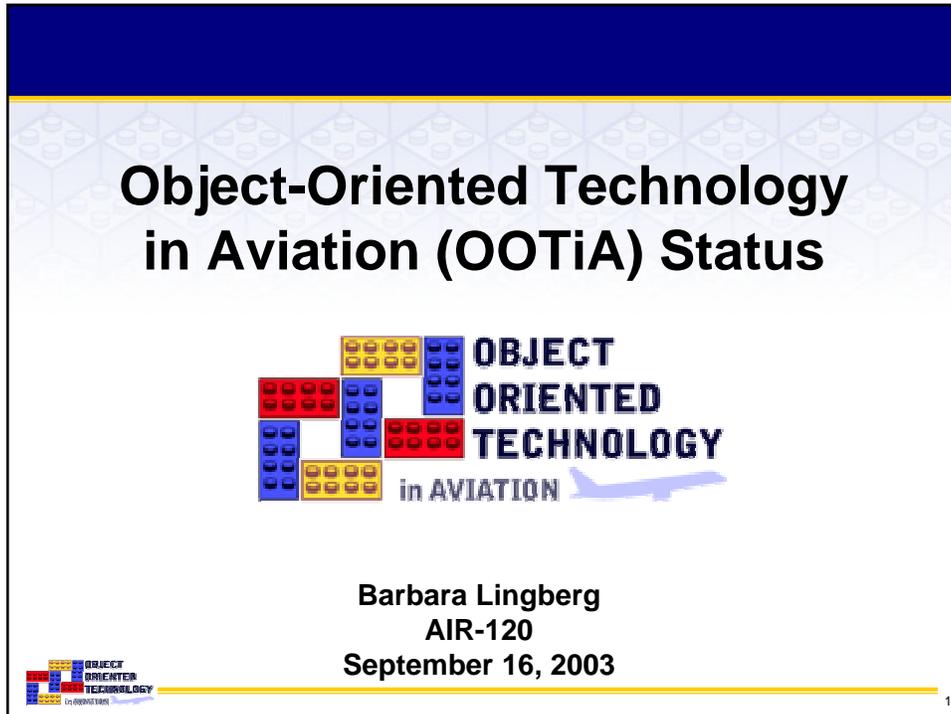


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**Object-Oriented Technology
in Aviation (OOTiA) Status**

