Best Practices Clearinghouse:  
*Making Lessons Learned Come Alive and Be Practical*

Forrest Shull,  
Fraunhofer Center Maryland  

NDIA Systems Engineering Conference  
October 2008
Objectives

- Review the DoD Acquisition Best Practices Clearinghouse (BPCh) approach and tool

- Describe our processes for working with both structured and unstructured content
  - And raise interest in submitting your own content

- Discuss some of the emerging priorities and best practices we are finding
What makes BPCh unique?

- Not all best practices are “best” for everybody
  - Content includes descriptions of past results in context, not just what to do
  - Allows context-sensitive search (show me just the practices that programs like mine have used)
  - Recommendations built on evidence

- Pointers to existing sites, resources, examples
Overview of building content

<table>
<thead>
<tr>
<th>Name: Practice X</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Practice X has been successfully applied …</td>
</tr>
<tr>
<td>• Use It to …</td>
</tr>
<tr>
<td>• For more information click on the following links:</td>
</tr>
<tr>
<td>• …</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evidence 1</th>
<th>Evidence 2</th>
<th>Evidence 3</th>
<th>Evidence 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Source</td>
<td>Source</td>
<td>Source</td>
</tr>
<tr>
<td>Context</td>
<td>Context</td>
<td>Context</td>
<td>Context</td>
</tr>
<tr>
<td>Results</td>
<td>Results</td>
<td>Results</td>
<td>Results</td>
</tr>
</tbody>
</table>

(Bronze) (Silver) (Gold)
Definitions

- **A practice** is:
  - A *documented* activity that is described in an *actionable, repeatable* way;
  - A description of *how* to do something, not a general goal of *what* to do
  - May be: A process, method, technique, standard...

- **Evidence** about a practice:
  - Is a description of an experience which provides a better understanding of a situation
  - Similar to a *lesson learned*
  - Composed of:
    - a practice,
    - a context and
    - a discernible result.
Representing Context

- Any piece of evidence is tagged according to where it was drawn from:
  - **Target role** (acquirer, developer)
  - **Domain** (warfighter, business, intelligence, enterprise integration environment)
  - **Criticality level** (normal, mission, safety, security)
  - **Integration level** (software application, standalone subsystem, platforms, major system, system of systems)
  - **Environment** (military, other govt., industry, academia)
  - **ACAT level** (I, IA, II, III)
  - **Lifecycle phases** where practice used: (Concept refinement, Technology development, System development & demonstration, etc.)
  - **Organizational scope** (individual, project, program, organization, enterprise)
BPCh Content Manager and Subject Matter Experts (SMEs)

List of priorities
- Topic 1
- Topic 2
- Topic 3
- Topic 4
- Topic 5

Leads list

Content Manager

SME 1

SME 2

SME 3

User-submitted Content

Structured, e.g.
- Case studies
- GAO reports

Unstructured, e.g.
- Guidebooks
- Program reviews

Contents
- Intro to BPCh
- Processes and examples
- The users' view
- How can I get involved?

List of priorities

Structured, e.g.
- Case studies
- GAO reports

Unstructured, e.g.
- Guidebooks
- Program reviews

User-submitted Content
Current Priorities

As determined by Content Advisory Group, input from independent review teams, conference feedback:

- Logistics
- Systems Engineering
- Modeling & Simulation (M&S)
- Program Management
- System Assurance
- Contracting
Example: Air Force Institute of Technology (AFIT) Case Studies
Example: AFIT Case Studies

- Identifying practice leads:
  - AFIT ‘learning principles’ explicitly identified important lessons contributing to success / failure of systems analyzed
    - Mostly SE, PM

- Creating evidence:
  - The case studies provide in-depth examination of a particular program that could be mined for evidence

- Fleshing out practices:
  - Working with AFIT personnel and case study analysts to provide appropriate detail about the practices.
Example: AFIT Case Studies

