Overview of FAA Composite Initiatives

Presented on 9/13/05 at the Workshop for Developments in Composite Maintenance Training

FAA

Larry Ilcewicz
CSTA, Composites

- Composite safety & certification initiatives
  - Background
  - Synopsis of technical progress and plans
  - Standards groups & government programs
- Composite maintenance training
  - FAA role/support to standards development
  - Critical composite maintenance & repair issues
  - Approach and timelines
- Current workshop
  - Objectives
  - Key subjects to be introduced by developers and reviewed by experts

Ongoing Composite Safety & Certification Initiatives*

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- **Objectives**
  1) Work with industry, other government agencies, and academia to ensure safe and efficient deployment of composite technologies used in existing and future aircraft
  2) Update policies, advisory circulars, training, and detailed background used to support standardized composite engineering practices

** Efforts started in 1999 to address issues associated with increasing composite applications*

FAA Approach to Composite Safety and Certification Initiatives

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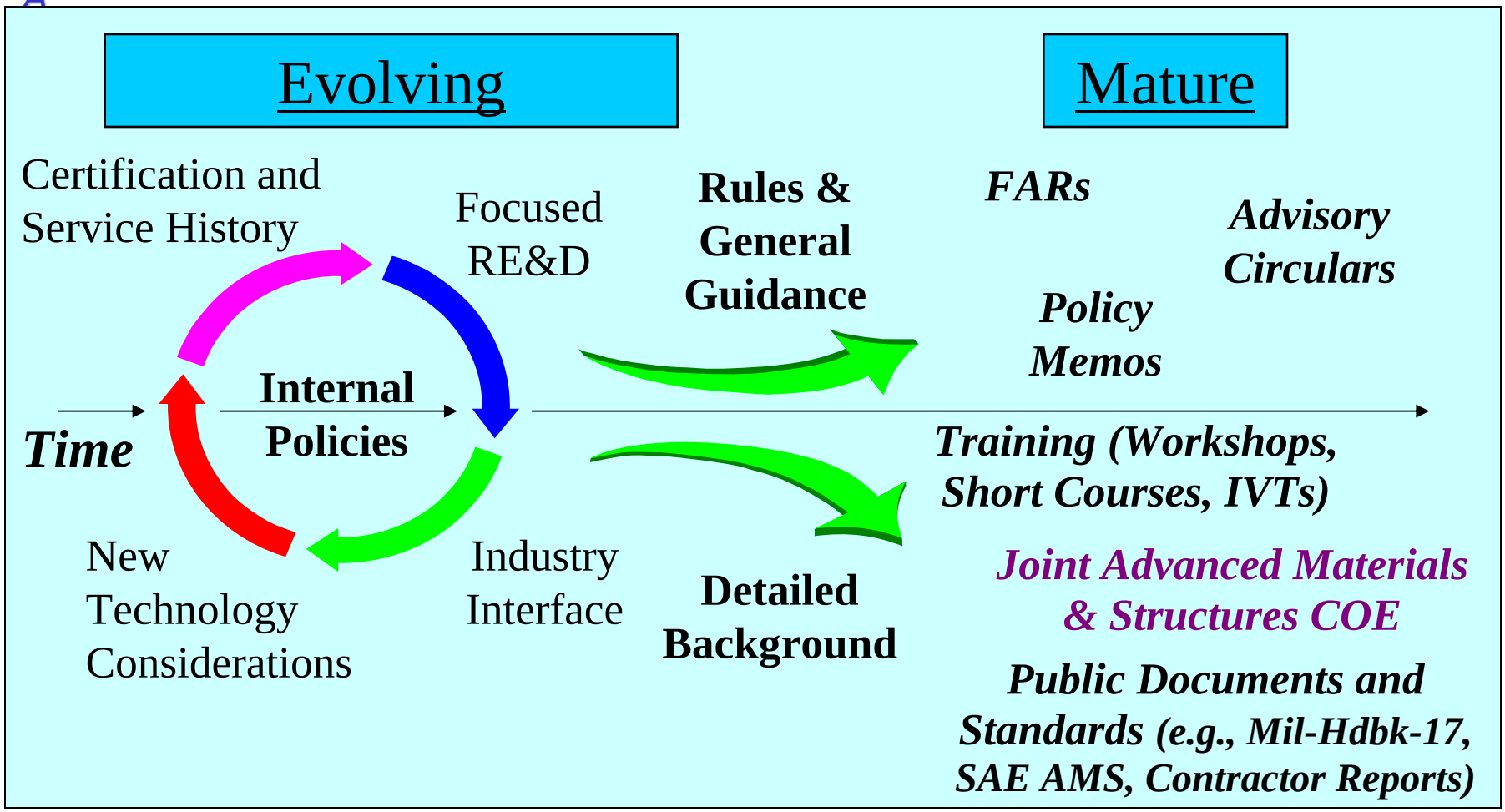

