U.S. Department of Defense (DoD) Approach to Best Practices:
Building Evidence for Practice Selection Based on Real Experiences

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Topics

- **Why** do we need a Clearinghouse?

- **What** to expect in the Best Practices Clearinghouse (BPCh)?

- **How** does the BPCh work?

- **When** can I get involved?

- **Who** to contact?

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Why a Clearinghouse?

"Best" practices are recommended, but…

➤ Too many lists to choose from

➤ No basis for selecting specific practices

➤ Proof of effectiveness is not generally available

➤ Not easy to see connection between practices and specific program risks or issues

➤ Practice's success factors not well understood

➤ Resources are limited and the return on practice investment is unknown (costs/benefits)
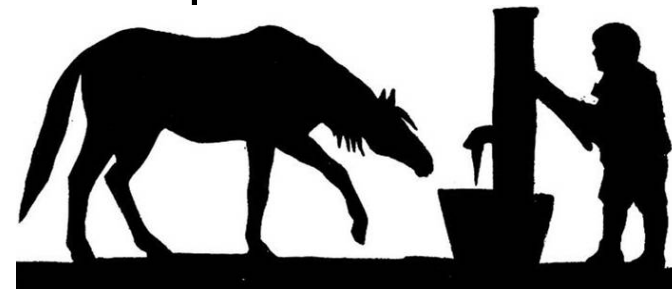
➤ Implementation guidance is inadequate

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What are the main requirements?

Process Components

IT components

Communities

Roles

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AT&L Knowledge Sharing System
Your one stop source for AT&L information

Central Repository for AT&L Policy & Reference Materials

Also serves as the home for knowledge gateways like:
• Defense Acquisition Guidebook
• AT&L Integrated Framework Chart (IFC)
• Ask A Professor

Best Practices Clearinghouse
Connecting you to Government and Industry Best Practices

DoD & Industry Best Practices

• Will stand alone as a best practices resource
• Will also provide content for CoPs to allow for additional collaboration/input on best practices
• Will be included in the enterprise search index/results

Acquisition Knowledge Management System

AT&L ACQuire
A value added DAU Search Service for the AT&L workforce

Enterprise Search System

• Stand-alone search and discovery for AT&L workforce
• Integrated search for AKSS
• Searches open areas of ACC
• Integrated search for DAU Homepage
• Integrated search for DAU Intranet

Acquisition Community Connection
Where the AT&L Workforce Meets to Share Knowledge

Collaborative Tool for the AT&L Community Where the Workforce Contributes Knowledge and Interacts to Share "Know-How"

Provides a nest of collaborative tools:
• Communities of Practice/Interest
• Special Interest Areas
• Limited Access Workspaces
• DAU Course Spaces
• Workflow Learning Tools
• IFC Templates

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How do we define a practice?

Operational definition:

➢ 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

➢ Usable by targeted acquisition end users

➢ About which we can collect empirical data or experiences.

→ may be a process, method, or tool

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What is a practice?

Distinguished from:

➤ A *best practice area*

❖ …a type of activity the user can't neglect, without specific advice on *how* to do it. E.g., risk management

➤ A *lesson learned*

❖ …good advice, drawn from experience, without enough detail to be clearly repeatable. E.g., don't overestimate cost savings from using COTS components.

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What is a practice?

For example:

- ## System Engineering Plan:

  - ### Risk Management Strategy
    Options to consider:
    - ❖ COTS Usage Risk Evaluation (CURE)
    - ❖ Willoughby templates
    - ❖ SEI's Taxonomy-based Risk Identification
    - ❖ Probability Consequence Software

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What makes BPCh unique?

- Not all best practices are "best" for everybody

  ➢ Descriptions of past results in context, not just what to do

- Context-sensitive search

- Levels of vetting of content

- Subject Matter Experts as practice owners

- Pointers to existing sites, resources, examples

What are the main process steps?

