

# Research to Reality

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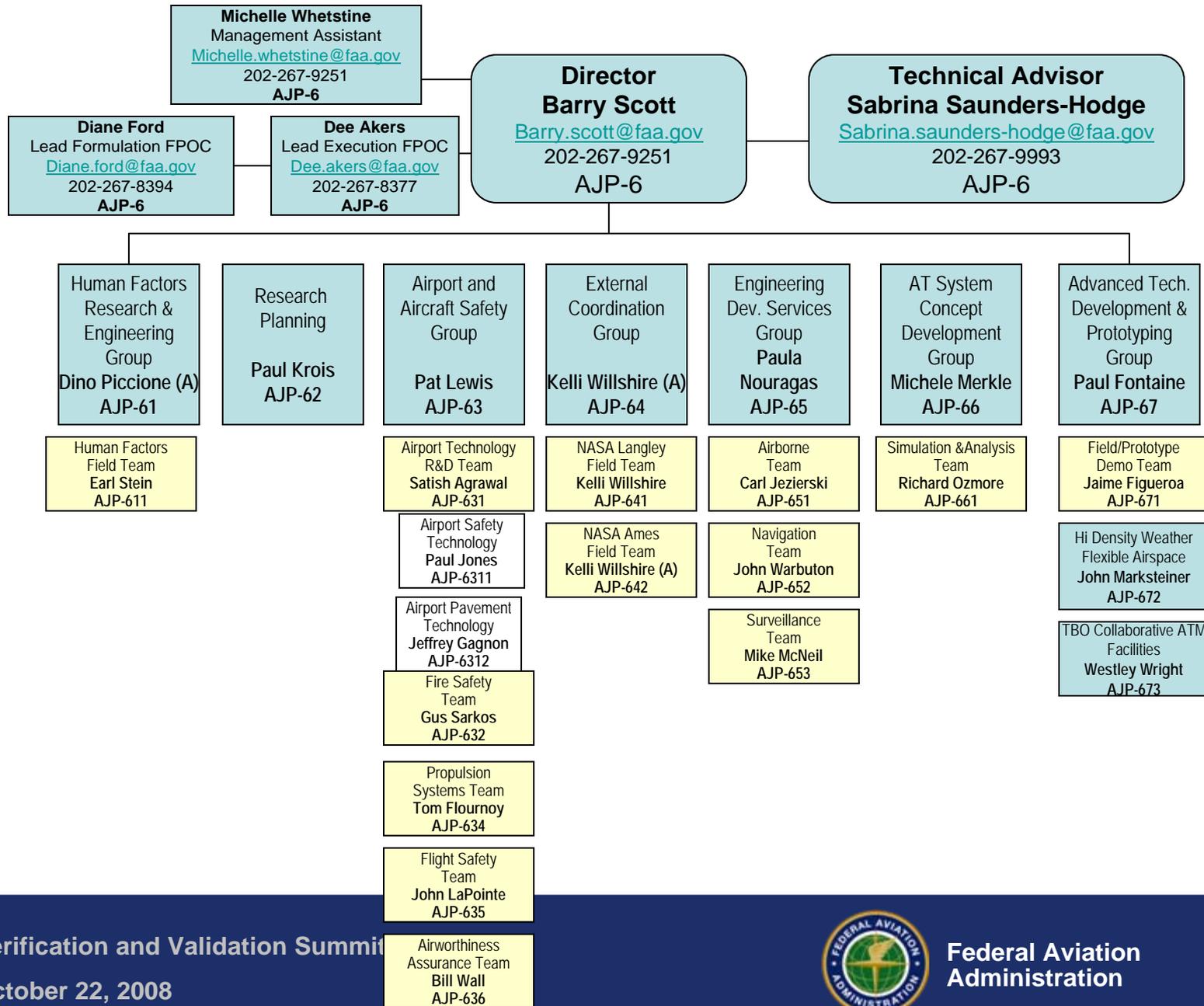


