

Consideration of STAMP-STPA in Civil Aviation

2021 STAMP Workshop

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Date: June 28, 2021



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Presentation Objectives

- **Summarize safety process improvement recommendations**
- **Request commercial aviation industry's experience in using STPA (or other tools/methods) in product development and system safety assessments**
 - Voluntary
 - All information will be treated as confidential
 - All information will be 'sanitized' if used by FAA in future guidance materials

Safety Process Recommendations / Mandate Summary

- **Multiple independent accident safety reviews, mandates, and recommendations**
 - Common themes
 - System Safety Process
 - Human Factors – Safety Integration
 - Guidance Material
 - Certification Processes
 - FAA Oversight

Recommendations Summary

- **System Safety Process**

- Develop, validate, and implement design and analysis models, methodologies, and approaches capable of identifying interactions among complex systems

- **Human Factors – Safety Integration**

- Develop methods/tools - validating assumptions about pilot recognition and response to safety-significant failure conditions
 - Working together with industry
- Promote consistent use of systematic analysis of Human Performance and Error Assessments to compliment System Safety Assessments

Noted Common Deficiencies from “Reviews”

- **Inadequate analysis of failure scenarios which result in multiple flight deck effects**
 - Cascading effects of a single failure
- **Incomplete understanding of automated systems effects on human performance**
- **Functional Hazard Assessment**
 - Identified assumptions of flight/ground crew actions not comprehensively validated in operational environments
 - Awareness of system behaviors
 - Pilot training
 - Pilot skills
 - Maintenance process
 - Potential incomplete functional hazard lists

Industry Outreach

- **What are current industry best practices for evaluation of complex systems and human factors that can be used in conjunction with system safety process?**
- **Does industry have recommendations to close gaps identified by independent safety process reviews?**

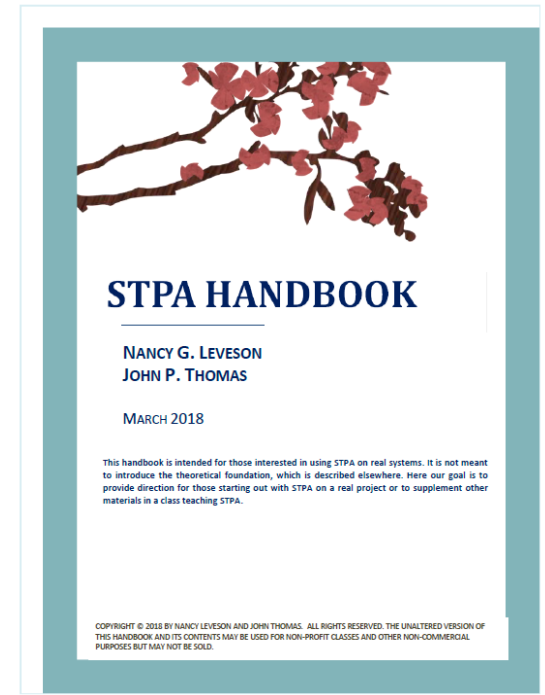
Industry Outreach

- **What methods, processes, tools will address human-factor analysis gaps?**
- **Are there complementary human factor methods /tools /processes which may be integrated into the safety assessment continuum?**
- **What methods, processes, tools will enhance complex system analyses?**



STPA Encouraging Constructs

- **Complex systems can be analyzed**
- **Includes planned implementation and human operators in the analysis**
- **Easily integrated into system engineering / model-based system engineering development strategies**



FAA Outreach

- **Seeking innovations in system safety analysis techniques and testing methods for human / machine interface and integrated or automated (i.e. complex) systems**
 - Evaluate new techniques (e.g. MIT's System-Theoretic Process Analysis (STPA)) that can augment/improve current System Safety methods, particularly in the effort to understand the role of human performance / human errors
 - Identifying methods for defining mission-representative test conditions to uncover workload and integration issues when the aircraft operates with normal/full-up configurations and when in failed conditions

STPA Consideration by Industry

- **Encourage wider application and evaluation of the STAMP-STPA methodology**
 - Apply to new projects (TC, STC)
 - Expand applications in civil aviation
 - Provide FAA feedback on lessons learned
 - What works well, what doesn't
 - Both good & bad lessons important
 - Establish a basis for FAA consideration of the technique for certification