Name: **Practice X**		**Practice Maturity**
$\sum$	•Practice X has been successfully applied … •Use It to … •For more information click on the following links: • …	**(Bronze)**

Evidence 1

Source
Context
Results

Evidence 2

Source
Context
Results

Evidence 3

Source
Context
Results

Evidence 4

Source
Context
Results
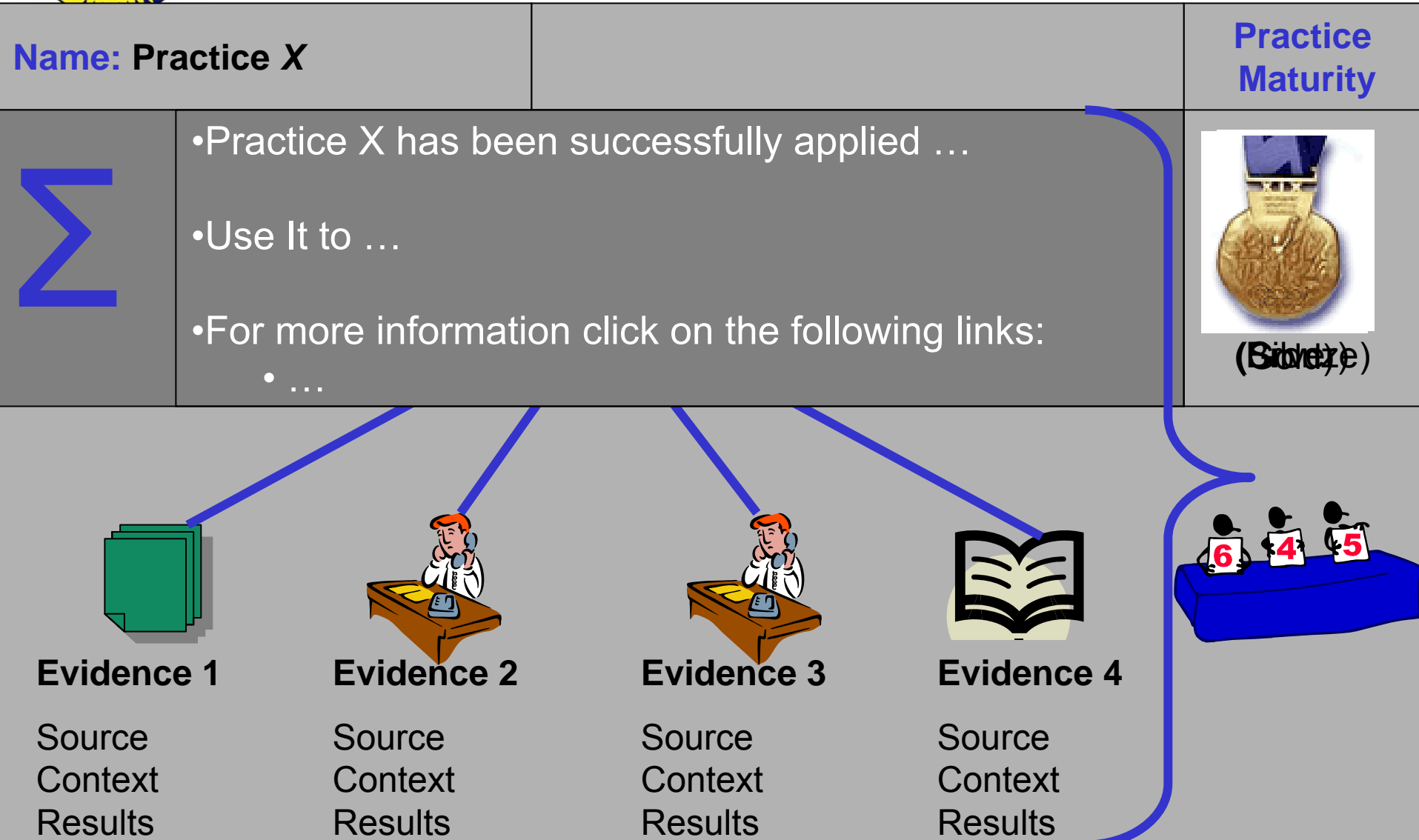
What are examples of content sources?

- **Systems Engineering**
  - ➤ OUSD / SEP Review Team
  - ➤ OUSD / PSR Teams and Systemic Analysis
  - ➤ Experience reports from NDIA-SE & similar
- **Software engineering**
  - ➤ ARDEC's Software Enterprise / Picatinny Arsenal
- **Acquisition**
  - ➤ NDIA
- *Other ideas?*
  - ➤ Existing DOD guidebooks / standards
  - ➤ Existing best practice / lessons learned sites
  - ➤ Expert interviews
  - ➤ Conference presentations, experience reports

What are some example practices?

