Composite Safety and Certification Initiatives

Federal Aviation Administration

- *Background*
  - *Objectives & approach*
  - *Technical thrust areas*
- *Progress and Plans*
  - *1999 to present*
  - *Future milestones*
  - *AC 20-107B*
- *Review of JAMS*
  - *Assessment of existing projects*
  - *More industry involvement*

Larry Ilcewicz

CS&TA

Federal Aviation Administration

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Ongoing Composite Safety & Certification Initiatives*

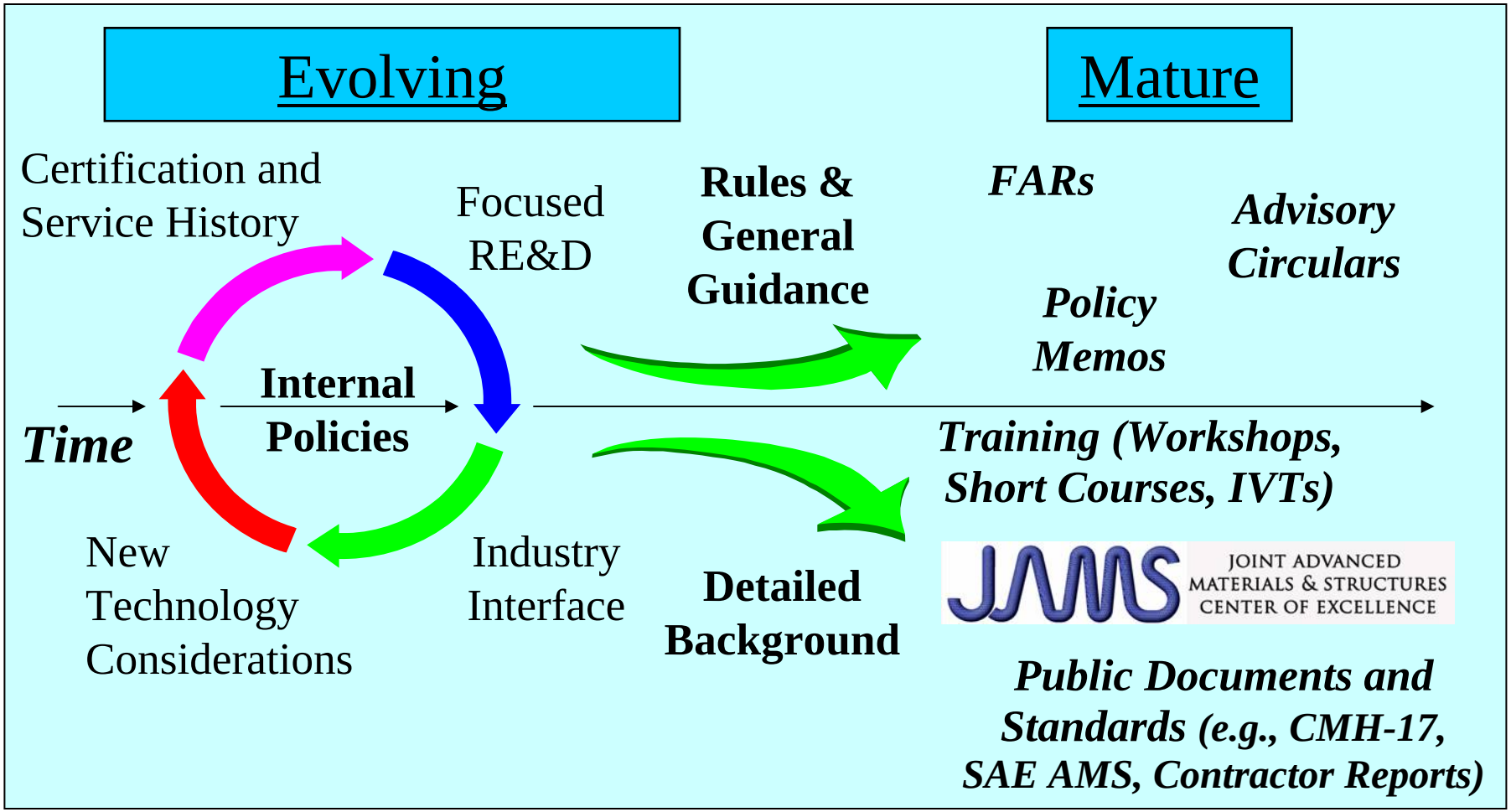
Objectives

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 practices

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

FAA Approach to Composite Safety and Certification Initiatives



Important Teammates

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

Training
Databases
Standardization
Engineering guidelines

- **NASA research and other support**
  - Significant research support since 1970/1980s
  - AA587, A300-600 accident investigation
- **DOD and DARPA research**
  - NCAMP support to material standardization
- **EASA and other foreign research/standardization**

