What is the Software Engineering Improvement Program?

- An on-going effort to ensure that the FAA adopts the best applicable software technology for improved
  - Safety
  - Efficiency
  - Effectiveness
  - Quality
- Additionally supports adoption of systems engineering technology for software-intensive systems
- Now addressing needs of most parts of the FAA that acquire, maintain, and regulate software-intensive systems
The Strategic Problems

1. Immature acquisition processes
2. Immature NAS technical architecture
3. Suboptimal quality assurance approaches for safety-critical flight software and inconsistent quality assurance approaches for safety-critical CNS/ATM software
4. Workforce needs stronger software and systems engineering competencies

A. Problems identified by mid 1997.
B. Directly tackling all 4 problems.
C. Expect big gains in 1999.
D. This talk is about problem 4.

What do we need to build a software-competent workforce?

- Understanding of the Knowledge
  - What are the competencies?
  - How much knowledge is needed?
- Well-defined Improvement Population
  - Who needs software competencies?
  - Which activities require that knowledge?
The Strategy

- Define a software engineering body of knowledge
- Analyze the acquisition roles to identify those with activities affected by software
- Use the acquisition processes, iCMM, practitioner interviews, and expert opinion as guides
- Map the body of knowledge into the identified roles

The Software Engineering Competency Model

- Based on an existing learning system concept
- Three dimensional mapping of
  - Software Engineering Body of Knowledge (SwE-BoK)
  - Depth of knowledge taxonomy
  - Acquisition Workforce Learning System roles
  - Process areas of the FAA-iCMM
The Software Engineering Body of Knowledge is composed of Knowledge Areas.

The Software Engineering Knowledge Category includes:

- Requirements Engineering Knowledge Area (1.1)
- Architecture
- Knowledge Unit
- Architecture
Knowledge
Level
Definition

- **Awareness**
  - awareness of the existence and context of the subject
  - provide a general, informal explanation
  - identify references that provide greater depth of knowledge

- **Understanding**
  - explain the subject through definition and example
  - appreciates the effort needed to perform work
  - monitor progress of work
  - evaluate quality of work

- **Execution**
  - produce products
  - analyze and evaluate methods and techniques
  - inform others about content and practices
Role Activities Derivation

- Based on AWLS Role Definitions
  - Role description
  - Competencies
  - Technical behaviors
- Augmented through Interviews
- Aggregated into a "verb - noun" table

Knowledge Mapped to Role Activities

Depth of Knowledge Levels:
- Awareness
- Understanding
- Execution

Role Activities

Knowledge Level
Knowledge and Activities Mapped to FAA-iCMM Process Areas

The Results of the Competency Mapping

<table>
<thead>
<tr>
<th>Role Activity</th>
<th>Process Area</th>
<th>FAA-iCMM</th>
<th>SWEBOK</th>
<th>optgroup</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
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<th>S11</th>
<th>S12</th>
<th>S13</th>
<th>S14</th>
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<tbody>
<tr>
<td>Participates in source qualification and selection</td>
<td>3.5.4</td>
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<td>Supports the latest software technology to improve and enhance</td>
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<td>Develops the SWEBOK software requirement specification</td>
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