Federal Aviation  
Administration

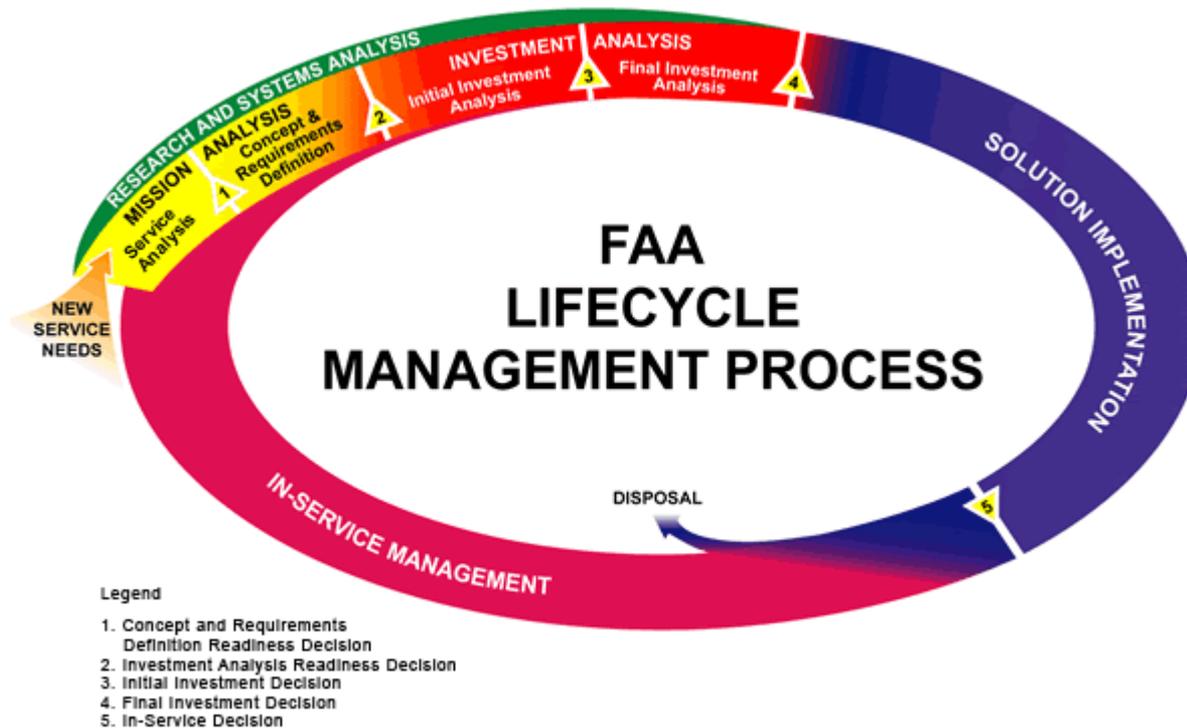


# Research & Technology Development

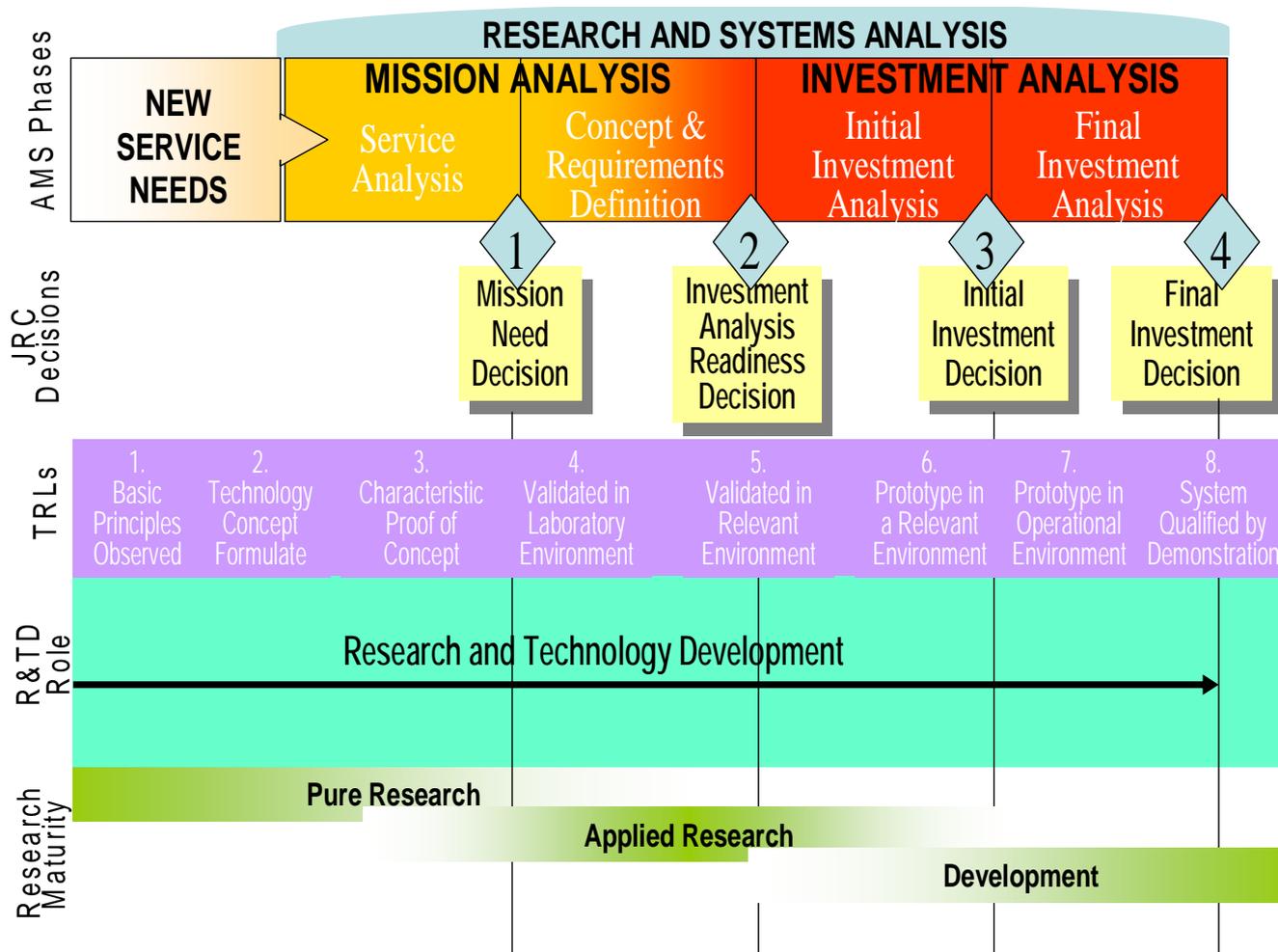
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# FAA Lifecycle Management Process



# Research and Systems Analysis



# The Path from Research to Reality

- **Airports**
  - Soft Ground Arresting System
- **Aircraft Safety**
  - Aircraft Fuel Tank Inerting System
- **Air Traffic**
  - ADS-B



# Background

**On February 28, 1984, a DC-10 aircraft overran after landing on runway 4R at JFK and plunged into Thurston Basin.**





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## Chicago – Dec. 08, 2006

Southwest Airlines B-737 carrying 89 passengers overran the end of runway 31C during a heavy snowstorm storm, crashed through a fence and hit two cars killing a six-year old boy.



## Toronto – Aug. 02, 2005

Air France A340 carrying 309 passengers overran the end of runway 06 during a thunderstorm coming to a stop about 600ft from the threshold.

# BURBANK



# ANCHORAGE





# Soft Ground Arresting System

- **1984 – DC10 accident JFK**
- **1986 – NTSB report. FAA\$ to Air Force**
- **1987 – Air Force Report. Refine math model. Select material.**
- **1991 – Test phenolic foam.**
- **1993 – Full Scale foam test**
- **1994 – CRDA with ESCO**
- **1995 – CRDA with PANY&NJ for JFK**
- **1996 – Successful test of cellular cement**



# FULL-SCALE TEST AT FAA TECHNICAL CENTER MAY 1996





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# Soft Ground Arresting System – cont.

