Subcommittee on Aircraft Safety 2015 Spring Meeting Report Out

FAA Research, Engineering & Development Advisory Committee

April 22, 2015

REDAC Tasking from Fall 2014 Meeting

- **From REDAC DFO - Dennis Filler, 5/19/2014**
- **Develop list of emerging issues**
  - ***Things the FAA should get ahead of***
- **Develop list of future opportunities**
  - ***Future areas where R&D could benefit the FAA***

SAS Emerging Issues

- Real time system-wide safety assurance
- Dependability of increasingly complex systems
- Certification of advanced materials and structural technologies
- High density energy storage, management, and use

SAS Future Opportunities

- Commercial space integration with the National space system
- General aviation's role in safety systems development
- Effects of breakthrough medical technologies on FAA medical certification standards
- Identification and funding of strategic research and development

SAS Key Questions

- **What are the recommendations and impacts for the FY17 Aviation Safety portfolio?**
- **What are the long-term considerations?**
- **Do we have the right building blocks?**

FY 2017 Requirements Portfolio

BUDGET LINE ITEM (BLI)	BLI Total Funds (,000)	FY17 REQUIREMENTS	Contract Funds (,000)	Contract Funds - BLI Level (,000)	TCRG
		New requirement in FY17			
Fire Research and Safety (A11.a)	**7,923**	Aircraft Fire Safety	4,000	**4,000**	Fire & Cabin Safety (F&CS)
Propulsion and Fuel Systems (A11.b)	**2,241**	Advanced Damage Tolerance and Risk Assessment Methods for Engine Life-Limited Parts	1,400	**1,400**	Propulsion Systems (PS)
Advanced Materials/Structural Safety (A11.c)	**4,616**	Airframe Structural Crashworthiness Response Characterization	500	**900**	Fire & Cabin Safety (FCS)
		Transport Airplane Ditching * (No target funding past FY17)	400		
		Damage Tolerance of Composite Structures	900	**2,750**	Structural Integrity Composite (SIC)
		Composite Maintenance Practices	300		
		Crashworthiness Issues Unique to Composite Materials	300		
		Structural Integrity of Adhesive Joints	250		
		Composite Materials Handbook 17 (CMH-17, formerly MIL-HDBK-17) *Ops Funding*	-		
		Continued Operational Safety (COS) and Certification Efficiency (CE) for Emerging Composite Technologies	1,000		
Aircraft Icing/Digital System Safety (A11.d)	**6,025**	Research on Ice Crystal and SLD (Appendix C Exceedance) Icing Conditions to Support Means of Compliance	200	**1,600**	Aircraft Icing (AI)
		Safe Operations and Take-off in Aircraft Ground Icing Conditions	550		
		Simulation Methods Development / Validation to Support Appendix C Icing Certification and Continued Operational Safety	450		
		SLD Engineering Tools Development and Validation	400		
		Onboard Network Security and Integrity (Aircraft Systems Information Security)	1,575	**2,268**	Software Digital Systems (SDS)
		System Considerations for Complex Software Intensive Systems	693		
Continued Airworthiness (A11.e)	**11,490**	Fuel Cell Systems for Aircraft Applications	925	**8,375**	Electrical Systems (ES)
		Recharge Lithium Batteries and Battery Systems for Aircraft Applications	1,300		
		Stall Departure Identification, Recognition and Recovery	650		Flight Control and Mechanical Systems (FCMS)
		Tire Failure Characteristics	550		
		Airplane System and Occupant Safety in Volcanic Ash	600		
		Integrated Flight Path Control to Address GAJSC and FAA GA Safety Interventions	600		
		Low Energy Alerting and Awareness Systems	950		
		Inspection and Tear Down of Bonded Repairs	425		Maintenance & Inspection (MI)
		Volcanic Ash Engine Injestion	400		Propulsion Systems (PS)
		Emerging Technology – Active Flutter Suppression	500		Structural Integrity Metallic (SIM)
		MMPDS Support and Design Values for Emerging Materials	125		
		Damage Tolerance and Durability Issues for Emerging Technologies	1,350		