Technical Thrust Areas

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Advancements depend on close integration between areas

Material Control, Standardization and Shared Databases

Structural Substantiation

- Advances in analysis & test building blocks
- Statistical significance
- Environmental effects
- Manufacturing integration

FAA and NASA R&D is currently active in most of these areas

NASA

Damage Tolerance and Maintenance Practices

- Critical defects (impact & mfg.)
- Bonded structure & repair issues
- Fatigue & damage considerations
- Life assessment (tests & analyses)
- Accelerated testing
- NDI damage metrics/service POD
- Equivalent levels of safety
- Training standards

Bonded Joint Processing Issues

Advanced Material Forms and Processes

Flammability & Crashworthiness

Support from cabin safety research groups

Significant progress, which has relevance to all aircraft products, has been gained to date

Milestones for Composite Safety and Certification Policy, Guidance and Training

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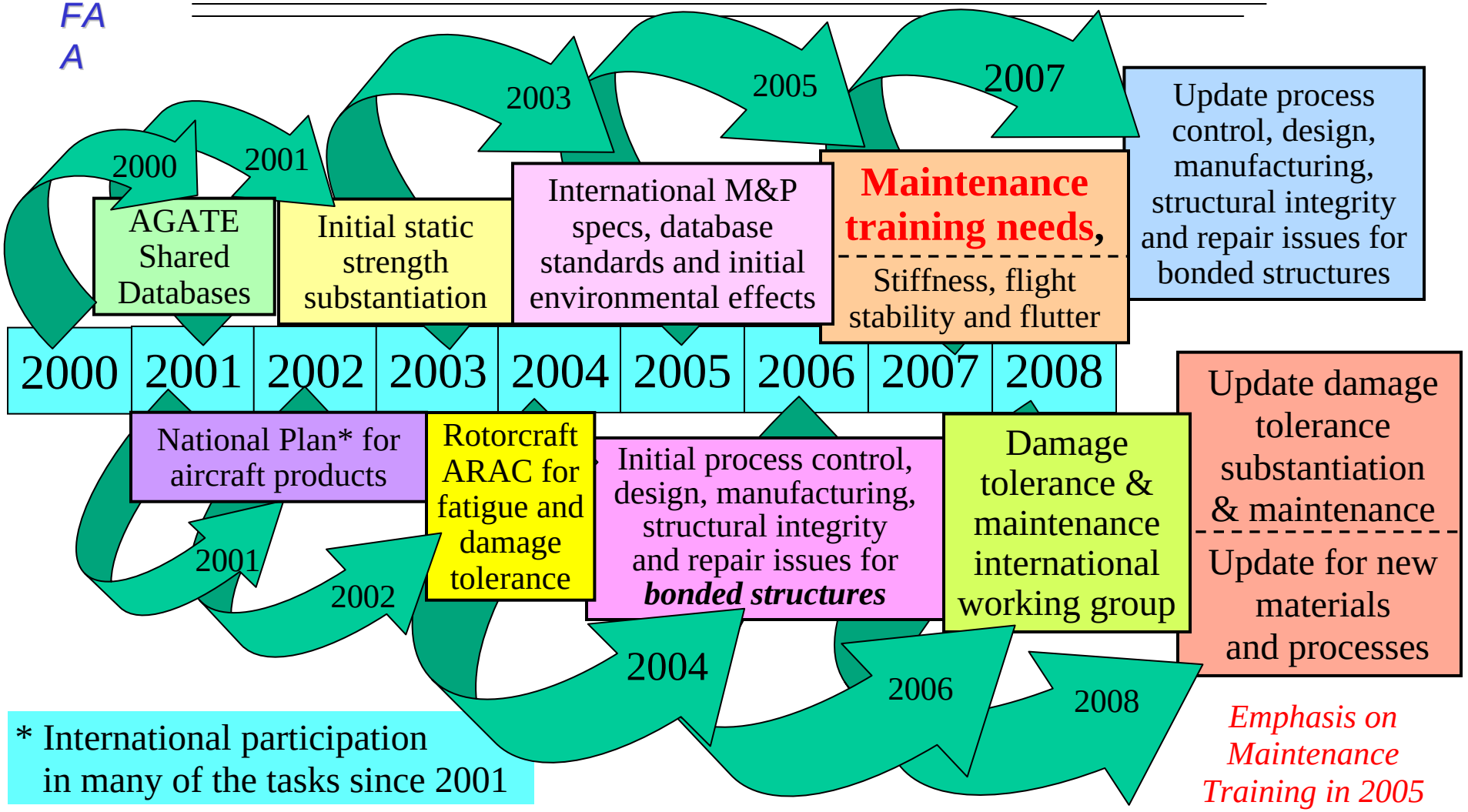