- **1996 – Test bed at JFK**
- **1997 – Moisture Protection and Fire Testing Research**
- **1998 – LGA Test Bed. Advisory Circular Published.**
- **1999 – SAAB340 Overrun**
- **2000 – Jet Blast Research**
- **2003 – MD11 Overrun**
- **Present – 31 Beds Installed**



# RESEARCH OUTCOME



MAY 1999 SAAB 340 OVERSHOOTS R/W 4R AT JFK  
WITH 34 ON-BOARD

# Center Wing Tank Explosions



**Thai International 737**  
March 3, 2001; Bangkok



**TWA 747**  
July 17, 1996; Off Long Island, NY



**Philippine Airlines 737**  
May 11, 1990; Manilla

# Aircraft Fuel Tank Inerting System

- **1996 – TWA800 Accident**
- **1997 – First NTSB Hearing**
- **1998 – ARAC FTHWG1 Formed**
- **1999 – GBI Study/Benefits Report**
- **2000 – Affects of Low Temperature on Fuel Tank Flammability**
- **2001 – Boeing B737 Test on GBI Concept. FAA Designs OBOAS. GBI Ruled Out.**



# Aircraft Fuel Tank Inerting System – cont.

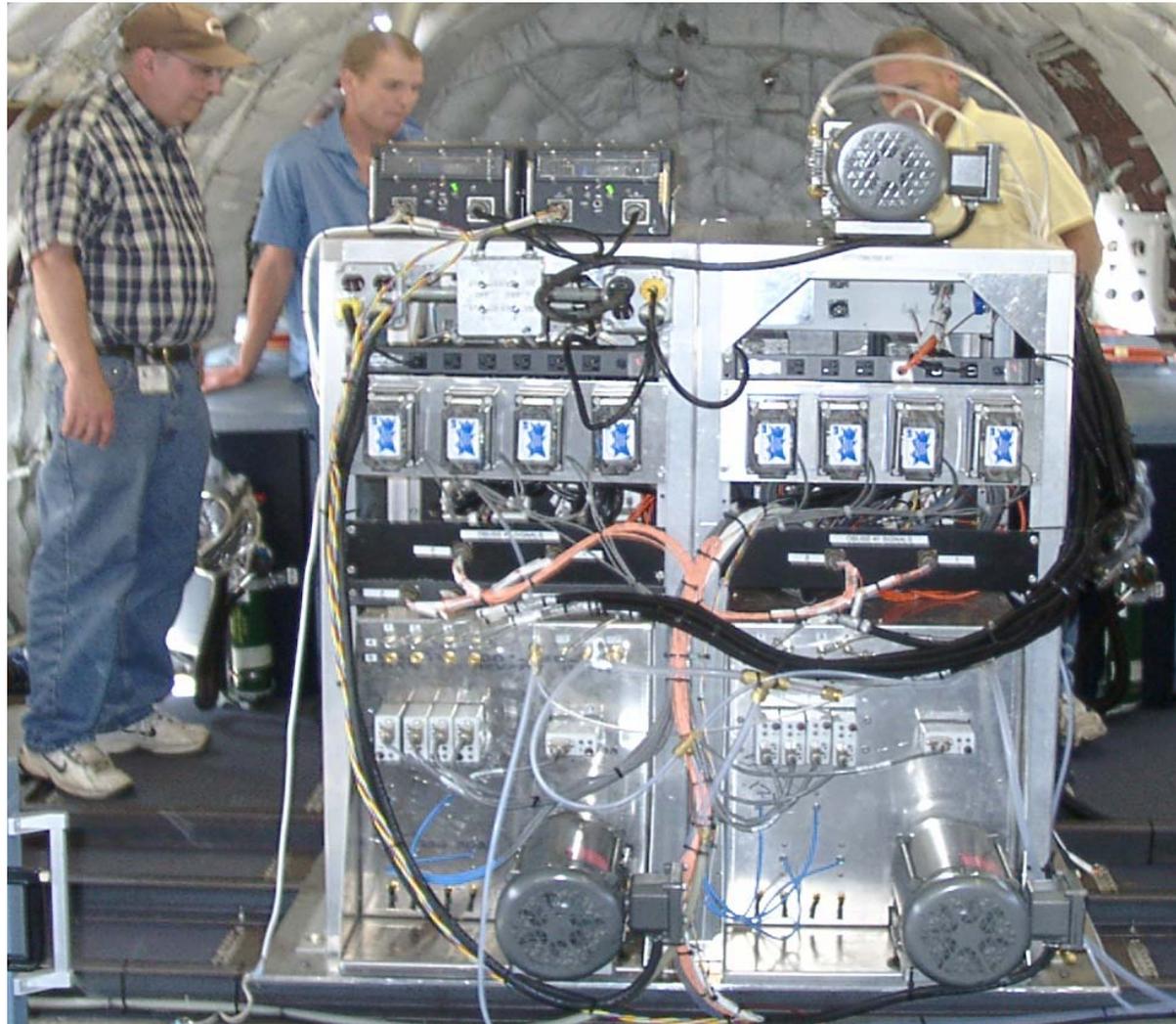
- **2001 – THAI 737. FAA buys 747SP. Fuel Tank Inerting Design Group formed.**
- **2002 – Small scale inerting study/Full scale test. OBIGGS.**
- **2003 – Airbus 320 and B747 Tests.**
- **2004 – Boeing 737 and NASA 747SCA tests**
- **2005 – NPRM**
- **2008 – FAA adopts final rule**