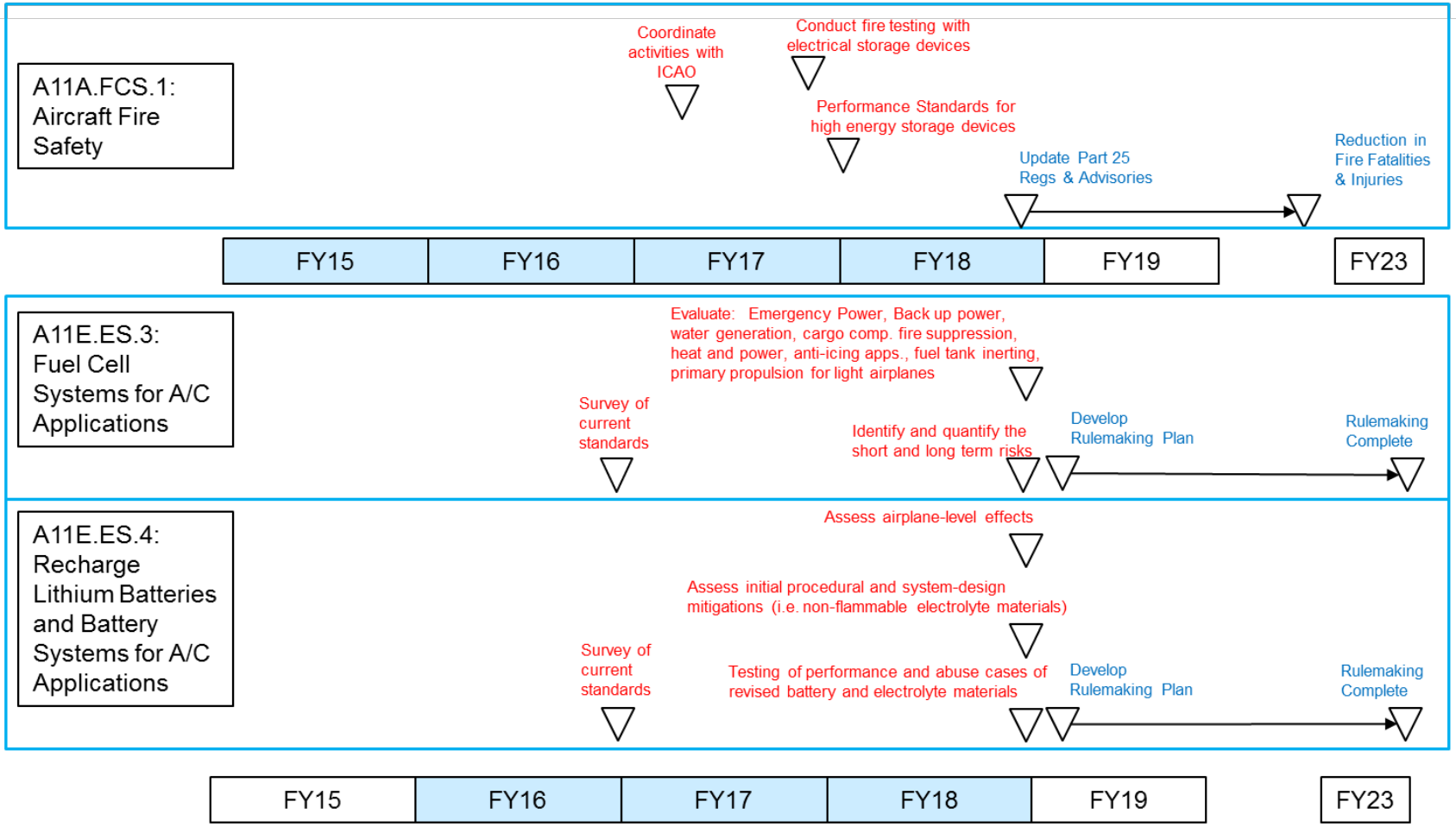
BUDGET LINE ITEM (BLI)	BLI Total Funds (,000)	FY17 REQUIREMENTS	Contract Funds (,000)	Contract Funds - BLI Level (,000)	TCRG
		New requirement in FY17			
Aircraft Catastrophic Failure Prevention Research (A11.f)	**1,590**	Advanced Analysis Methods for Impact of Composite Aircraft Materials in Rotor Burst and Blade Release	1,200	**1,200**	Propulsion Systems (PS)
Flightdeck/Maintenance/System Integration Human Factors (A11.g)	**9,285**	Enhancing Aviation Safety Through Advanced Procedures, Training & Checking Methods, to include Loss of Control Detection, Avoidance, and Recovery	1,650	**4,750**	Human Factors (HF)
		Avionics & New Technologies	800		
		Advanced Vision Systems - EFVS, EVS, SVS, and CVS, HUD, HMD - Certification and Operational Approval Criteria	1,400		
		Fatigue Mitigation in Flight Operations	100		
		Maintenance Human Factors to Support Risk-Based Decision Making (RBDM) and Maintenance Safety Culture	800		
System Safety Management/Terminal Area Safety (A11.h)	**7,318**	Helicopter FDM Data Gathering and Analysis for ASIAS	1,050	**4,738**	System Safety Management (SSM)
		Safety Oversight Management System (SOMS)	788		
		Integrated Domain Safety Risk Evaluation Tool (ID-SRET)	900		
		Development of Stable Approach Criteria	1,050		Terminal Area safety (TAS)
		Helicopter Operational Safety Improvements Using Advanced Vision Systems	550		
		Angle-of-attack Displays for Upset Recovery and Air Data System Failure Diagnosis	400		
Aeromedical Research (A11.j)	**9,271**	Aeromedical Systems Analysis	698	**2,601**	Aeromdical (AM)
		Accident Investigation & Prevention	978		
		Human Protection & Survival	200		
		System level Crashworthiness Injury Criteria and Certification Methodology	400		
		Evacuation Equipment and Aids	300		
		Emergency Exit Operation and Location	25		
Weather Program (A11.k)	**18,527**	Terminal Area Icing Weather Information for NextGen	1,100	**3,500**	AVS Weather Wedge (Wx)
		Mitigating the Ice Crystal Weather Threat to Aircraft Turbine Engines	1,000		
		Convectively Induced Turbulence - Extent, Severity, and its Impact on Aviation	600		
		Validation of Advanced Airborne Radar Weather Hazards Detection	800		
		NOTE: The $18,527 number reflects the entire weather program under A11.k and not just the AVS Sponsored Weather Wedge shown to the right.			
Unmanned Aircraft Systems Research (A11.l)	**8,505**	Detect and Avoid (DAA) Multi-Sensor Data Fusion Strategies	1,000	**6,850**	Unmanned Aircraft Systems (UAS)
		UAS System Safety Criteria	900		
		UAS Maintenance, Modification, Repair, Inspection, Training, and Certification Considerations	1,000		
		Small UAS (sUAS) Detect and Avoid Requirements Necessary for Limited Beyond Visual Line of Sight (BVLOS) Operations	750		
		UAS Command and Control Link Compatibility	1,300		
		UAS Human Factors Control Station Design Standards	1,200		
		UAS Navigation Performance, Accuracy, and Reliability	700		
NextGen - Altenative Fuels for General Aviation (A11.m)	**5,940**	Alternative Fuels for General Aviation	5,615	**5,615**	Propulsion Systems (PS)
Total	**$92,731**		**Subtotal**	**$50,547**	

