Overview:
Cargo Safety Enhancement Standards and ICAO SCG-SWG

2023 TSO Workshop – Denver, CO

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Topics

- Cargo TSO Overview
- Fire Resistant Containers (FRCs) and Fire Containment Covers (FCCs)
- Standards and Policy Updates
- Research Update
- Release of SAIB 2023-06
- ICAO Cargo Activities
- Relevant Links

Cargo TSO Overview

- **FAA has developed Technical Standards Orders (TSOs) for several articles**
  - Many TSO approved articles are installed on an aircraft
  - Most cargo-related articles are not installed
- **Cargo TSO Summary**
  - TSO-C90 ULDs
  - TSO-C203 Fire Containment Covers
  - TSO-C172 Cargo Straps
  - TSO-C202 Cargo Stoppers

What is a ULD?

- **Unit Load Device (ULD) is a pallet and net combination, or a container**
- **Device to contain and carry cargo**

ULDs and FRCs

- **FAA has issued TSO-C90 for ULDs**
  - Past revisions focused on structural integrity and basic flammability requirements
  - Latest revision “E” includes a Fire Resistant Container (FRC) Standard
- **Meeting the TSO**
  - Aircraft Weight and Balance Manuals (part of the Aircraft Flight Manual) refer to the ULDs in TSO-C90 (and its associated standards) as operating limitations
    - This reference is structural in nature, only
    - Cargo Containment Devices are not installed equipment (not part of the aircraft)

Fire Resistant Containers (FRCs)

- **ULDs whose panels and doors are typically made out of fire resistant materials**
- **Suppress fires through oxygen starvation**
- **Considered a risk mitigation for certain fires**
- **SAE AS8992 is the design and testing standard for FRCs**
  - Tested to a Class A fire (ordinary combustibles such as wood, paper and fabric)
  - TSO-C90e refers to this standard
- **Currently used on a voluntary basis as an extra layer of fire protection**

Fire Resistant Containers (cont.)

- **Often used in Class E cargo compartments**
- **An FRC tested to AS8992 / TSO-C90e may contain fires involving limited amounts of Li-Batteries**
- **FAA is working with SAE and Underwriter Laboratories to:**
  - Develop challenge fires that address threats posed by Lithium Batteries

Fire Containment Covers (FCCs)

- **FCC is a fire-resistant cover designed to contain fires and starve a fire of oxygen**
  - FAA has issued TSOs for FCCs (TSO-C203)
    - Non-Structural
  - TSO levies SAE industry standard AS6453
  - Tested to a Class A fire (ordinary materials)
- **Meeting the TSO is not required**
- **Integrated with net or separate**
- **Considered a risk mitigation for *certain fires***

Fire Containment Covers (cont.)

- **Aircraft Weight and Balance Manuals and Aircraft Flight Manual do not currently address Safety Enhancing Equipment (voluntary)**
- **FCC tested to AS6453 / TSO-C203 may contain fires involving limited amounts of Li-Batteries**
- **FAA is working with SAE and Underwriter Laboratories to:**
  - Develop challenge fires that address threats posed by Lithium Batteries

Summary: FRC and FCC Standards

- **TSO-C90e Unit Load Devices**
  - Released July 2021
  - Leverages SAE AGE-2 Standard AS8992 “Fire Resistant Container Design, Performance and Testing Requirements”, October 2020
- **TSO-C203 Fire Containment Covers**
  - Released July 2014
  - Leverages SAE AGE-2 Standard AS6453 “Fire Containment Cover – Design, Performance, and Testing Requirements”, August 2013
  - In process of updating to incorporate AS6253A
- **Future versions of both TSOs will potentially include lithium battery challenge fires**

Standards & Policy Updates

- **Attachment and Integration of Active Devices to ULDs**
  - FAA Order 8150.4 addresses the attachment of systems for controlling container temperature
  - Approach needs to be updated to include:
    - Tracking Devices
    - Active Fire Suppression Systems
- **Challenge Fires that Include Lithium Batteries**
- **Active Fire Suppression in ULDs**
  - Underwriter Laboratories UL5810