- Example results:
  - **New / Modified Practices:**
    - Invest in and retain core engineers and staff
    - Integration of requirements and design process
    - Effective validation and verification requires a firm requirements baseline
    - Implement technology development plan when technology spans multiple programs
  - **Existing Practices:**
    - Independent Reviews
    - Work Breakdown Structure
    - Distributed Work Allocation
    - Architectural Trade-off Analysis Method (ATAM)
    - Systems Engineering Plan (SEP) Preparation Guide
Example: Program Support Reviews

- Identifying practice leads:
  - Conducted a brainstorming session with technical experts to capture trends, recurring problems

- Creating evidence:
  - Reviewers provided insights from the programs they reviewed, that illustrate the practices they discussed

- Fleshing out practices:
  - Plan to conduct follow-up meetings with the programs themselves to get more detail about how practices were implemented
Example: Program Support Reviews

Example practices:

- Include requirements database in Request for Proposal (RFP) process
- Get potential bidders to comment on SRR before RFP
- Develop system engineering plan prior to RFP release and include RFP
- Independent cost & schedule estimate
- Independent reviews
- Establish a battle rhythm for reports
- Integrated Developmental Test / Operational Test (DT/OT)
Other Emerging Practices: Logistics

- **Performance-Based Logistics (PBL)**
  - Business Case Analysis
  - Award Contract
  - Supply Chain Management
  - Performance-based agreements
  - Resource: DAU Acquisition Community Connection (ACC) PBL toolkit

- **Sustainment**
  - Technology Insertion
  - Software Sustainment
  - Item Unique Identification (IUID) / Radio Frequency Identification (RFID)
  - Independent Logistics Assessments
  - Prognostics & Health Management and Enhanced Diagnostics
Other Emerging Practices: M&S

- Involve Operational Test Authority in M&S planning to support DT/OT objectives
- Develop M&S plans and integrate with Test Evaluation and Management Plan (TEMP)
- M&S reuse
  - Based on: domain info, conceptual model, algorithms, software components, input data sets…
- Include M&S in contractual provisions
  - Addressing: representation requirements, data rights, M&S planning and documentation, ownership of resources…
What the User Sees… An Example Practice

**Best Practices Clearinghouse**

Connecting you to Government and Industry Best Practices

You are here: Home > Systems Engineering Plan > Capabilities, Requirements and Concept(s) of Operation

All practices under “Capabilities, Requirements and Concept(s) of Operation” category

<table>
<thead>
<tr>
<th>Maturity</th>
<th>Practice Name</th>
<th>Program Requirements</th>
<th>Practice Summary Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronze</td>
<td>Integration with Overall Program Management</td>
<td>Technical Staffing and Organizational Planning</td>
<td>Capabilities, Requirements and Concept(s) of Operation</td>
</tr>
<tr>
<td>Bronze</td>
<td>Utility Curve Methodology</td>
<td>Technology Maturation and Planning</td>
<td>Critical Technologies</td>
</tr>
<tr>
<td>Bronze</td>
<td>Requirements Allocation Sheet</td>
<td>Technical Review Planning</td>
<td>Technology Maturation Cost/ Schedule Constraints</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Technology Development and Evolving Acquisition Strategy</td>
</tr>
</tbody>
</table>

**Center for Experimental Software Engineering Maryland**

Slide 17 © 2008 Fraunhofer USA
## Practice: Software Formal Inspections 💬

Evidence (11), Resources (2)