* International participation in many of the tasks since 2001

Emphasis on Maintenance Training in 2005

FAA Joint Advanced Materials and Structures (JAMS) Centers of Excellence

FA

New FAA JAMS Centers of Excellence to provide research and training in support of expanding composite applications

CECAM center of excellence for composites and advanced materials

Wichita State University

Northwestern University
Purdue University
Tuskegee University
University of California at Los Angeles
University of Delaware

FAA Center of Excellence AMTAS Advanced Materials in Transport Aircraft Structures

University of Washington

Edmonds Community College
Oregon State University
Washington State University

Important Teammates

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- NASA has been a leader for composite applications
  - Significant research support since 1970/1980s
  - AA587, A300-600 accident investigation
  - NCAMP support to material standardization

NASA

NCAMP NATIONAL CENTER for ADVANCED MATERIALS PERFORMANCE

- Partnerships with industry have been essential, e.g., Mil-17, SAE P-17, CACRC, ASTM, SAMPE, AGATE, SATS, RITA, SAS/IAB/AACE

Federal Aviation Administration AACE Airworthiness Assurance Center of Excellence

SAE INTERNATIONAL

COMMERCIAL AIRCRAFT COMPOSITE REPAIR COMMITTEE (ata, IATA, SAE)

Training
Databases
Standardization
Engineering guidelines

MIL COMPOSITE MATERIALS HANDBOOK 17

ASTM INTERNATIONAL

- DOD and DARPA research
- EASA and other foreign research/standardization

FAA Strategic Plan: Safety Continuum

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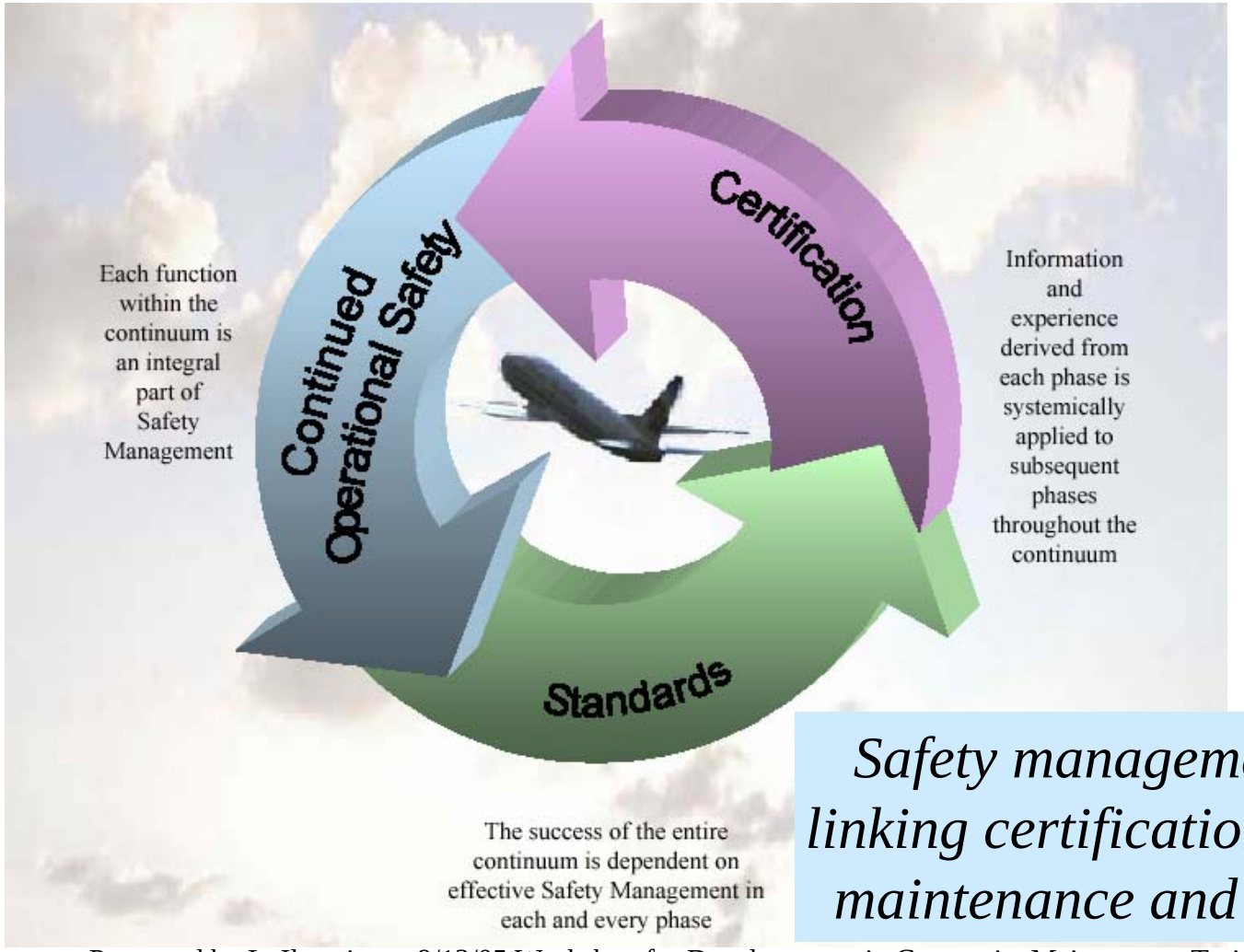

Safety management system linking certification standards, maintenance and operations

Importance of Industry Benchmarking

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- The FAA has used workshops involving experts from the field and associated experiences to provide an essential basis for CS&CI