Initial look at FY 2017 Requirements Supporting SAS Issues – by BLI

SAS Issue BLI	SAS/Emerging - Real Time System-Wide Safety Assurance	SAS/Emerging - Dependability of Increasingly Complex Systems	SAS/Emerging - Certification of Advanced Materials and Structural technologies	SAS/Emerging - High Density Energy Storage, Management and Use	SAS/Future - Commercial Space Integration with the National Space System	SAS/Future - General Aviation's Role in Safety Systems Development	SAS/Future - Effects of Breakthrough Medical Technologies on FAA Medical Certification Standards	SAS/Future - Identification and Funding of Strategic Research and Development
a11.a	1 Funded		1 Funded	**1 Funded**				
A11.b	1 Funded		1 Funded					
A11.c	1 Funded		7 Funded					
A11.d	4 Funded	2 Funded 1 Unfunded	1 Funded					
A11.e	3 Funded 1 Unfunded	1 Unfunded	**4 Funded** **7 Unfunded**	**2 Funded**		**1 Funded**		
A11.f	1 Funded		1 Funded					
A11.g	2 Funded					**1 Funded**		1 Funded
A11.h	5 Funded 1 Unfunded	4 Funded 1 Unfunded						
A11.j	3 Funded 1 Unfunded		1 Funded				**2 Funded**	
A11.k	3 Funded							
A11.l	3 Funded	2 Funded 3 Unfunded	2 Funded					
Total	**30**	**14**	**25**	**3**	**0**	**2**	**2**	**1**

SAS Issue: Emerging - High Density Energy Storage, Management & Use

- **Understand and assess characteristics of high energy generation and storage technologies**
- **Provide data for standards for design, implementation, certification, maintenance, and operation**



SAS Findings & Recommendations

- **SAS Spring_2015-1: UAS Portfolio Flexibility**

  Build flexibility into UAS budget to address emerging and as yet unknown issues

- **SAS Spring_2015-2: Research Roadmap Development**

  Develop and implement a 5-10 year research roadmap on strategically significant elements

- **SAS Spring_2015-3: Additive Manufacturing Research Acceleration**

  Accelerate development of additive manufacturing roadmap to identify regulatory, policy, and R&D program needs

SAS Observations

- **One Observation on HF**
  - Pleased to see the involvements of FAA HF specialists through out the AVS research portfolio

- **One Observation for REDAC to consider (*based on feedback from other Subcommittees)***
  - Crosscutting capabilities should be engaged at earlier stages of setting requirements and concept development. Earlier coupling across multiple disciplines may result in reduced development time and costs.