Composite Technical Thrust Areas

Advancements depend on close integration between areas

Material Control, Standardization and Shared Databases

Damage Tolerance and Maintenance Practices

- Critical defects (impact & mfg.)
- Bonded structure & repair issues
- Fatigue & damage considerations
- Life assessment (tests & analyses)
- Accelerated testing
- Structural tear-down aging studies
- NDI damage metrics
- Equivalent levels of safety
- Training standards

Structural Substantiation

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

Progress to Date

- 2 Advisory Circulars
- 6 Policy Memos
- 9 Workshops
- 3 Training Initiatives
- 2 Technical Reports
- CMH-17 Updates
- SAE CACRC Standard
- ~50 FAA R&D Reports

Flammability & Crashworthiness

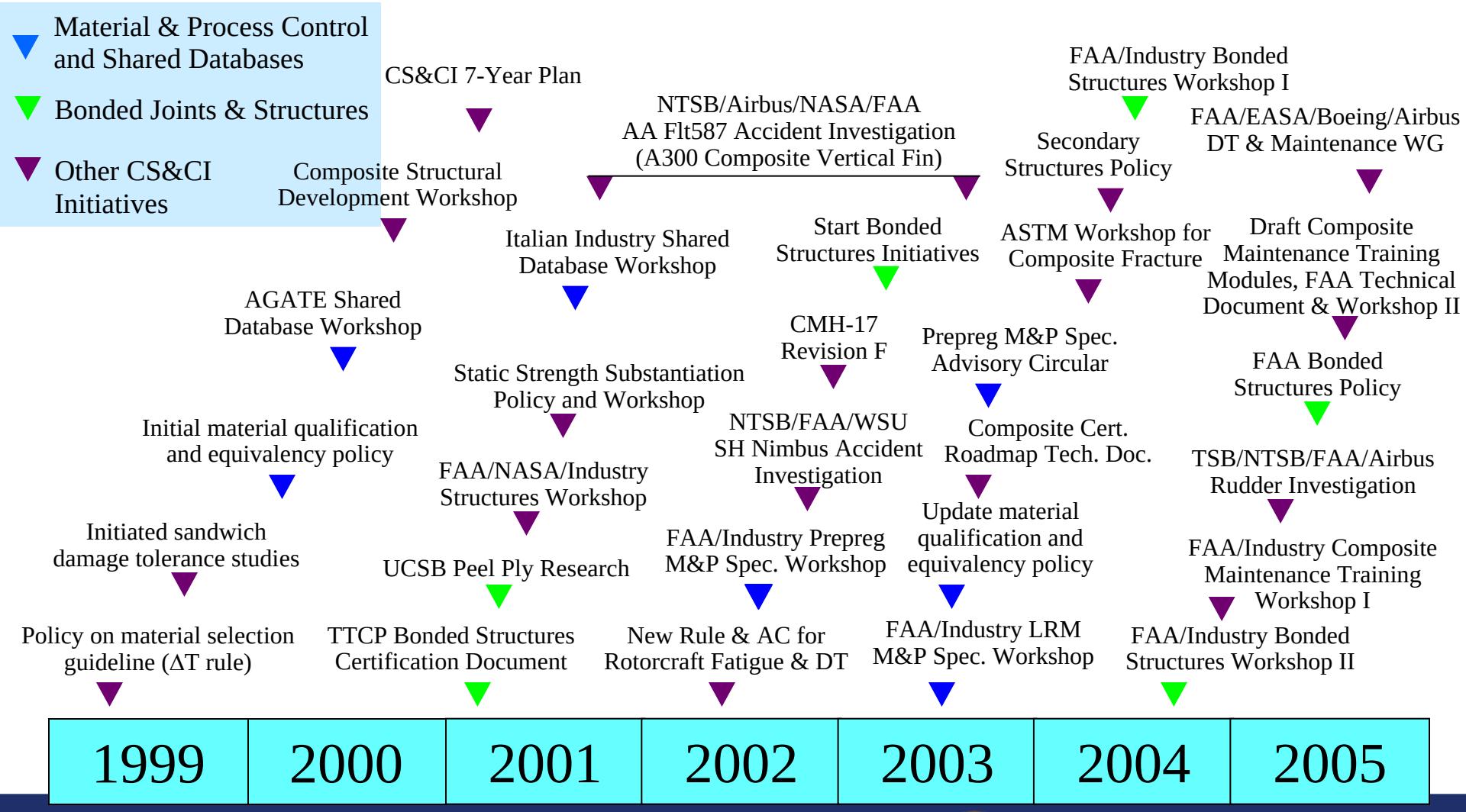
Support to cabin safety research groups

Bonded Joint Processing Issues

Advanced Material Forms and Processes

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

Past Milestones for Composite Safety & Certification Policy, Guidance & Training



Recent Milestones for Composite Damage Tolerance and Maintenance Initiatives

FAA/NRC Workshop (5/04) Composite Maintenance Overview

FAA Seattle Workshop (11/04) Initiate Composite Maintenance Training (CMT)