- **Requirements analysis**
  - ➢ Govt-only review of RFP
  - ➢ Distribute requirements database for bidders
- **Reporting / stakeholder communication**
  - ➢ Establish a battle rhythm for meetings in SEP – what gets done daily, weekly, semi-annually.
- **Interfaces**
  - ➢ PEO-level coordination
- **General…**
  - ➢ Independent technical reviews
  - ➢ Integrated data environment

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What is the BPCh content pedigree?

- Pedigree comes from information that is available on each piece of evidence:
  - **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)

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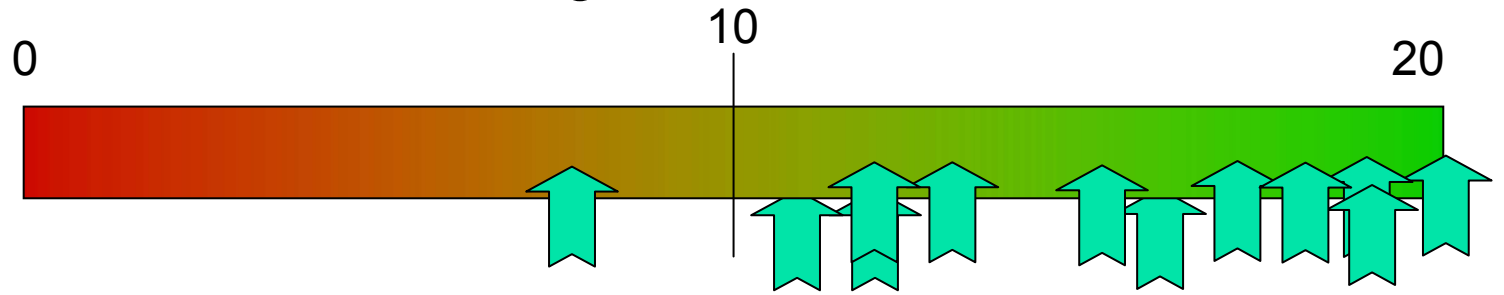Center for Experimental
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How do we classify "trustability"?

- Evidence is scored based on objective measures:

Total =	How practice applied	How results measured	How reported	Who reported
[0..20]	[0..7]	[0..5]	[0..5]	[0..3]

- Practices are described as a sum of evidences with different ratings:

How does it work for a particular example?

Practice detail

Practice Name:	Inspections
Description:	Formal inspection is a well-defined review process for finding and fixing defects in work products from all phases of development.
Practice Status:	Summarized - waiting for vetting

Resources:	Description:
DAU's Tech Review Course	

Summary

Primary Benefit:

The majority of sources show that inspections have a measurable impact on the number of defects taken out of software documents.

Inspections have a better ROI for the effort spent performing them, than other common means of defect reduction like testing.

All sources agree that inspections are useful within the system development phase. Multiple authors discuss that inspections are usable in all phases of software development, although more benefits accrue when they are used earlier in the lifecycle.

Organizational Scope:

Summary

Primary Benefit:

The most often-mentioned impact is on quality: The majority of sources show that inspections have a measurable impact on the number of defects taken out of software documents. As a side-effect, some sources also argue that they lead to fewer defects being generated in the future, through skill development of the personnel involved.
A secondary benefit is on cost: Inspections have a better ROI for the effort spent performing them, than other common means of defect reduction like testing.

Life Cycle Phases:

All sources agree that inspections are useful within the system development phase. Multiple authors discuss that inspections are usable in all phases of software development, although more benefits accrue when they are used earlier in the lifecycle.

Organizational Scope:

While there are numerous benefits that can be achieved within a project, authors also described an overall advantage to the entire organization or a given program that can result from implementation of inspections across projects.

Primary Target:

Almost all sources focus on the use of inspection within the development organization (to minimize their test and rework effort). However, the technical review process at NavAir can be considered a variant. It has been used across many projects by acquirers to help monitor the developers they are overseeing.