  - Composites have very few standards
  - Critical technical issues are often not well documented
  - Much of academia's training & research is of limited use
  - FAA Technical Center Reports document industry practice and insights derived from workshop forum
- Everyone attending this workshop are challenged to contribute to the training standards discussed
  - Our collected experiences are greater than any individual
  - Even experts learn from one another's experiences

2004 - 2006 Composite Maintenance Initiatives

FAA

- Series of workshops to bring regulators and industry together on technical issues
  - FAA/NRC Workshop in Wash. DC (May 18 & 19, 2004) *Executive review of systematic, repair, NDI & training issues*
  - Kickoff Workshop for FAA research on training needs hosted by Boeing in Seattle, WA (Nov. 30 - Dec. 2, 2004)
  - Chicago FAA Workshop for Developments in Composite Maintenance Training *(September 13-15, 2005)*
- FAA research at JAMS COE (ongoing)
  - Continued evaluation of existing procedures with CACRC
  - Evaluate training needs and establish a standard intro course

Training Initiative: *Critical Composite Maintenance & Repair Issues*

FAA

- Practical, introductory-level course for engineers, technicians and inspectors is under development
  - FAA/Edmonds C.C. Cooperative Agreement (2004-2006)
  - Short course (5–7 days), incl. labs, worth 3-5 credits
  - Future efforts on web-based, distance learning
- Industry & government experts recruited to support the development of training *standards*
  - Initial workshop defined terminal course objectives (TCO)
  - **Current workshop used to review documented modules that will be released with the TCO as *industry standards***
  - Initial course scheduled to be completed by early 2006
  - FAA policy planned for late 2006