# OBIGGS Installed in 747



# On-Board Oxygen Analysis System (OBOAS) Installed in A320



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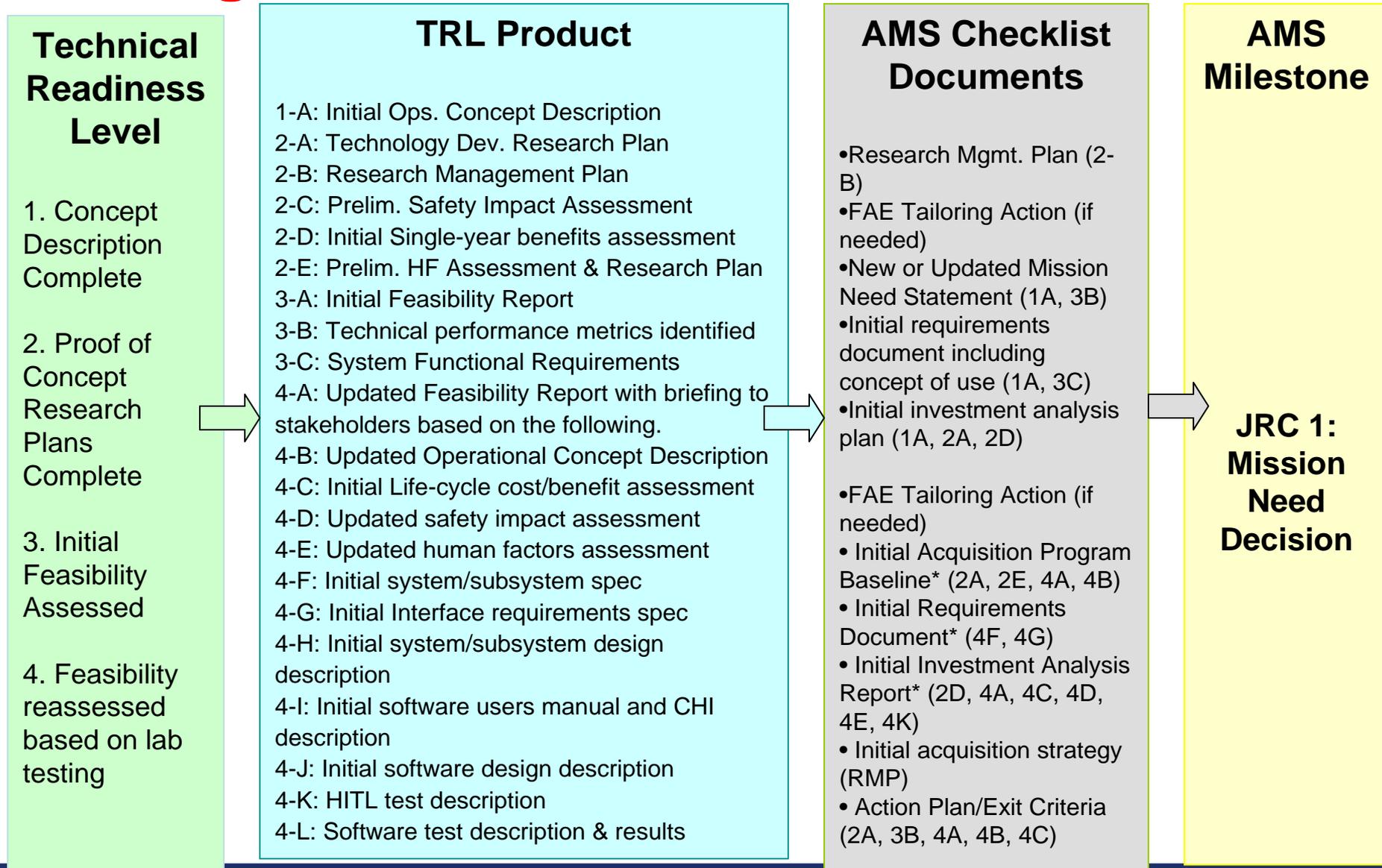