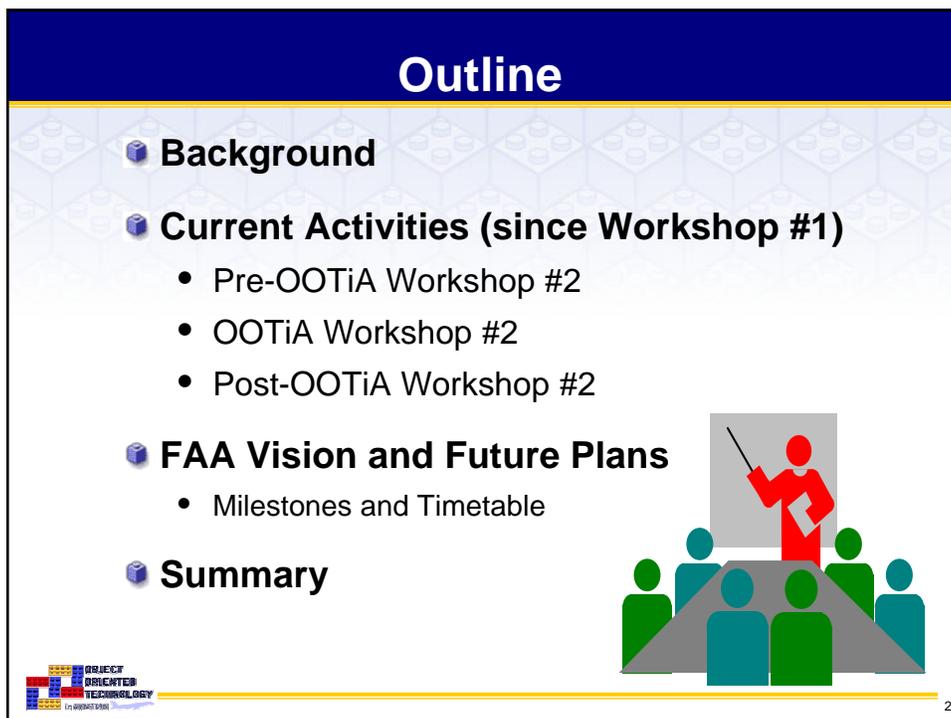


**OBJECT
ORIENTED
TECHNOLOGY**
in AVIATION

Barbara Lingberg
AIR-120
September 16, 2003



1



Outline

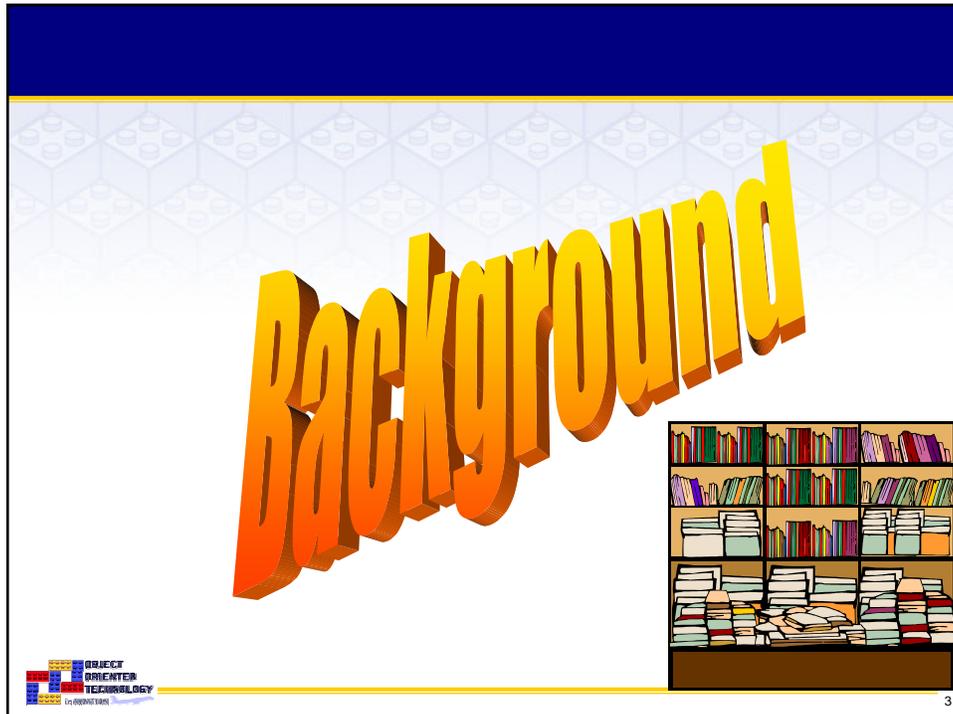
- **Background**
- **Current Activities (since Workshop #1)**
 - Pre-OOTiA Workshop #2
 - OOTiA Workshop #2
 - Post-OOTiA Workshop #2
- **FAA Vision and Future Plans**
 - Milestones and Timetable
- **Summary**