Barriers:

The primary inhibitors seem to be in the realm of developer motivation:
- Inspections are perceived as being labor intensive in nature
- Payback is delayed (i.e. benefits are not seen until long after the effort is spent)

than the team to coordinate the process, and personnel who provide support for measurement and interpretation.
Inspections may not be put into common use if there is no way to allow some customization to the division/group.

Madachy argues that, since there is some overhead cost involved in inspections, projects that already have extremely low defect rates (e.g. development using the Cleanroom paradigm) may not see a cost-benefit.

Enablers:

There is a need for local champions and management support. Development teams who implement inspections need trained moderators and support materials. Providing explicit training helps improve effectiveness.

Inspections work best if management is not present at inspections, to remove the threat that defect information could be used to evaluate workers.

Net Impact on Cost:

Is there any evidence that inspections will actually save us time and money?

List of evidences for this practice

Rating	Status	Evidence Name	Created on
20	Included in summary	Advances in Software Inspections	2/16/2005
19	Included in summary	An Analysis of Defect Densities Found During Software Inspections	1/13/2005
19	Included in summary	Measuring Inspections at Litton	1/12/2005
18	Included in summary	Experience with Inspection in Ultralarge-Scale Developments	1/13/2005
17	Included in summary	Key Lessons in Achieving Widespread Inspection Use	1/13/2005
17	Included in summary	Space Shuttle Primary Onboard Software Development: Process Control and Defect Cause Analysis	2/16/2005
15	Included in summary	Comparing the Effectiveness of Software Testing Strategies	2/16/2005
13	Included in summary	Report on the Loss of the Mars Climate Orbiter Mission	2/17/2005
13	Included in summary	The Empirical Investigation of Perspective-Based Reading	2/16/2005
12	Included in summary	Applying Program Comprehension Techniques to Improve Software Inspections	1/13/2005
12	Included in summary	NavAir technical reviews	2/17/2005
8	Included in summary	What We Have Learned about Fighting Defects	1/13/2005

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Is there any evidence that inspections will actually save us time and money?

Sources:
Madachy, Ray

Affiliations:
Litton

Name:
Criticality Level
Integration Lev
Domain:
Environment:
Applied how:
Total System co
ACAT Level:
Team Size
Team Environm
Life Cycle Phas
Organizational s
Target Role:

Project detail

Domain:	Business
Environment:	Industry
Applied how:	Multiple production projects
Total System cost:	
ACAT Level:	
Team Size	
Team Environment:	
Life Cycle Phases:	System Development & Demonstration
Organizational scope:	Organization
Target Role:	Developer

Resulting recommendations

Primary Benefit: | Improve Quality

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Net Impact on Cost:	Reduced cost

p6: "Our project director set goals to save at least 50% of integration effort..." which are being met using inspections.

p9: "The net return per inspection... range from 64 to 200 person-hours saved per inspection..."

Cost involves extra effort in addition to meeting time. p9: "Our results concur with [Grady92] and other references that suggest a large proportion of preparation time to meeting time..."

Resulting recommendations

Primary Benefit:	Improve Quality
Barriers:	

p13: "We have also found that the use of an SEPG peer review coordinator goes a long way to keep the process intact." That is, sustaining requires someone at a higher level responsible for coordinating the practice.

p13: "While inspection and preparation effort stay fairly constant, the rework and test error fixing effort vary with the defect rates...[...]

Net Impact on Cost:
- During design and coding, about 3% of the total project effort was used for inspection
- The net return per inspection range from 64 to 200 person-hours saved per inspection

p7: "An overall inspection efficiency of 30%..." That is, inspections removed approximately 30% of defects in the inspected products, improving quality.

p6: "...achieved significant results in terms of defect reduction and return on investment"

p9: "Besides the detection of errors during inspection, less errors are originally generated due to authors being more careful as inspection metrics are publicized."

p9: "When comparing trouble report data before and after inspections were introduced, there is about a 2/3 reduction in trouble report density during integration..."

Is there any evidence that inspections will actually save us time and money?

Contents

List of evidences for this practice

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Is there any evidence that inspections will actually save us time and money?

Resulting recommendations

Primary Benefit: Improve Quality

Barriers:

Lack of training can be a barrier: p. 748: "Some organizations have started inspections without proper education and have achieved some success, but less than others who prepared their participants fully. This has caused some amount of start-over, which was frustr...

p. 74...
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- Exc...