# ADS-B

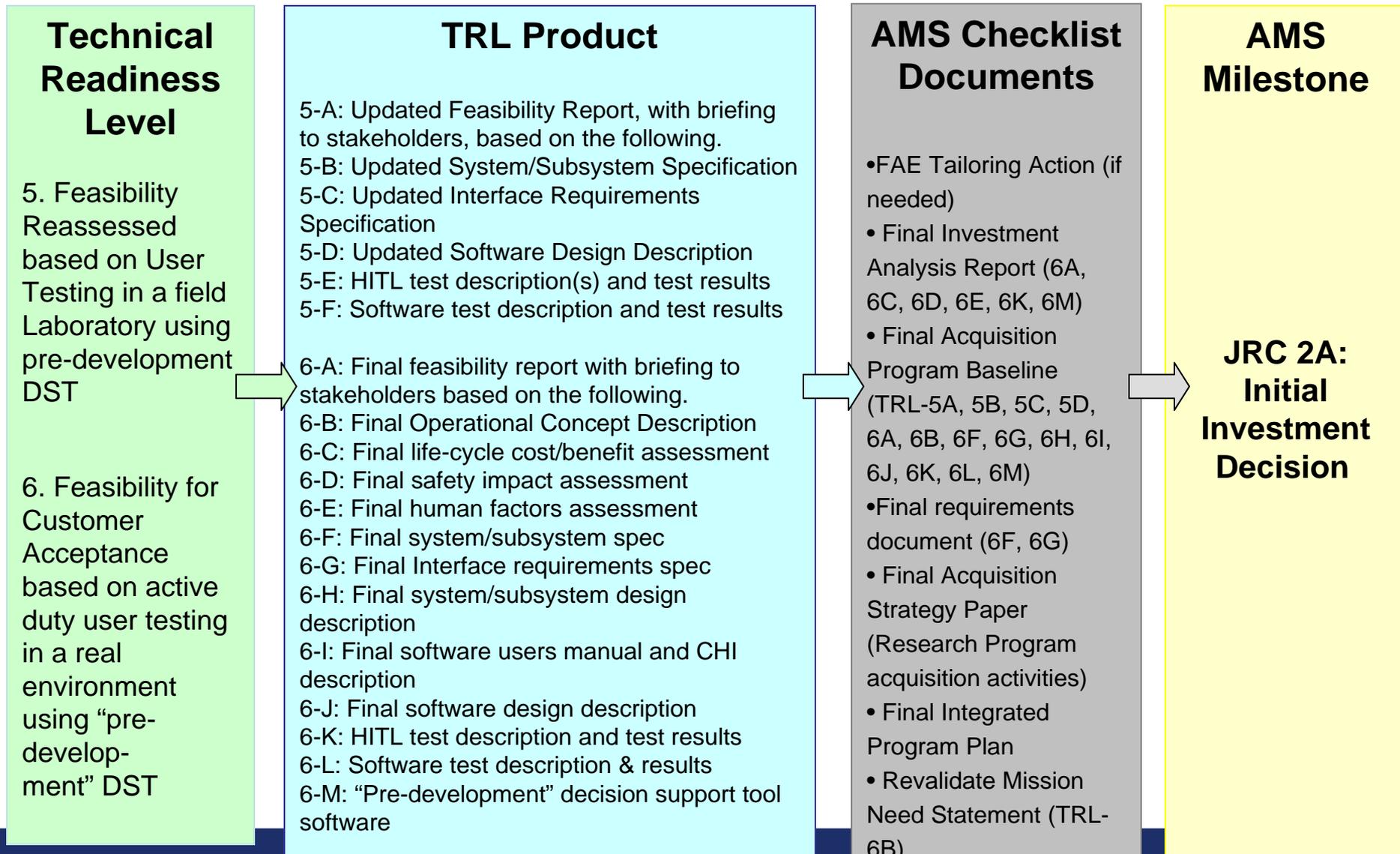
- **1970s – Early ADS-B concept research**
- **1992 – FAA research into capabilities of specific ADS-B links**
- **1994 – RTCA SC-186**
- **1995 – ADS-B – Enabling technology for FF**
- **1996 – CAA ADS-B Program**
- **1998 – CAPSTONE and SF21 begin**
- **2005 – Initial investment decision**
- **2006 – Final investment decision**
- **2007 – ITT wins contract**



