Future Challenges for the Research and Regulatory System

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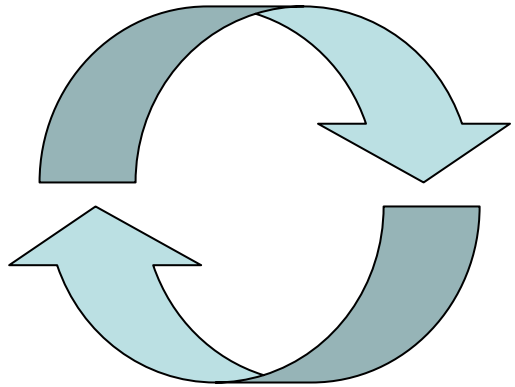
FAA's Safety Life-Cycle Responsibility

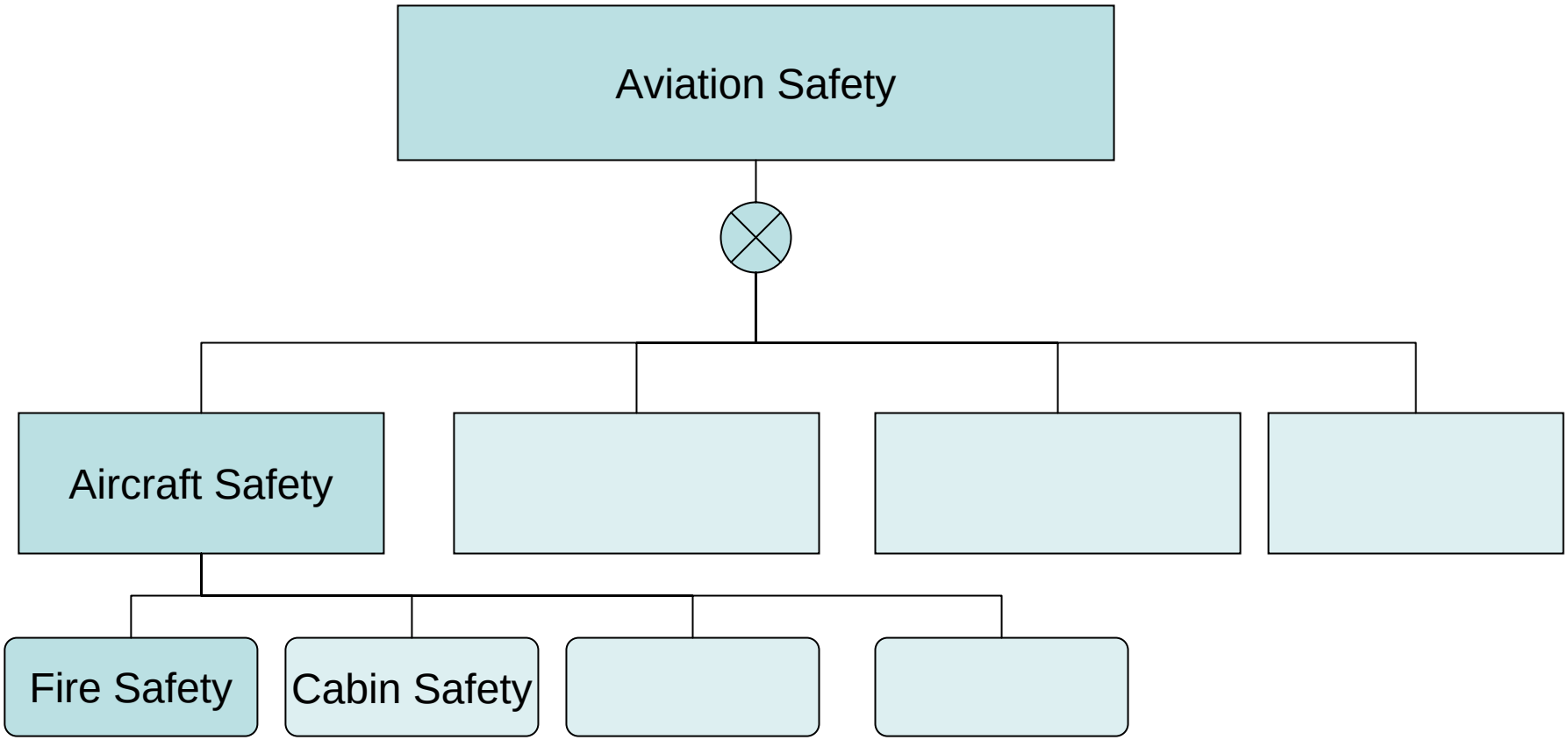
- **Threat identification**
- **Prioritization**
- **Mitigation research**
- **Implementation**
- **Assessment**