2

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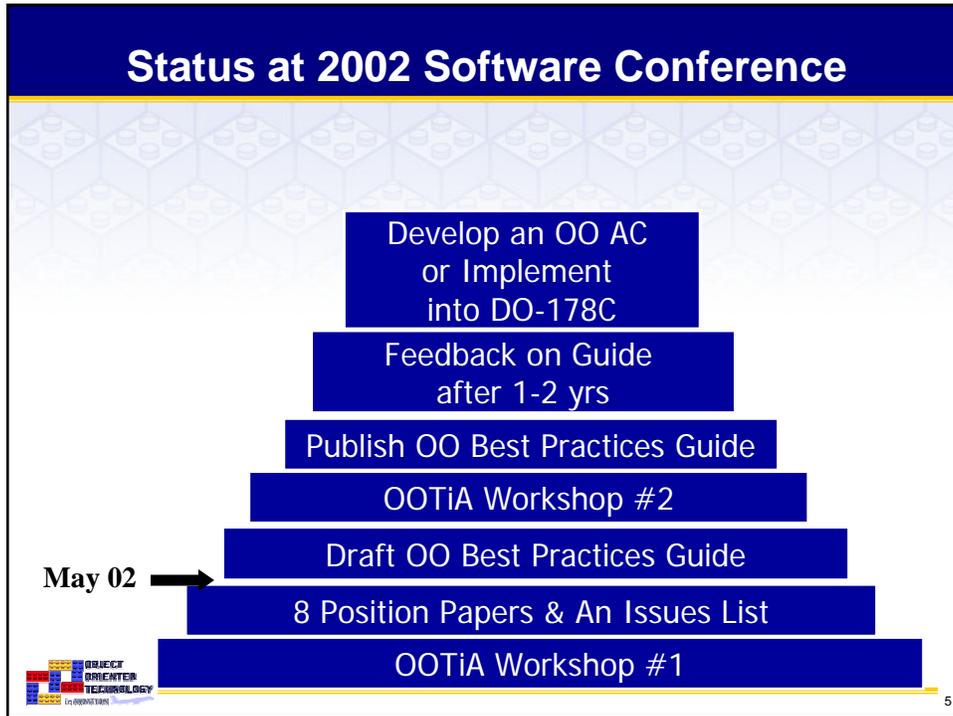
Object-Oriented Technology (OOT) Background

- **OOT is concern for both government and industry**
 - Multiple projects using OOT
 - Specific guidance for OOT lacking
 - **FAA and industry both sponsored research in OOT**
 - Need for guidance identified
 - **Certification Authorities Software Team (CAST) Paper (CAST 8) - *Use of the C++ Programming Language***
 - Served as basis for project-specific Issue papers
 - **FAA and NASA Langley jointly sponsored OOTiA Workshop #1 (April 2002)**
 - Purpose was to identify and document concerns about using object-oriented technology in aviation applications
 - Resulted in:
 - 8 position papers, glossary, and issues list
 - Determined that handbook or workshop proceedings was best approach to document workshop proceedings
- Confirmed need for OOTiA Workshop #2



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Object-Oriented Technology in Aviation Status



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Pre-OOTiA Workshop #2

- Comments provided during and after Workshop #1 were documented
- New issues were accepted on the website
- Papers were updated by workshop committee based on comments and issues list
- New paper was added on Traceability
- Papers were consolidated into OOTiA Handbook
- Handbook (v2.0) distributed to workshop participants on March 5, 2003



7

OOTiA Workshop #2

- OOTiA Workshop #2 held March 25 - 27, 2003
- Workshop Sponsored by FAA and NASA Langley
 - 112 Attendees from industry, academia, government, military
- Purpose:
 - Continue coordination and communication between industry, government, and academia on OOT
 - Continue working safety and certification issues related to using OOT
 - Review and update the handbook chapters “real-time”
 - Reach closure on technical positions in the handbook
 - Document any issues with the handbook
 - Identify issues that may be beyond handbook scope that still need consideration



8

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OOTiA Workshop #2 (cont.)