Conclusion

- **Civil aviation needs an integrated human factor – safety assessment analytical methodology in addition to traditional pilot-in-the-loop evaluation / testing**

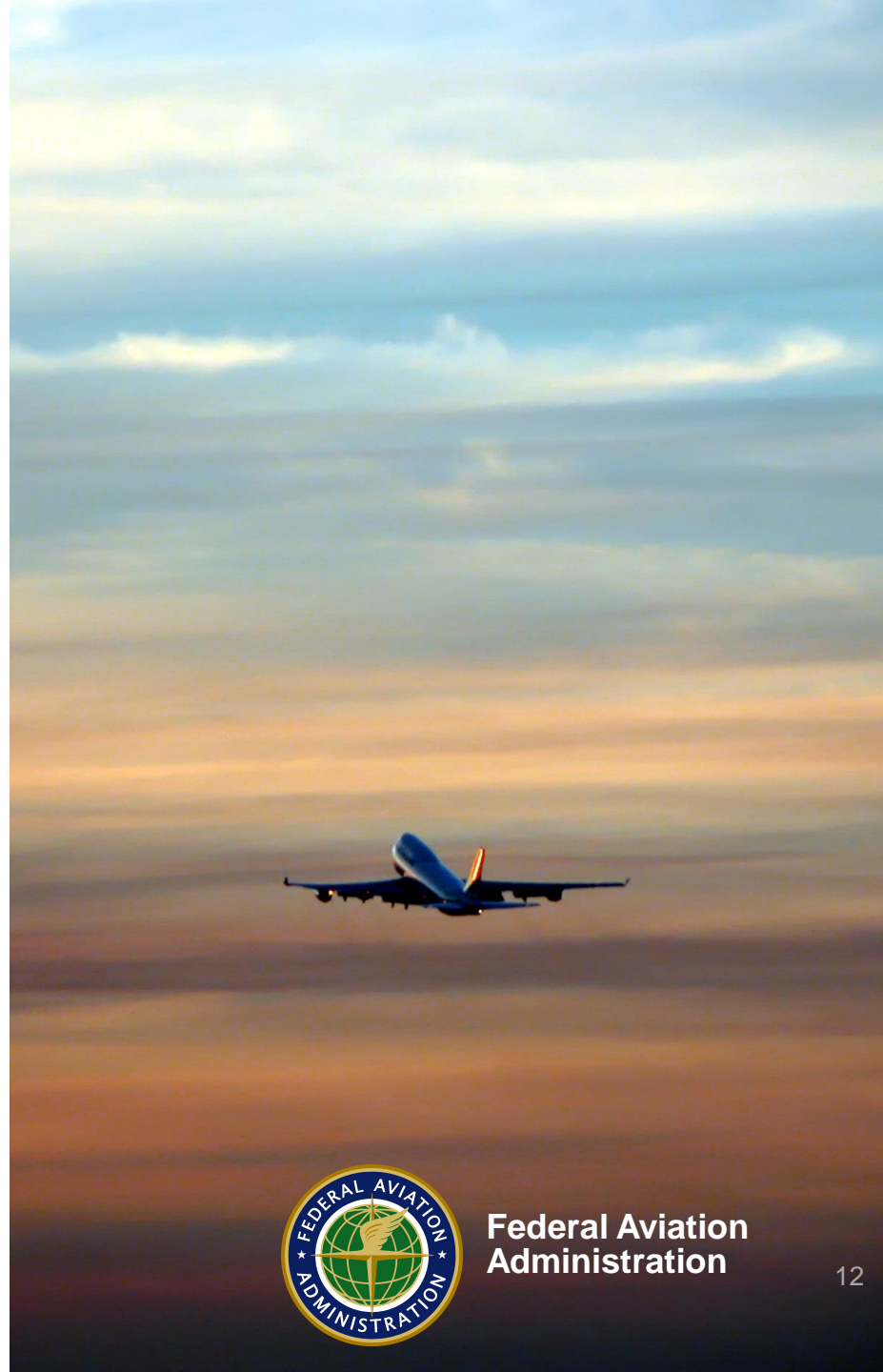
- **STPA may be an one approach to address the method / tool needs**
 - Need experienced, empirical data to accomplish

Thank You for your attention

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