JAMS CMT Develop. (11/04-7/05) Draft Course Objectives/Modules

FAA/Industry CMT Workshop (9/05) Detailed CMT Review

Airbus/Boeing FAA/EASA Composite Damage Tolerance & Maintenance WG

Toulouse (9/05) Seattle (3/06)

Workshop presentations, recaps and breakout session summaries at: http://www.niar.wichita.edu/niarworkshops/

JAMS CMT Develop. (7/06-6/07)
SAE CACRC Course Standard

FAA/EASA/Industry Damage Tolerance & Maintenance Workshops

Chicago (7/06) Amsterdam (5/07)

FAA/EASA/TCCA WG Draft CMH-17 Certification and Compliance Chapter, V3C3 (9/07)

Ongoing CMH-17 Revision G Developments (2005-2007)

2004	2005	2006	2007

Future milestones for Composite Safety & Certification Policy, Guidance & Training

Release CMH-17 Revision G

- *Advances in statistics, test methods and data reduction protocol*
- *Major Volume 3 re-organization*
- *New Volume 6 (Sandwich)*
- *New certification & compliance chapter*
- *New crashworthiness chapter*
- *New safety management chapter*
- *Updates to damage tolerance & maintenance*

Implement Composite Maintenance Awareness Course

High Energy Blunt Impact Awareness

Release AC 20-107B (Composite Aircraft Structure)

NCAMP shared databases and specifications (CMH-17, SAE AMS)

Additional composite maintenance guidance

Composite damage tolerance guidance & policy

Guidance for new material and processes

Crashworthiness AC

2008	2009	2010	2011	2012

Draft AC 20-107B Outline

1. **Purpose**
2. **Cancellation**
3. **Regulations Affected**
4. **General**
5. **Material and Fabrication Development**
6. **Proof of Structure – Static**
7. **Proof of Structure – Fatigue and Damage Tolerance**
8. **Proof of Structure – Flutter**
9. **Continued Airworthiness**
10. **Additional Considerations**

Appendix 1

Appendix 2

Appendix 3 (EASA CS 25.603, AMC No. 1, Para. 9 and No. 2: *Change of Composite Material and/or Process*)

Draft content for AC 20-107B, created by L. Ilcewicz & L. Cheng

- Most sections expanded significantly
- Some re-organization
- New sections are highlighted in blue

Future plans and schedule milestones for AC 20-107B Development

- **Joint FAA/EASA/TCCA Draft AC 20-107B Development Meetings (Cologne, Germany - 4/08 and Seattle, WA - 6/08)**
- **Joint FAA/EASA/TCCA/Industry AC 20-107B Draft Review Meeting (CMH-17 Meeting, Ottawa, Canada): 8/08**
- **Release updated Draft AC 20-107B to FAA Clearance Record Process: 9/08**
- **Series of industry "town meeting" reviews: 11/08 to 5/09 (draft available for informal review)**
- **Start formal public commenting process (NPRM): 3/09**
- **Official release: 9/09**

Review of Existing JAMS Projects

Overall Grade
B

Convertion of
R&D Results
to Practice
C

Grading Considerations

- Quality of R&D performed to date
- Relationship with safety issues
- Understanding of industry practice and practical needs for application

Areas Needing Improvement

- Researcher involvement in process
  (e.g., CMH-17, CACRC, workshops, standards and course development)
- Proactive industry involvement
- Availability of FAA and industry resources for implementation

Challenges for JAMS
More Industry Involvement

- Help JAMS identify key R&D areas, realizing the need for a safety & certification emphasis
  - Outline existing industry problems and near-term applications
  - Cost sharing partners should have proactive involvement in the initial project definition
- Actively participate in ongoing projects
  - Provide advice/guidance to the PI and researchers
  - Interface with FAA personnel directing the project
  - Help convert results to practice (deliverables to support industry and FAA needs)
- Review JAMS project descriptions and presentations
  - Provide feedback and suggestions for improvement (feel free to "grade" the efforts)