# TRL Alignment with AMS

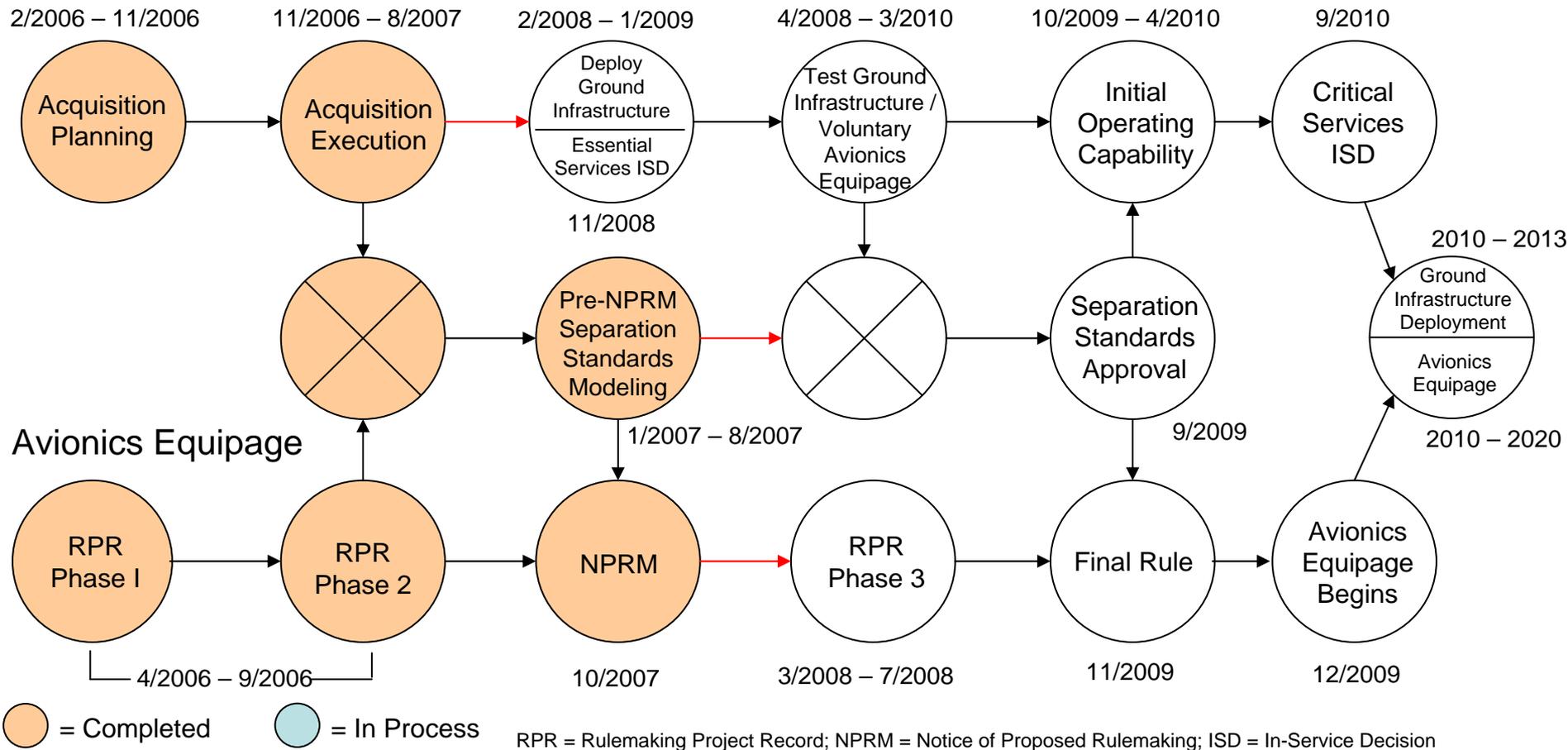


# TRL Alignment with AMS (Continued)



# Program Status: Dual Track Strategy

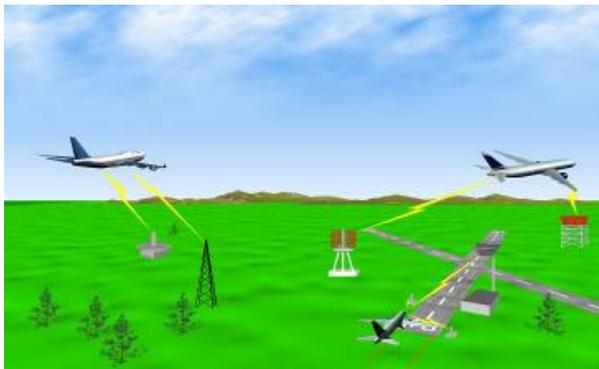
## Ground Infrastructure



# NextGen: Improving Efficiency & Capacity

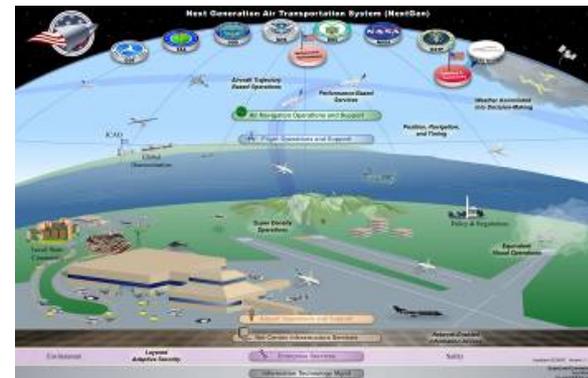
## Today's NAS

- Ground-based Navigation and Surveillance
- Air Traffic Control Communications By Voice
- Disconnected Information Systems
- Air Traffic "Control"
- Fragmented Weather Forecasting
- Airport Operations Limited By Visibility Conditions
- Forensic Safety Systems



## NextGen

- Satellite-based Navigation and Surveillance
- Routine Information Sent Digitally
- Information More Readily Accessible
- Air Traffic "Management"
- Forecasts Embedded into Decisions
- Operations Continue Into Lower Visibility Conditions
- Prognostic Safety Systems



*The transition to NextGen has already begun.*