NDIA 11th Annual Systems Engineering Conference

“Improving Process Utilization with Tools”

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Overview

- Introduction
- The Process Problem
- Tools are a solution
- Examples
- Substantiating Data
- Conclusion
The Process Problem

All the “best” processes in the world are useless if they are not accepted, understood and implemented by the workforce.
Difficulties with Process Acceptance

- Hard to understand/implement the process
- Don’t know what’s available to help process implementation
- No common method of implementation
- Uncertainty on the part of the user and the advocate on whether implementation is being done correctly.
Tools are a solution

- The US Army ARDEC Systems Engineering Directorate (SED) has been investing in its infrastructure via tools that facilitate proper use of its processes
  - Many are simple Excel/Access tools that were developed in <100 man hours

- Tools that:
  - Guide the user through the process and document the results of each step (DAR, Peer Review, Roadmap)
  - Evaluate a project’s compliance to process(es) (PP Eval)
  - Guide the user towards additional resources to assist them (PP Eval, IPPD, PAL)
  - Get the user started with some instruction (Requirements Management Plan Template, System Spec Template)
  - Provide the user with examples to choose from (Technical Engineering Database (TED), Example Project Plans)

- Feedback has shown that they improve process utilization
ARDEC SE Roadmap

The SE Roadmap Tool encompasses 17 ARDEC SE process areas that describe key aspects of SE tasks covered by projects during the complete product lifecycle.

- Project Planning
- Requirements Development
- Logical Analysis
- Design Solution
- Implementation
- Integration
- Verification
- Validation
- Transition
- Decision Analysis and Resolution (DAR)
- Technical Assessment
- Requirements Management
- Risk Management
- Data Management
- Configuration Management
- Interface Management
- Peer Review
SE Roadmap Implementation Guide:

1. **Planning**
   - Coordinate with APO/IPT to baseline current SE activities
   - Based on the project objectives, define with APO/IPT the required SE End State (use SE procedures to assist with tailoring as appropriate)
   - Work with APO/IPT to determine what SE Tasks will satisfy transition criteria to achieve next SE level & complete Roadmap accordingly
   - Develop or update Project Plan/Schedule using Roadmap input to complete SE sections of plan
   - Verify that IMS/Project Schedule reflects accomplishments, schedule and products contained in Roadmap
   - Assess Project's performance against Roadmap details and provide status in the Roadmap Column title "status". Describe any corrective actions as required.

2. **Reporting**
   - Use tech assessment from Roadmap to address reporting requirements (MAPR, Level 1, Level 2, Level 3 Briefings, etc.)

3. **Roadmap**
   - Provides basis for technical planning, feeds the Project Plan/Schedule, allows technical assessment versus planned activities and supports multiple reporting needs

4. **Roadmap Implementation Guide**
   - MAPR format includes SE Status (tech assessment), project rating, and corrective action plan (if needed)

5. **Level 1 Briefing**
   - Summarizes SE status of project

6. **Roadmap**
   - Planning
   - Tracking
   - Assessment
   - Reporting

7. **Reporting Processes**

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SE Roadmap is the Linchpin that Ensures Effective Technical Planning and Technical Assessment Activities on Projects
The Project Plan (PP) is a key piece of the ARDEC Project Management process
- Originally developed for Project Plan (PP) evaluators to perform an assessment of a PP which lead to PP approval and project funding
- Quickly became a key instructional document provided to projects who were writing/updating their PP
- Also used to capture the Ownership Matrix for every PP section (who the SME is for each PP section). This provides key contact for further assistance
- Process Flow
- Automatically tailors the Evaluation Criteria based on project details that are used to “seed” the tool. (project scenario, phase etc.)
**Project Plan Evaluation Tool**

The Questions are tailored based on the Project Details above.

**Ownership Matrix details SMEs for each section**

**Feedback**

We welcome feedback on the Evaluation Criteria and this Evaluation Tool itself. Please use the link below to send feedback to Frank J. Salvatore (SED), Humisar Stanipar (PIO) and Dan Crowley (PMG).

[Click to Send Feedback]
Decision Analysis and Resolution

- Process is nested within the tool
  - Each Process Step has a corresponding section of the tool.