Clarification from TSO to AS

- **TSO Section 4.19 Device Illumination:**
  - TSO: Addresses illumination per § 25.813 & safe evacuation in normal manner
  - AS Section 4.6.6: Same as TSO but added information on components of the emergency lighting system, including batteries, wiring, relays, lamps, and switches shall be capable of normal operation after having been subjected to the inertia forces listed in § 25.561(b) in accordance with § 25.812(k)

Current Tech Center Research

- **Interactions with aircraft fire detection and suppression**
- **Sensors that improve situational awareness related to fires in containers or on pallets**
- **Ongoing battery and containment research**
- **Additional representative challenge fires**
  - Mixed Hazmat with Ordinary Materials
  - Lithium Battery Fire Vent Gases can create a flammable/explosive environment in enclosed spaces, including ULDs

Release of SAIB 2023-06

- **“Risk of Uncontrolled Fire Incidents Caused by Aircraft Cargo” dated April 4, 2023**
- **Re-iterates the safety issue to a broader audience**
- **Educates the aviation community regarding**
  - Safety enhancing technologies under development
  - Forums they can participate in
  - Expectations for operators to understand the capabilities and limitations of their aircraft
  - Information operations should consider when deciding what to carry

What is an SAIB?

- **An information tool that alerts, educates, and makes recommendations to the aviation community**
- **Contains non-regulatory information and guidance that does not meet the criteria for an Airworthiness Directive*, i.e., there is not an unsafe condition***
- **Guidance (for FAA employees) on when to develop an SAIB is provided in FAA Order 8110.100**

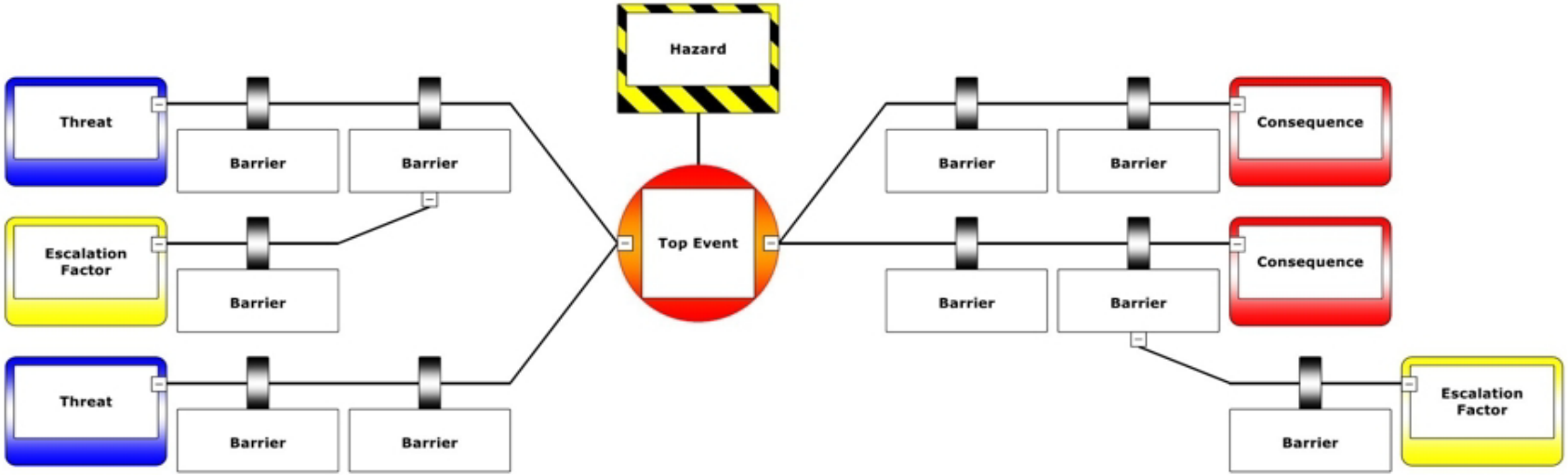
ICAO Safe Carriage of Goods Specific Working Group (SCG-SWG)

- **Formed in December 2020**
- **Continuation of a prior group that was formed to address specific safety issue**
- **Addresses the need for a cross-disciplinary approach to solving cargo issues**
  - Airworthiness of Aircraft
  - Properties of Hazardous Materials
  - Operational Issues