FAA Support to Standards Development

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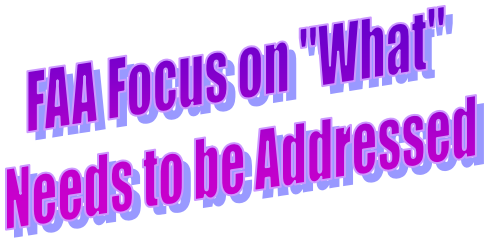
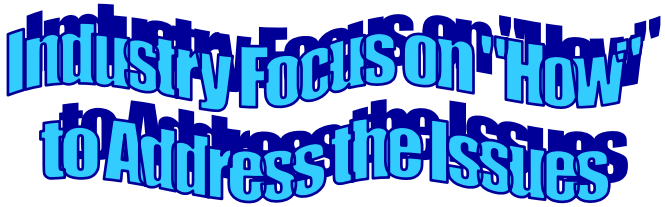
- Primary role: document critical safety issues and work with industry to ensure they are properly addressed





- The current FAA support to training standards is focused on establishing a common basis in *Critical Composite Maintenance & Repair Issues*
  - Important start for technicians, inspectors and engineers, as well as regulators, suppliers and management
  - Practical training for workers that have limited composite experience (new hires & existing workforce)

Critical Composite Maintenance and Repair Issues

FAA

- Understand roles & responsibilities (importance of teamwork)
- Recognize composite damage types & sources (proper team reaction to possible service damage)
- Understand the inspection methods & procedures needed for detection, characterization and disposition of damage
- Understand regulations and importance of approved source documentation (+ process for cases requiring new approval)
- Realize the unique processing issues and quality controls needed for bonded composite repairs
- Realize the unique processing issues and quality controls needed for bolted composite repairs
- Realize need for more training to acquire technician, inspector or engineering skills (avoid working beyond skill limits)

SAE CACRC AIR Training Documents

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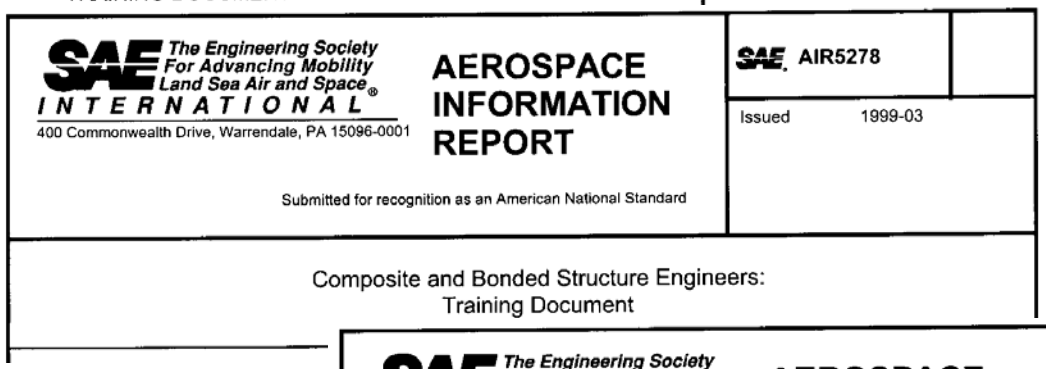
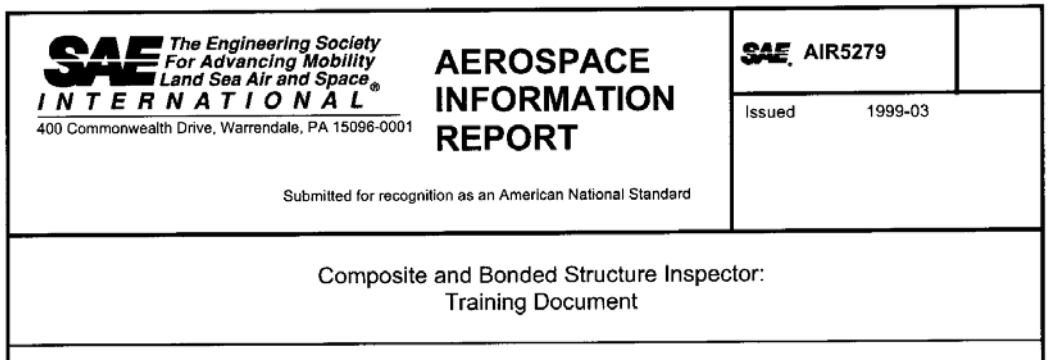
AIR4938
Technician/Specialist