Session A – 4 breakouts

- Single Inheritance (chapter 4)
- Tools (chapter 11)
- Overloading, Type Conversion, Templates, Inlining (chapters 6-9)
- OOT Considerations Beyond the Handbook

Session B – 4 breakouts

- Multiple Inheritance (chapter 5)
- Reuse and Dead/Deactivated Code (chapter 10)
- Traceability (chapter 12)
- Open Issues

Optional night session to discuss ideas to improve the Handbook

Some materials posted on:

<http://shemesh.larc.nasa.gov/foot/>



9

Post-OOTiA Workshop #2

Additional comments on Handbook were accepted through April 4, 2003

Workshop committee:

- Updated technical positions based on workshop and comment input
- Added guidelines on Structural Coverage
- Evaluated Handbook improvement suggestions to determine packaging and timing of the OOTiA product
- Began draft of Handbook using 4-volume approach

FAA planned to have Handbook update completed prior to annual Conference

- Handbook is still in DRAFT form
- However, breakout session is scheduled at Conference to discuss revised Handbook format and accept comments
- DRAFT version will be provided for breakout session discussion



10

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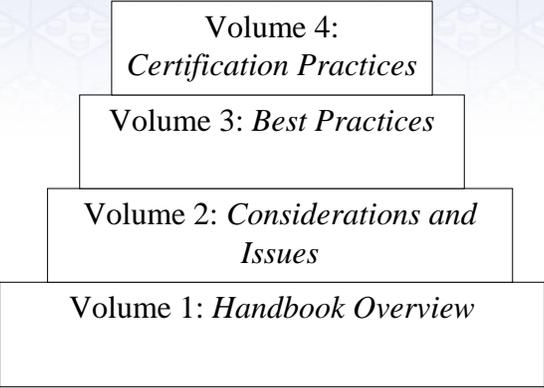
OOTiA Handbook: 4-Volume Approach

- Handbook consists of 4 volumes
- Handbook follows a “tiered” approach
- Volume 1 contains information common to all volumes including:
 - Glossary
 - Acronym List
- Each Volume:
 - Provides the foundation for all volumes above it in the tier
 - Contains its own:
 - References
 - Index of Terms



11

OOTiA Handbook: 4-Volume Approach (cont)



Volume 4:
Certification Practices

Volume 3: *Best Practices*

Volume 2: *Considerations and Issues*

Volume 1: *Handbook Overview*

Tiered Approach



12

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OOTiA Handbook: 4-Volume Approach (cont)

- **Volume 1: Handbook Overview**
 - Target Audience: All Handbook users
 - Provides background and foundational information needed to use all other volumes
- **Volume 2: Considerations and Issues**
 - Target Audience: Project planners, decision makers, certification authorities
 - Poses questions to be answered before committing to OO
 - Presents concerns raised about OOT that are relevant to certification and safety without discussing approaches for addressing these concerns
 - Categorizes, summarizes, and discusses key issues
 - Provides issue rationale and ties to DO-178B life cycle processes



13

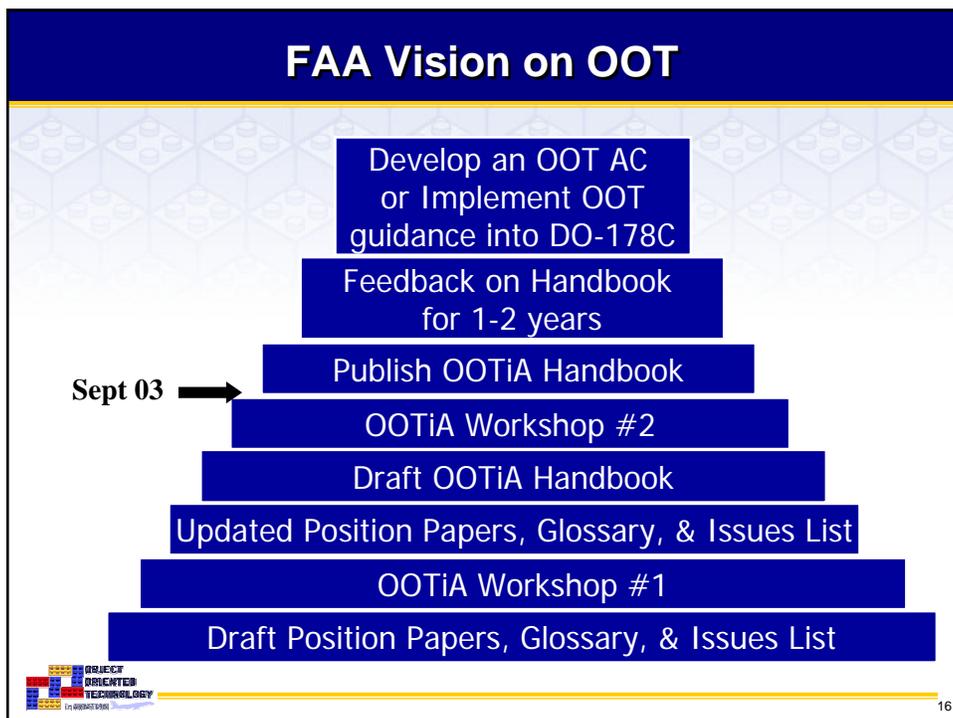
OOTiA Handbook: 4-Volume Approach (cont)