- Use of the tool provides a project with “self documenting” input data and results

- Provides the user with some standard graphical forms of output that assist with both making the decision and capturing its rationale

- Use of the tool follows the DAR Procedure
Decision Analysis and Resolution

Follow the process steps in the tool

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<thead>
<tr>
<th>Criteria</th>
<th>Weight</th>
<th>Alt 1</th>
<th>Alt 2</th>
<th>Alt 3</th>
<th>Alt 4</th>
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<td>7</td>
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<td>Fair</td>
<td>Bad</td>
<td>Great</td>
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<td>Startup Risk</td>
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<td>3</td>
<td>9</td>
<td>1</td>
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</tbody>
</table>

Raw Input for each Alternative

Utility applies to the Raw Input to Score the Alternatives against the Criteria
Integrated Process & Product Development Tool

- database of available resources (procedures, tools, templates etc.)

- Search based on different “languages” (DOD lifecycle, Six Sigma, SED SE Process…), and the sub-steps within that language
**Integrated Processes and Tools**

*Help You Find the Best Processes and Tools to Support IPPD*

**Use Drop Down Lists to Generate Report**

1) Select Process/Method

2) Select Procedure/Step

3) Select Resource Type (optional)

### Resource Table

<table>
<thead>
<tr>
<th>Resource</th>
<th>Type</th>
<th>User</th>
<th>Purpose</th>
<th>Reference</th>
<th>Reference Location</th>
<th>POC</th>
<th>Applies to</th>
</tr>
</thead>
<tbody>
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<td>Work Breakdown Structure</td>
<td>Tool</td>
<td>APO</td>
<td>To better define and organize the total scope of a project, using a hierarchical tree structure</td>
<td>Para. 7.1 Phase A Project Initiation Step A4 WBS Template 1 Oct 2007</td>
<td>ARDEC 101 Project Management Procedure</td>
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<td>Project Planning, Technical Planning,</td>
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<tr>
<td>Earned Value Management</td>
<td>Tool</td>
<td>APO</td>
<td>To better ensure the total integration of cost, schedule, and work scope aspects of the contract.</td>
<td></td>
<td></td>
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<td>Project Planning, Technical Planning, Risk Management,</td>
</tr>
<tr>
<td>Project Plan Evaluation</td>
<td>Tool</td>
<td>ALL</td>
<td>To better evaluate the quality of the Project Plan</td>
<td>Project Plan Evaluation Tool 21 Sept 2007</td>
<td>POC SED</td>
<td></td>
<td>Project Planning, Technical Planning,</td>
</tr>
</tbody>
</table>

**Report provides tailored list of Resources**
Verification Tool

- Use Interview
- Use Questionnaires
- Include Stakeholders Early and Often.
- Have Stakeholders Peer Review Requirements
- Use a JCCB
### TRL 5 Verification Method:

**Responsibility:**
- Analysis
- Inspection

**Location of Test:**
- Measurement
- Test

**Verification Procedure:**
- N/A

**Critical Test:**
- Please Select a Test

**Data Collected:**

### TRL 6 Verification Method:

**Responsibility:**
- (e.g. IPT Name, Subcontractor, System Integrator)

**Location of Test:**
- (e.g. Picarling, Contractor Facility, Proving Ground)

**Verification Procedure:**
- Briefly describe the procedure you recommend at this TRL level to validate or confirm the requirement.

**Data Collected:**

### TRL 7 Verification Method:

**Responsibility:**

**Location of Test:**

**Verification Procedure:**

**Data Collected:**

Templates

- Project Plan Template
- Requirements Management Plan Template
- System Specification Template
- Interface Control Document Template
- Etc....
Substantiating Data

- This year we are working on metrics and measures that will provide greater insights into what is and isn’t working.

- Here is a whole suite of metrics and measurement tools that have been developed.
What makes a “good” tool?

- Configuration Management built into the tool for Change History, versioning etc.
- Instructions on how to use the tool
  - Instruction sheet, pop-up comments
- Process Flow
- Feedback Form
- Integrate the tool into the process they are seeking to implement (language, steps etc.)
Conclusion

- Tools are common focal points for discussion.
- Management expects them to be used.
- We are starting to capture metrics to help guide future changes and to build a case to develop and make improvements to tools.
Questions?