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 (OBS) 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
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-MSB)
**EIS Characteristics & Size Usage**

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

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

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