AIR5278
Engineer



AIR5279
Inspector

Approach and Timelines

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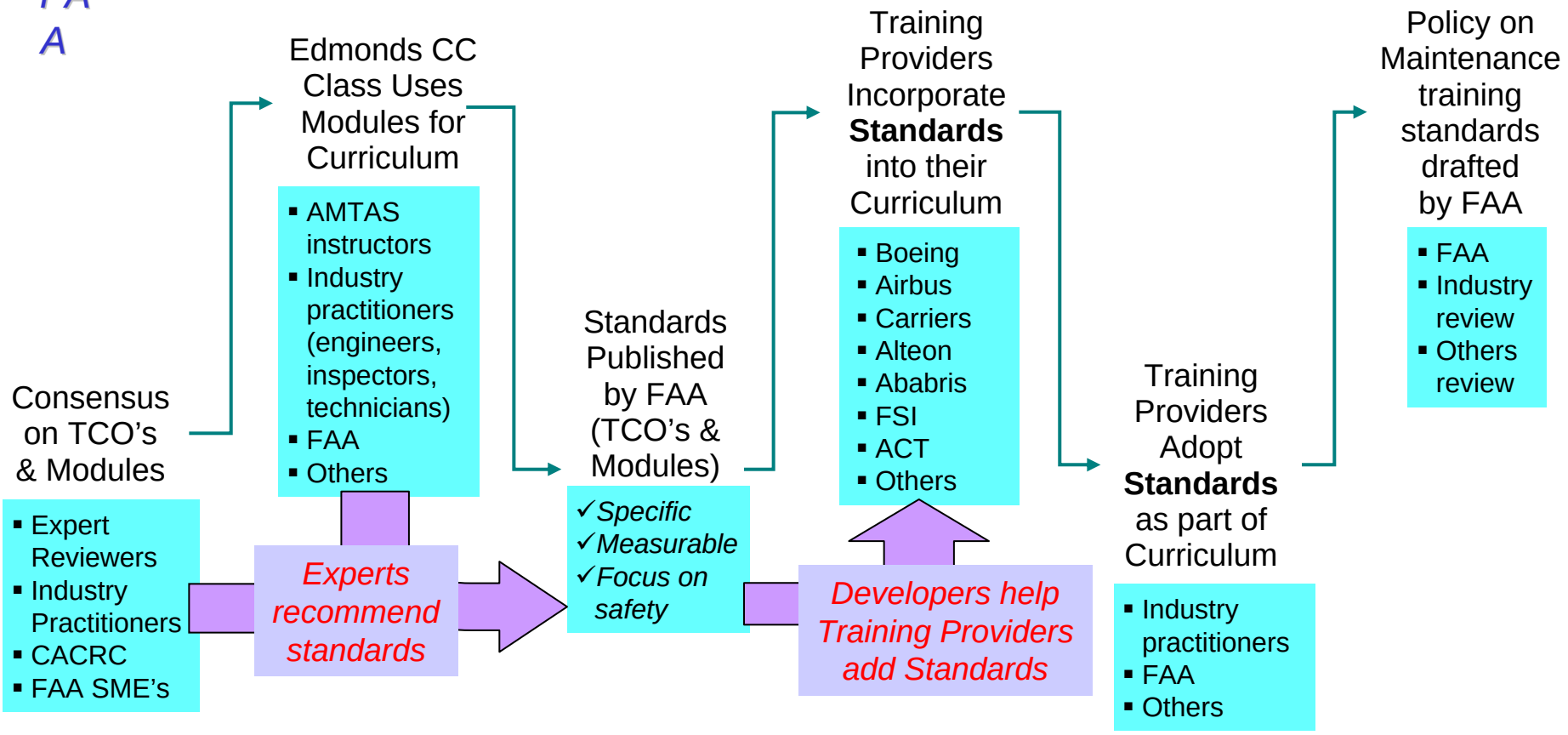

Maintenance Training Initiative

Objectives for 9/05 Workshop & Related FAA Report

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Primary objective

Review technical details that need to be included as a basis for maintenance & repair training, with a focus on critical safety issues

Secondary objectives

1) *Discuss industry engineering practices, which are needed in training modules to authenticate safety messages*
2) *Identify additional training development needs*
3) *Provide directions for future research and development*

Background: The primary objective relates to a FAA goal for outlining ***what*** needs to be considered for aircraft safety. In addition, secondary objectives help industry develop guidelines, standards and other training needs in addressing the critical issues.