Research is Foundation of New Requirements

- **New requirements evolve from many different drivers**
  - New technology
  - Service experience
  - Emerging threats
  - Improvement in state of the art
- **Research is linked to safety and regulatory support**
  - What to do
  - What not to do

Identification and prioritization



Researchers and Regulators Work Together

- **Earliest stages of new requirements**
- **Research is geared to support safety standards**
- **Useful research leads to better standards**

Challenges Come from Different Places

- **Technology: Regulations ‘assume’ certain technological norms (e.g., materials or configuration)**
- **Threats: New sources of safety risks can arise (e.g., security concerns)**
- **Environment: Changes in exposure to risk (e.g., Volume of air traffic or types of airplanes)**

Technological Changes (many improve safety)

- **Composite Airframe:**
  - Crash dynamic behavior
  - Fire safety in post-crash or in-flight scenarios
- **Magnesium Alloys**
- **Automation:**
  - Evacuation systems
  - Exit operation
  - Seating
- **Power technology**
  - Lithium ion batteries
  - Fuel cells

Threats are evolving

- **Security traditionally removed from aviation safety**
- **Security is now more integral with classical safety considerations**
- **Carry-on items evolving to contain potentially hazardous materials**

The Environment is different

- **Added capacity increases exposure to a given event**
- **Safety level is very good, making each incident more prominent**
- **Each successful safety innovation tends to mute the effectiveness of the next one, i.e., fewer benefits available to be realized**

Realities

- **Technology moves faster than the pace of regulation**
  - Special Conditions become necessary
  - Criteria lag the design
- **There is a limited capacity to process regulatory changes**
- **Each generation of airplane has a better safety record than the previous generation**

Example:

The Use of Magnesium in Airplane Interiors

Magnesium Use in Aircraft Interiors

Drivers for Industry:

Reduced weight

Improved Fire Resistance – New alloys / coatings

Magnesium Use in Aircraft Interiors

Possible Locations of Magnesium Use

- seat components
- overhead ducts
- galley components
- lavatory components
- floor components, seat track

Magnesium Use in Aircraft Interiors

? Do present standards address its usage ?

No!

The Use of Magnesium in Airplane Interiors

Prioritize Research Based On Need.

Need By Usage Area.

Seats First ?

Industry must participate and contribute resources, i.e., Magnesium is not a safety *enhancement*—its benefits are economic

Magnesium Use in Aircraft Interiors

Researchers and Regulators Work Together To Develop Plan

Work Together With Industry & Other Authorities Through the International Aircraft Materials Fire Test Working Group

Magnesium Use in Aircraft Interiors

Potential Threats:

In-Flight

- Electrical Arc
- Adjacent Hidden Fire
- O_2 canister fire
- Consider terroristic threat?

Magnesium Use in Aircraft Interiors

Potential Threats:

Post crash

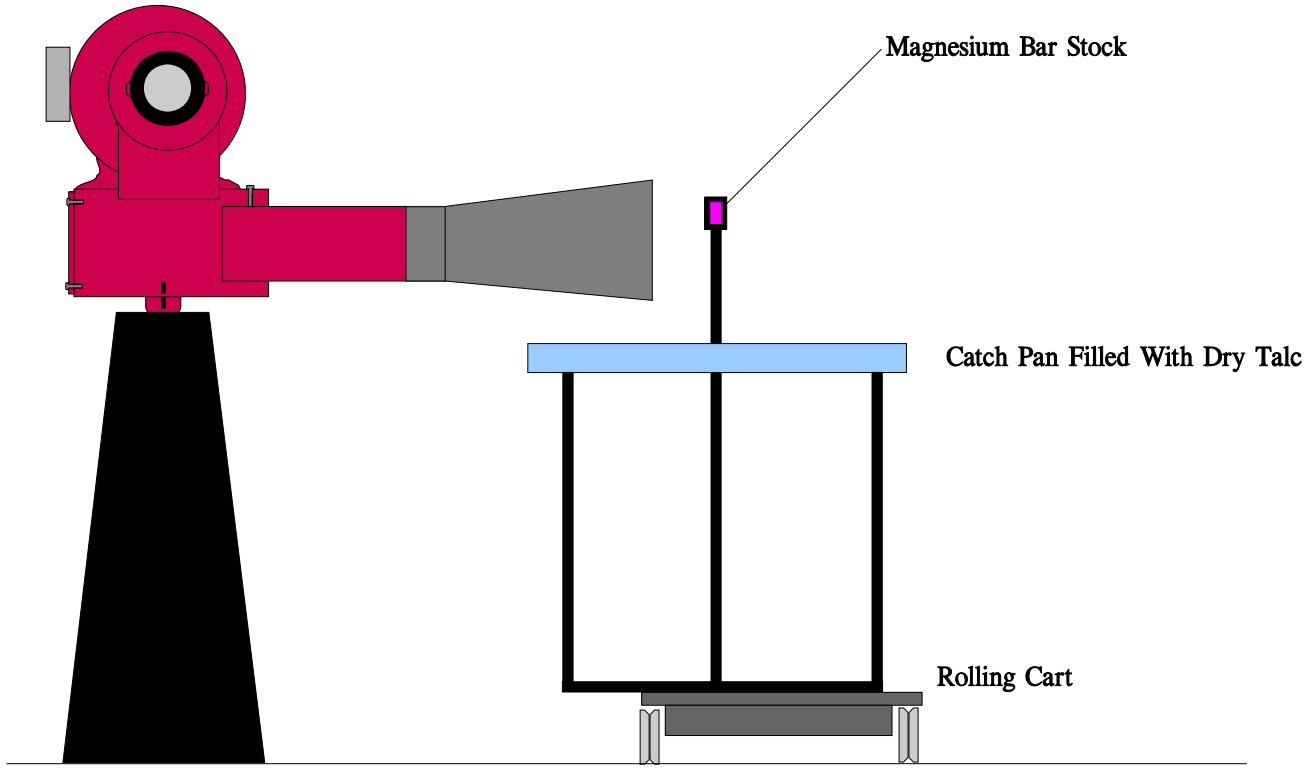
External fuel fire entering cabin

Safety of passengers

Safety of firefighters?

The Use of Magnesium in Airplane Interiors

Feasibility Testing:



Magnesium Use in Aircraft Interiors

Development of Test Protocol :

- Clearly defined threat
- Full-scale test findings
- Lab-scale test development

Magnesium Use in Aircraft Interiors

Development of Test Protocol:

- Post crash Test
  - Oil burner apparatus, what heat flux?
  - Duration of test, 2-min or 5-min?
  - Size, shape of test sample?
  - Pass/Fail criteria?

Magnesium Use in Aircraft Interiors

Coordinate Test Method Development:

CSRTG

IAMFTWG

Magnesium Use in Aircraft Interiors

Begin Process Again If Needed

Next Usage Area

Magnesium Use in Aircraft Interiors

Continue R&D and Coordination During Implementation Phase of New Test Method.

Looking to the future

- **Prioritization of resources is essential**
- **Awareness of new technologies and design practices in advance of implementation is key**
- **International cooperation must continue**
  - With industry
  - With other authorities

Prioritization

- **Accident prevention is primary goal**
- **Accident mitigation is required when there is a failure to prevent an accident**
- **Accident mitigation measure will generally have lower priority than accident prevention**
- **However:**
  - Accidents are “accidental”
  - Increased traffic with same or lower accident rates still results in some accidents
  - New threats may not ever disappear