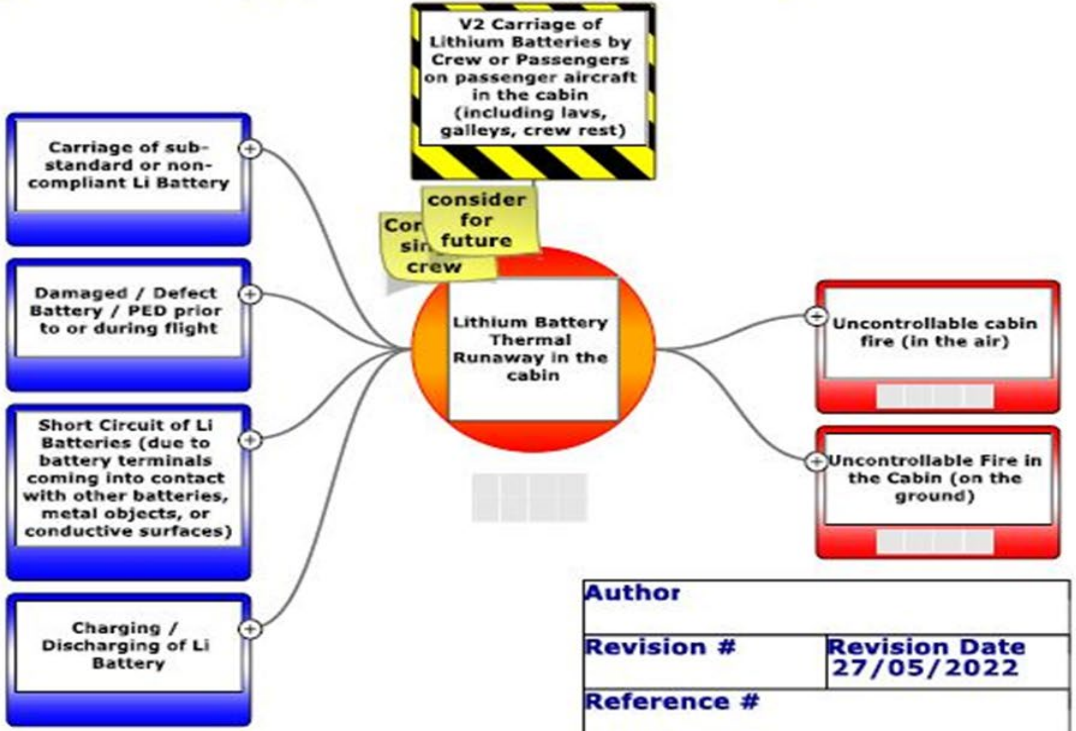
ICAO Safe Carriage of Goods Specific Working Group (SCG-SWG) [cont.]

- **Current Focus: Two "Job Cards" from the Air Navigation Committee**
- **Job Card 2**
  - Studying Supply Chain Issues and potential mitigations (screening, training)
- **Job Card 3**
  - Current provisions for dealing with passenger and operator Portable Electronic Devices (PEDs) may not be sufficient
  - Cabin
  - Cockpit
  - Lower Deck (Checked Baggage)

