

# FAA National Software Conference, June 2001

## Aging of DO-178B

### How The Aging of DO-178B Impacts DERs

---

Presenter: Michael D. Herring  
Rockwell Collins

### Overview

---

- This presentation is based on formal and informal discussions and conversations with both DERs and Aviation Software Practitioners from a variety of backgrounds.

# FAA National Software Conference, June 2001

## Aging of DO-178B

### Why Is This A Topic?

- Time for Reflection:
  - Why Should We Reflect On The Past?
  - Why Did We Start Down This Path?
  - How Did We End Up Here?
  - Are Today's DER Concerns The Same As Yesterday's?
  - Conclusion
  - Comments

### Why Should We Reflect On The Past?

- The past is not well documented.
- Many of the DERs and software practitioners in the Aviation business have only experienced DO-178B. Without some knowledge of the history, the probability of repeating mistakes increases.
- Do we understand our initial objectives?

# FAA National Software Conference, June 2001

## Aging of DO-178B

### Why Did We Start Down This Path

#### ■ DO-178( ) History

- Pre DO-178 - Software isn't a "part" so we don't have to worry about it.
- ⇒ Historically safety analysis focused on the component failure rate of mechanical or hardware "parts". Software doesn't have any parts, so how do we evaluate software safety?

### Why Did We Start Down This Path (cont)

#### ■ DO-178( ) History

- DO-178 (1981) - Although software isn't a "part", design errors are a concern and we should do something.
- ⇒ DO-178 embraced the concepts that reviews, testing, Sw Quality, and Sw Config Mgmt were important aspects to ensuring software safety.

# FAA National Software Conference, June 2001

## Aging of DO-178B

### Why Did We Start Down This Path (cont)

#### ■ DO-178( ) History

- DO-178A (1985) - Everyone seems to be doing a different something. How can this be?

- ⇒ Software complexity continued to increase. The processes outlined in DO-178A did not accommodate the rapidly increasing software complexity.

- DO-178B (1992) - Today's State

### How Did We End Up Here?

- Reflecting back on the path we've traveled, the primary driver has been to ensure safety is adequately addressed in an environment of rapidly increasing software complexity and content. But why was software safety such an issue?

# FAA National Software Conference, June 2001

## Aging of DO-178B

### How Did We End Up Here? (Cont)

- Realization that the historical approach of focusing on mechanical and hardware component failure rates to determine safety is fundamentally flawed in the current environment.
  - ┆ Component failure rates have improved dramatically over historical levels.
  - ┆ Simultaneously, design complexity dramatically increased. Thus design issues have increased in importance.

### How Did We End Up Here? (Cont)

- Throughout the DO-178( ) evolution, the focus has been to establish a process capable of addressing the safety aspects of software.
  - Does DO-178B adequately address these safety issues?
    - ⇒ DO-178B has been definitely more adaptable to software industry changes than it's predecessors.

# FAA National Software Conference, June 2001

## Aging of DO-178B

### Are Today's DER Concerns The Same As Yesterday's?

- Initial practitioner reaction to DO-178B was confusion.
  - Initially, projects struggled to understand the basic philosophy of DO-178B. The project confusion caused significant obvious issues in submittals. DERs had a role in teaching the meaning of DO-178B. Most issues could be identified by reading the submittal package.

### Are Today's DER Concerns The Same As Yesterday's?

- As DO-178B became more widely understood, the amount of significant confusion diminished.
  - The majority of issues became more subtle and considered a misinterpretation of the details. Regulatory industry helped clarify issues with DO-248 and numerous notices. Most issues continued to be identifiable during a submittal package review.

# FAA National Software Conference, June 2001

## Aging of DO-178B

### Are Today's DER Concerns The Same As Yesterday's?

#### ■ Today's State

- Although some projects continue to struggle with the basic philosophy of DO-178B and others are trying to understand the details, many projects have a solid understanding of DO-178B. So now that many projects appear to understand DO-178B, how has the DER role been impacted?

### Are Today's DER Concerns The Same As Yesterday's?

#### ■ Has the DER role been impacted?

- Software development processes are significantly better understood. DER's role of teaching DO-178B concepts are reduced.
- In the past, DERs frequently needed more life cycle details than was provided. Now projects often provide more details than necessary. This impacts a DER in terms of time and clarity.

# FAA National Software Conference, June 2001

## Aging of DO-178B

### Are Today's DER Concerns The Same As Yesterday's?

- What does this mean to a DER.
  - Because of increased equipment complexity the DER frequently has more material to go through as part of a submittal.
  - The DER has to question the details in the submittal package more today.
    - ┆ Example: On a minor modification, "were any requirements actually captured during this development?"

### Conclusion

- As DO-178B ages, there is an impact on the DER's role.
  - Less emphasis on the process champion role and more emphasis on the oversight role.
  - As equipment complexity increases and development cycle time is reduced, DER involvement needs to be on a more continuous basis and less focused on major milestone audits.

# FAA National Software Conference, June 2001

## Aging of DO-178B

### Conclusion (cont)

- As DO-178B ages, there is an impact on the DER's role. (cont)
  - Consider the correlation between software DER role just described and our mechanical or hardware (rivet & bolts) DER associates.
    - | Process changes are important, but occur less frequently and therefore are a reduced issue.
    - | Ensuring that the approved process is properly applied over time will become the primary focus.

Comments?