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Net Impact on Cost:
Inspections have the effect of slightly front-end loading the commitment of resources, adding to requirements and design

In each instance, the new uses of inspection were found to improve product quality and to be cost effective, i.e., it saved more than it cost.

Net Impact on Quality: Increased quality

p. 744: "In each instance, the new uses of inspection were found to improve product quality and to be cost effective, i.e., it saved more than it cost."

p. 744: Fagan quotes an IBM director saying: "Since we introduced the inspection process in 1974, we have achieved significant improvements in quality. IBM has nearly doubled the number of lines of code shipped... since 1976, while the number of defects per

What is the status of BPCh?

- Run by **Defense Acquisition University** (DAU)
  - An OUSD(AT&L) training institution

- **IT Components:**
  - BPCh v1.0 developed, undergoing usability training
- **Processes:**
  - Piloted for submitting practices and evidence, e.g.
    - Integration with DAU traditional and e-classrooms
    - Solicited via the tool
- **Roles / Communities:**
  - SMEs from DAU, Services, Agencies and Industry are being engaged
  - Practice Provider Network being forged to create a list of trusted content sources

→ Public debut of BPCh v1.0 planned for Spring 2008

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How are practices prioritized?

- **Priorities are set by Content Advisory Group**
  - ➢ Periodic meetings to review content, recommend areas of interest
    - ❖ Low-hanging fruit or areas of high concern
  - ➢ Also to review opportunities to share content with other best practice / lessons learned initiatives
    - ❖ *Looking for speakers!*
  - ➢ Chaired by David Castellano, OUSD (AT&L)
  - ➢ Recommendations executed by Content Manager, Forrest Shull
  - ➢ Current hot topics include: Risk management, Earned Value Management, Requirements engineering

➔ Priorities constantly reviewed and updated

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Can I suggest content?

- **YES!**

  - ➤ We are looking for practice suggestions to ensure the usefulness of the BPCh to the user community

  - ➤ We are looking for evidence to add to an existing practice

  - ➤ Everyone can suggest practices
    - → simply e-mail us

  → please fill in the survey that we circulate

How can I participate next year?

- Visit: https://acc.dau.mil/bpch

- 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

- Elicitation workshops
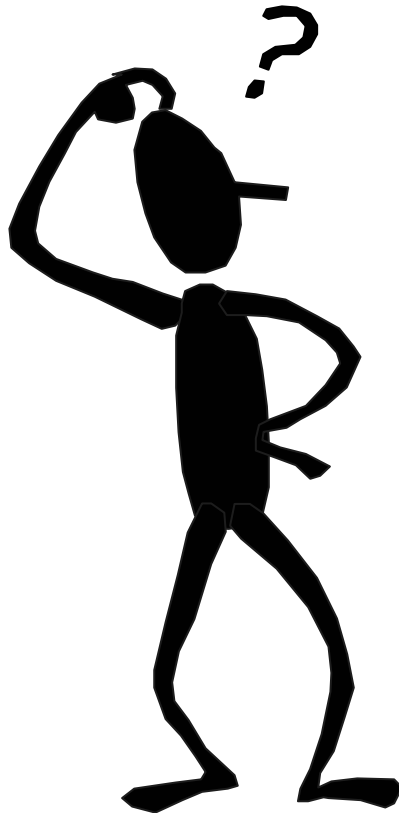 - ➢ *Send us your suggestions*

Questions?

Feel free to contact:

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List of used abbreviations

- ACC: Acquisition Community Connection
- ACAT: Acquisition CATegory
- AKSS: AT&L Knowledge Sharing System
- AT&L: Acquisition, Technology and Logistics
- BPCh: (Acquisition) Best Practices Clearinghouse
- CoP: Communities of Practice
- COTS: Components Off The Shelf
- DAU: Defense Acquisition University
- DoD: U.S. Department of Defense
- IFC: Integrated Framework Chart
- MOSS: Microsoft Office SharePoint Server
- OSD: Office of the Under Secretary of Defense
- ROI: Return On Investment
- SAM: Software Acquisition Management
- SE: Systems Engineering
- SEI: Software Engineering Institute
- SMEs: Subject Matter Experts

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