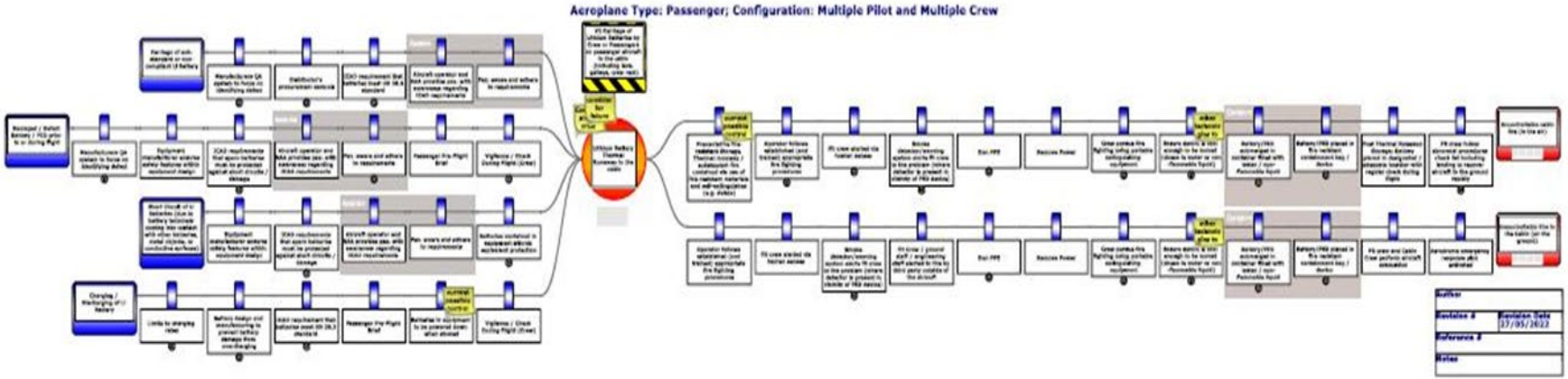
Risk Analysis Tool: “Bowtie XP”



Aeroplane Type: Passenger; Configuration: Multiple Pilot and Multiple Crew



View #2 – Controls



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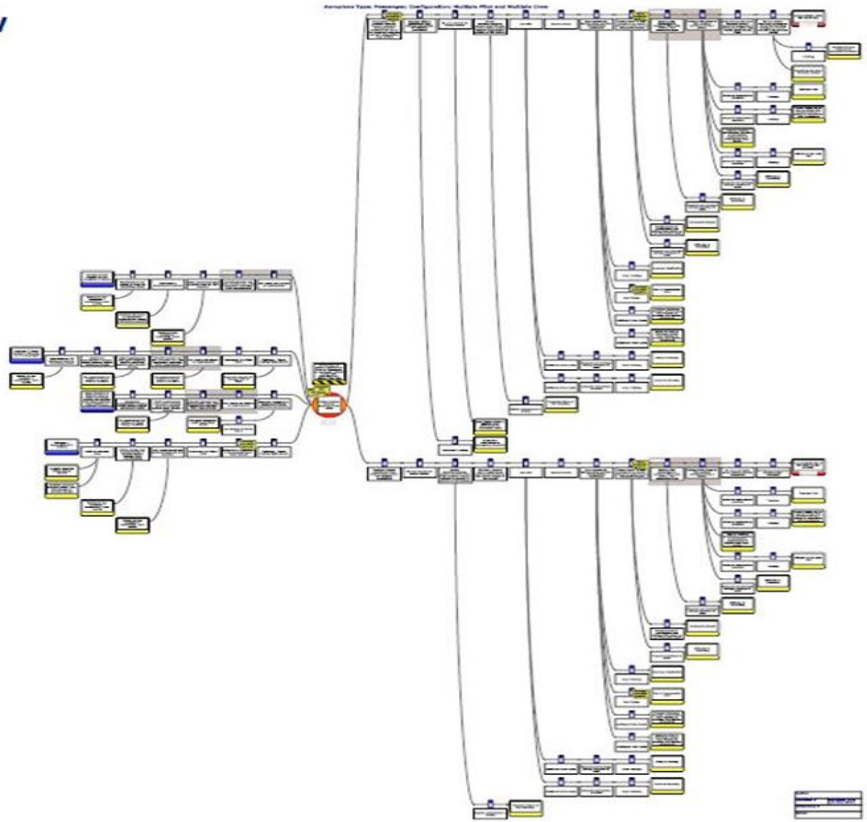
View #3 – Full View



Relevant Links

To get involved in ULD/FCC/FRC standards development:

SAE AGE-2 Air Cargo Committee

www.sae.org/works/committeeHome.do?comtID=TEAAGE2

To get involved in Underwriter Laboratories "active" fire suppression standards: email Susan.P.Malohn@ul.org

To stay up-to-date on research and guidance related to mitigating cargo hazards:

FAA Cargo Fire Safety Website

www.fire.tc.faa.gov/cargosafety

FAA Fire Safety Research Site

www.fire.tc.faa.gov

FAA Cargo Safety Website (higher level guidance)

www.faa.gov/aircraft/safety/cargosafety

Questions?

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