- **Volume 3: Best Practices**
 - Target Audience: Developers, certification authorities
 - Identifies best practices to safely implement OOT in aviation by providing some known ways to address the issues documented in Volume 2
- **Volume 4: Certification Practices**
 - Target Audience: Certification authorities, designees
 - Provides an approach for certification authorities and designees to ensure that OOT issues are addressed



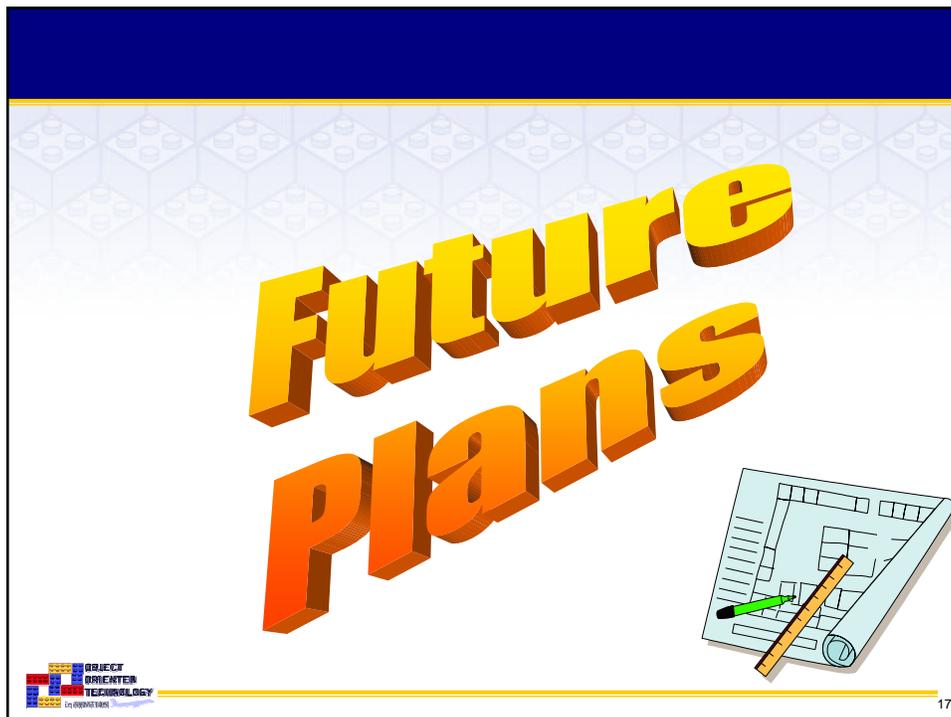
14

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Future Milestones & Timeline