TCO Broken into Key Subjects for Workshop

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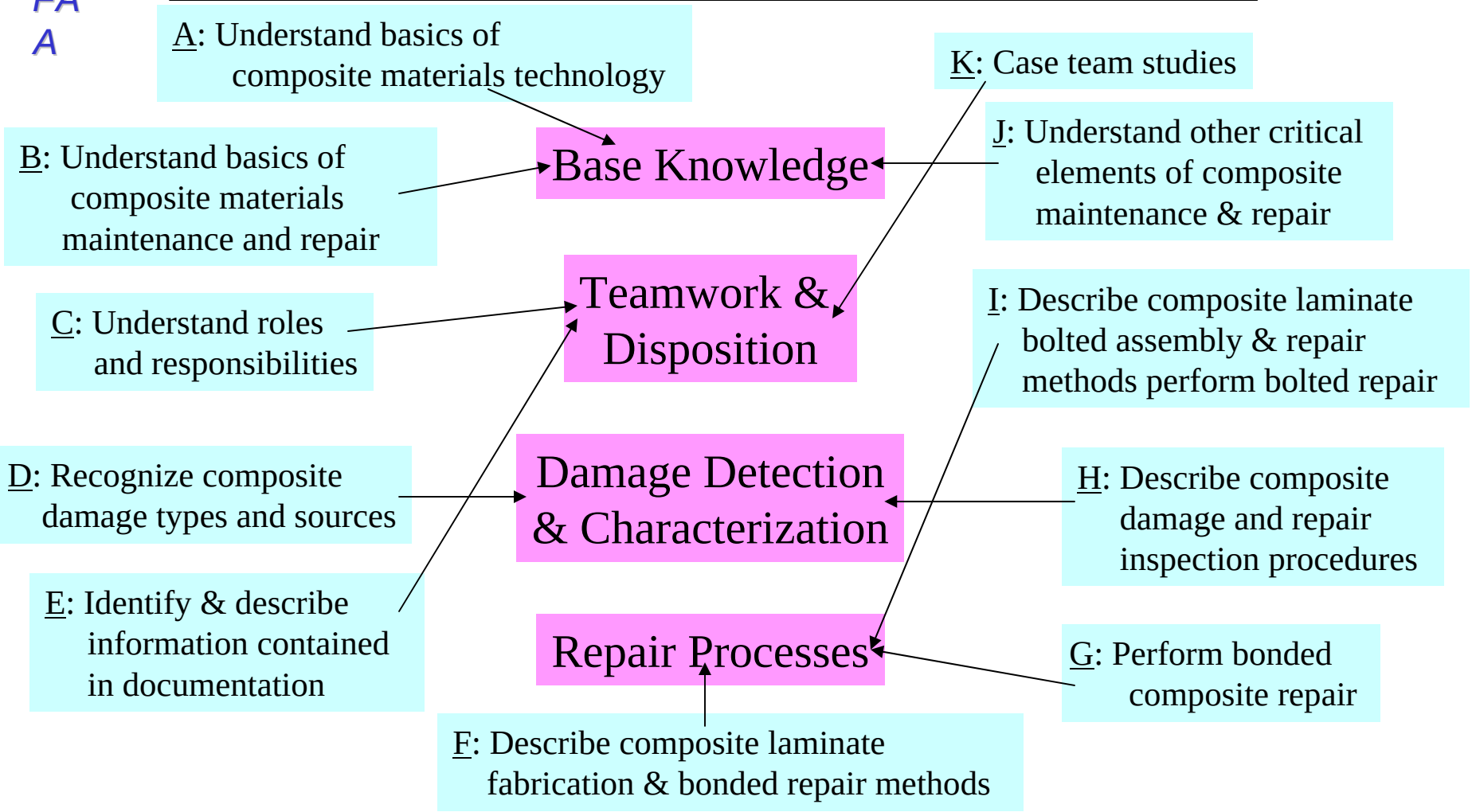

Course Title Contest

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Baseline: Critical Composite Maintenance and Repair Issues

Provide title nominations and your name to Ellen Barker, Kristin Strole or Michelle Thomson by the end of today's workshop