuration Designs	320	29	9280	4	1280
Total		376	52640	57	8400
RICE					
Simple Reports	100		0		0
Average Reports	200		0		0
Complex Reports	300		0		0
Simple Interfaces	320	11	3520		0
Average Interfaces	620	14	8680	5	3100
Complex Interfaces	1520	11	16720	19	28880
Simple Conversion	100		0		0
Average Conversions	200		0		0
Complex Conversions	300		0		0
Simple Extensions	100	1	100		0
Average Extensions	500		0		0
Complex Extensions	1000	8	8000	10	10000
Simple Forms	100		0		0
Average Forms	200		0		0
Complex Forms	300		0		0
Simple Workflow	100		0		0
Average Workflow	500	1	500		0
Complex Workflow	1000		0		0

Initial Sizing and Size Stability

- Limited availability of quantifiable system artifacts beyond high-level requirements and core business processes at Milestones A & pre-B
- Significant number of course corrections:
  - Policy changes/mandates
  - Evolving external system interfaces
  - User-driven changes (extending functionality, improving performance and defect resolution)
  - Cybersecurity
- Evolving end product beyond initial deployment
  - For example: new DoD Directive states an interfacing system will be retired and now the functionality needs to be provided by System X

EIS Project Size Growth Example



- Initial cost estimate assumed no 'new' RICEFW object growth and 25% break/fix for modifications post Full Deployment
- RICEFW object growth continues (271 since FD) and actual break/fix to date is 65%

Common Sizing and Estimation Challenges

- Lack of historical data (analogous data points)
- Traditional sizing measures don't translate; willingness to use RICEFW objects
- Lack of understanding and experience with RICEFW objects

Challenges drive the need to reinforce estimation basics:
- Assumptions (engineering approach, reuse, funding sources)
- Size (based on engineering artifacts; normalization)
- Historical data (basis for CERs)
- Estimation approach

Critique of Size Measures for EIS

	Strengths	Weaknesses	Opportunities for improvement
Business Requirements	Available early in the life cycle	Highly variable to effort	Use of non-DoD historical data (i.e., analogous)
Business Processes	Core Functionality based	Highly variable to effort	Historical data; metadata
ESLOC	Code counting tools and robust definitions; minimal counting variation	Not natural by-product of EIS software development environment	Establish definitions for size normalization of EIS work products
Function Points	Counting standards & definitions, minimal variation	Lack system definition at early milestones; training investment	Invest in function point counting of analogous and target system
RICEFW / Configurations	Natural by-product of software end product	Not well defined (lack of standardized counting guidance)	Counting guidance and standardization
Agile User Stories / Story points	Natural by-product of the software development process & end product	Definition of a User story varies; Use of Story Points is scarce	Increase usage of analogous historical data

Sizing Observations

- EIS/ERP/Agile implementations are introducing terminology (e.g., themes, workstreams) affecting standardized data collection and hindering future cost estimation effectiveness
- RICEFW objects lack of definition and counting guidance/standards cause inconsistent counting results
- Requirements: Most COTS ERP providers don't have their documentation written to DoD Standards (i.e., lack of a robust system requirements specifications prohibits counting 'shalls' in a manner meaningful for cost estimation sizing purposes)

Final thoughts…

- Large variation in definition and quantifying size measures leads to ineffective cost estimating relationships at Milestones A and B (prior to systems integrator contract award)
- Too often sizing (and cost estimation) appears as an afterthought to other acquisition activities
- Reported size measures change during development and deployment
  - Requirements → RICEFW → Use cases → Releases
- Witnessing significant EIS system size growth post Full Deployment (FD) driving added costs in either unplanned acquisition or unplanned maintenance

"See, this is why, I like modern architecture. The houses are too new to have ghosts" -
Gabriella Pierce

Thank you

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