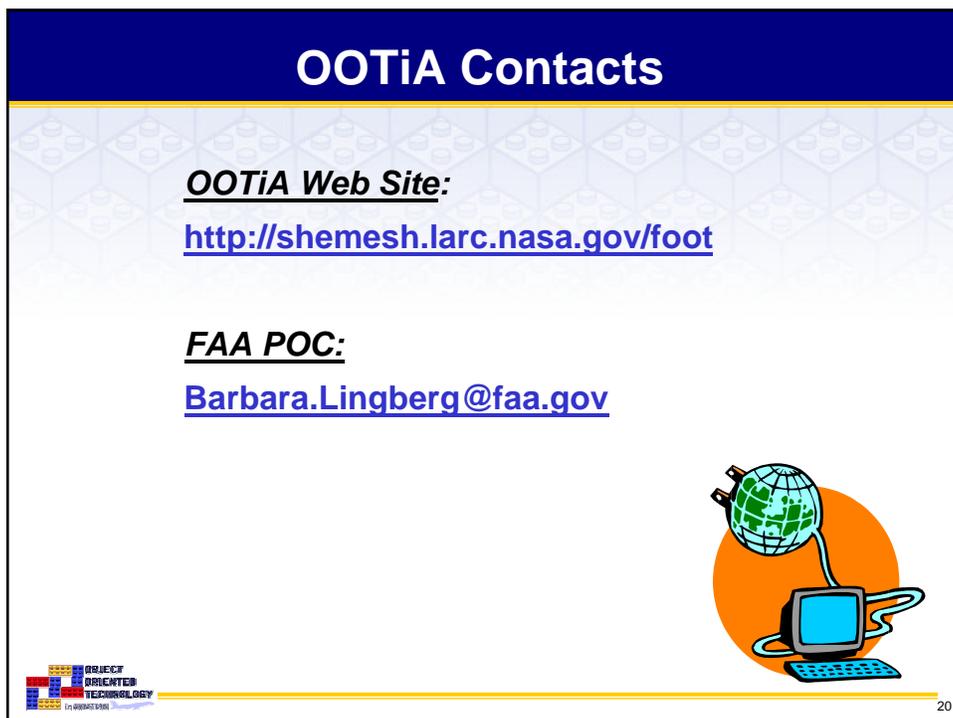
- Complete integration of Handbook Volumes 1 – 4 and send for public review (Nov 03)
- Accept comments (Jan 04)
- Disposition comments (March 04)
- Publish Handbook (June 04)
- Deliver OOT Basics IVT (Nov 04)
- Deliver Prototype Training on OOT (Nov 05)
- Receive Feedback on Handbook Usage (Jun 04 - late 05)
- Determine next approach - AC vs. DO-178C (late 05)

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The slide features a dark blue header. Below it, the word "Summary" is written in large, 3D, yellow-to-orange gradient letters, slanted upwards. To the right of the text is a cartoon illustration of a light blue gift box with red and white stripes and a red bow. In the bottom left corner, there is a small logo for "OBJECT ORIENTED TECHNOLOGY" and the number "19" in the bottom right corner.



The slide has a dark blue header with the text "OOTiA Contacts" in white. Below the header, the text "*OOTiA Web Site:*" is followed by the URL "<http://shemesh.larc.nasa.gov/foot>". Below that, the text "*FAA POC:*" is followed by the email address "Barbara.Lingberg@faa.gov". In the bottom right corner, there is a cartoon illustration of a computer monitor and keyboard with a globe on top. In the bottom left corner, there is a small logo for "OBJECT ORIENTED TECHNOLOGY" and the number "20" in the bottom right corner.

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Summary

- We recognize need for OOT guidance and are working toward both near- and long-term solutions
- We will provide the OOTiA Handbook to the public for one more review before it is published
 - OOTiA Workshop Participants
 - Master Software Distribution List
 - Certification Authorities Software Team (CAST)
- We do not plan to call this product out via AC, Notice, or Order.
- We're striving to safely address and enable use of OOT in aviation software



21

Big Thanks!

Thank you to:

- Workshop committee

Gary Daugherty

Salah Obeid

Dennis Wallace

Wayne Schulz

Jeff Knickerbocker

Brenda Ocker

Tom Rhoads

John Chilenski

John Lewis

Leanna Rierson

Chuck Kilgore

Will Struck

Kelly Hayhurst



22

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Big Thanks!

Thank you also to:

- Participants of both Workshops
- NASA Langley for sponsoring the Workshops



Any Questions?



23