<table>
<thead>
<tr>
<th>Evidence Name</th>
<th>Rating</th>
<th>Overall Perception</th>
<th>Quality Experience Report</th>
<th>Criticality</th>
<th>Primary Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>What We Have Learned about Fighting Defects</td>
<td>8</td>
<td></td>
<td>Via interview</td>
<td></td>
<td>Improved Quality</td>
</tr>
<tr>
<td>Applying Program Comprehension Techniques to Improve Software Inspections</td>
<td>12</td>
<td></td>
<td>Workshop publication</td>
<td></td>
<td>Reduced Cost</td>
</tr>
<tr>
<td>Report on the Loss of the Mars Climate Orbiter Mission</td>
<td>9</td>
<td></td>
<td>Technical report (within an organization or university)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Empirical Investigation of Perspective-Based Reading</td>
<td>13</td>
<td>🍁</td>
<td>Archival journal publication (e.g. IEEE Transactions on Software Engineering)</td>
<td>Normal</td>
<td>Improved Quality</td>
</tr>
<tr>
<td>Comparing the Effectiveness of Software Testing Strategies</td>
<td>14</td>
<td></td>
<td>Archival journal publication (e.g. IEEE Transactions on Software Engineering)</td>
<td></td>
<td>Improved Quality</td>
</tr>
<tr>
<td>Space Shuttle Primary Onboard Software Development: Process Control and Detect Cause Analysis</td>
<td>12</td>
<td></td>
<td>Technical report (within an organization or university)</td>
<td>Safety critical</td>
<td>Improved Quality</td>
</tr>
<tr>
<td>Key Lessons in Achieving Widespread Inspection Use</td>
<td>17</td>
<td>🍁</td>
<td>Trade journal publication (e.g. CrossTalk)</td>
<td>Don't know</td>
<td>Reduced Cost</td>
</tr>
<tr>
<td>Experience with Inspection in Ultralarge-Scale Developments</td>
<td>18</td>
<td>🍁</td>
<td>Conference publication or 2nd-tier publication (EMSE, IEEE Software, CACM)</td>
<td>Don't know</td>
<td>Reduced Cost</td>
</tr>
<tr>
<td>An Analysis of Defect Densities Found During Software Inspections</td>
<td>19</td>
<td>🍁</td>
<td>Archival journal publication (e.g. IEEE Transactions on Software Engineering)</td>
<td></td>
<td>Improved Quality</td>
</tr>
</tbody>
</table>
Current SMEs

- **Systems Engineering**
  - Dona Lee  dona.lee@syseng-so.com
  - Mike Ucchino  michael.ucchino@afit.edu

- **Logistics**
  - Bruce Hatlem  bruce.hatlam@dau.mil
  - Jill Garcia  jill.garcia@dau.mil

- **Modeling & Simulation (M&S)**
  - Mike Truelove  mike.truelove@syseng-so.com

- **Program Management, System Assurance, Contracting**
  - None participating

- **Software Acquisition Management**
  - Larry Baker  larry.baker@dau.mil
  - Bob Skertic  robert.skertic@dau.mil
How can I participate?

- Visit: https://bpch.dau.mil
- Built-in feedback forms in the application
  - ...To give us a lead
  - ...To suggest a practice we should have
  - ...To tell us your experience with a practice
  - ...To give us a detailed experience report
- Ability to integrate BPCh with in-house best practice / lessons learned systems

- Fill out our questionnaires...
  - To suggest other content
  - To volunteer as a SME
Questions?

Feel free to contact:

Forrest Shull
fshull@fc-md.umd.edu
301-403-8970

or

Mike Lambert
Michael.Lambert@dau.mil
703-805-4555
List of used abbreviations

- ACC: Acquisition Community Connection
- ACAT: Acquisition CATegory
- AFIT: Air Force Institute of Technology
- BPCh: (Acquisition) Best Practices Clearinghouse
- CoP: Communities of Practice
- COTS: Components Off The Shelf
- DAU: Defense Acquisition University
- DT/OT: Developmental Test / Operational Test
- DoD: U.S. Department of Defense
- IUID: Item Unique Identification
- M&S: Modeling and Simulation
- OSD: Office of the Under Secretary of Defense
- PBL: Performance Based Logistics
- PM: Program/Project Manager
- RFID: Radio Frequency Identification
- SE: Systems Engineering
- SMEs: Subject Matter Experts
- SSR: System Requirements Review
- TEMP: Test Evaluation and Management Plan