FAA CENTER OF EXCELLENCE FOR COMMERCIAL SPACE TRANSPORTATION:

YEAR 6 OVERVIEW

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SIXTH COE CST ANNUAL TECHNICAL MEETING
LAS CRUCES, NEW MEXICO
11 OCTOBER 2016

AGENDA

- Commercial Space Transportation Research Roadmap Themes
- Long-Term R&D Planning Activities

RESEARCH THEME 1
Space Traffic Management & Spaceport Operations Research

1.1
Air/Space Traffic Management

1.2
Space Situational Awareness

1.3
Spaceport Operations

RESEARCH THEME 2
Space Transportation Vehicles Research

2.1 Ground System & Operations Safety Technologies

2.2 Vehicle Safety Analyses

2.3 Vehicle Safety Systems & Technologies

2.4 Payload Safety

2.5 Vehicle Operations Safety

RESEARCH THEME 3
Human Spaceflight Research

- 3.1 Aerospace Physiology & Medicine
- 3.2 Personnel Training
- 3.3 ECLSS
- 3.4 Habita-bility & Human Factors
- 3.4 Human Rating

RESEARCH THEME 4
Space Transportation Industry Viability Research

4.1
Markets

4.2
Policy

4.3
Law

4.4
Regulation

CST RESEARCH ROADMAP PAGES 28-29

"Safe and Efficient Integration" Research Ideas

- Improving integration of launch and reentry sites into the NAS and its system of airports, including sites in the vicinity of major airports or complex airspace.
- Exploring the development of separation standards for improved airspace management of launch/reentry vehicles during non-explosive phases of flight.
- Improving approaches to monitor launch/reentry vehicle operations for airspace integration, to decrease the amount of airspace closed to regular air traffic operations and expedite response to off-nominal scenarios.
- Developing and validating improved noise models for commercial space launch operations at inland launch sites, including spaceports co-located with airports.
- Improving methods for launch and reentry collision avoidance analysis to produce more efficient launch and reentry planning and NAS integration.

28

"Advanced Safety Assessment Methods" Research Ideas

- Exploring advanced commercial human space flight data sharing and mining capabilities to inform safety assessments and identify emerging safety issues.
- Improved safety analysis methods to assess and manage hazards to dynamic population clusters, such as for the public in recreational areas and on roads and rail.
- Improved understanding of aircraft vulnerability to space-vehicle-breakup debris, including model development and refinement to reduce over-conservatism applied to airspace "keep out" areas used to protect against a launch or reentry vehicle failure.
- Improved methods to evaluate failure probabilities for launch and reentry vehicles.
- Improved methods to evaluate debris generated by launch and re-entry vehicle failures

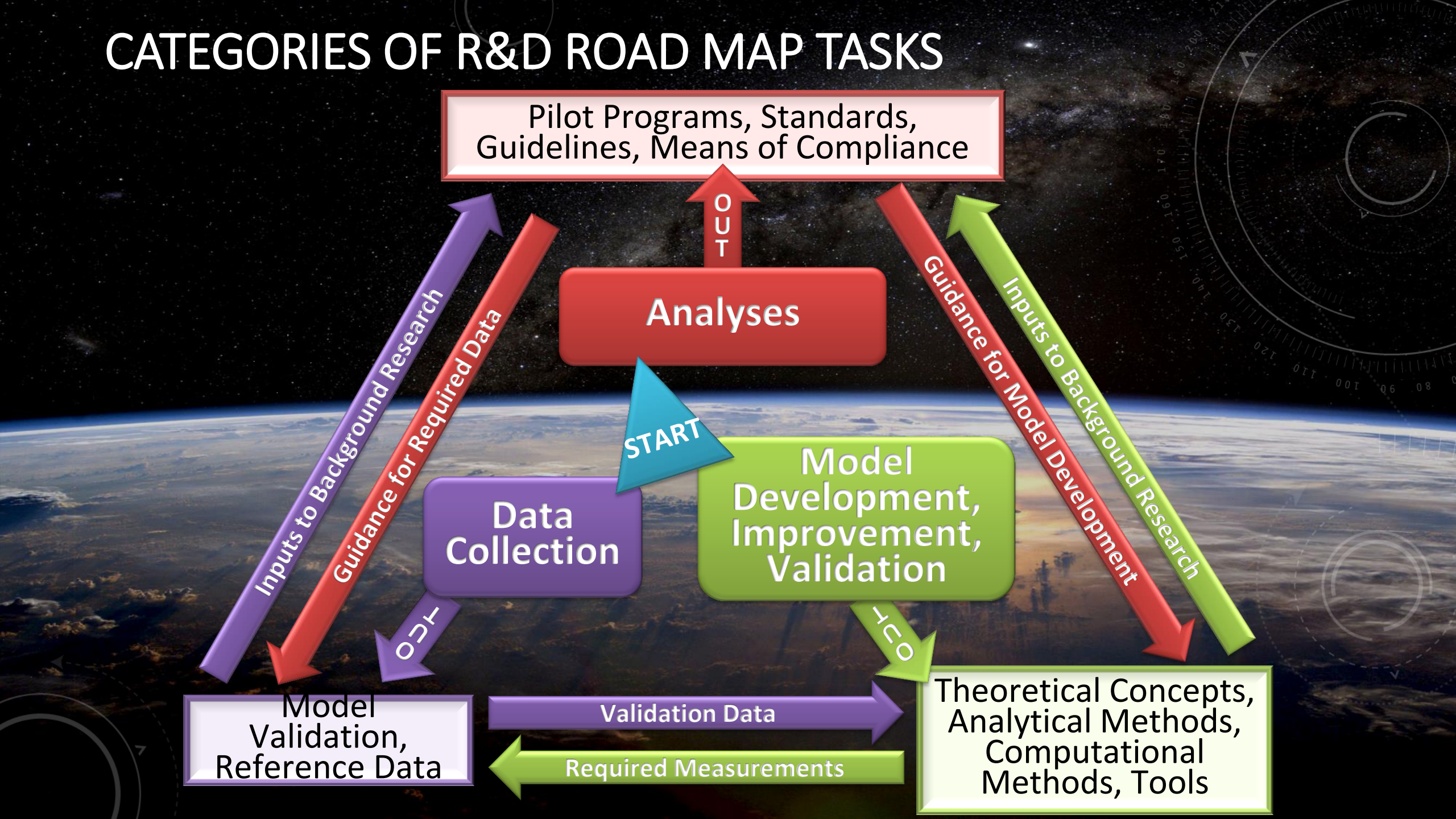
"Advanced Vehicle Safety Technologies and Methodologies" Research Ideas

- Exploring the repetitive use considerations for high utilization reusable space vehicles, to include assessing the use of integrated vehicle health monitoring technologies and reentry breakup recorders when applicable.
- Improved understanding of emerging autonomous flight safety systems and exploring mitigation factors to address their potential vulnerabilities.

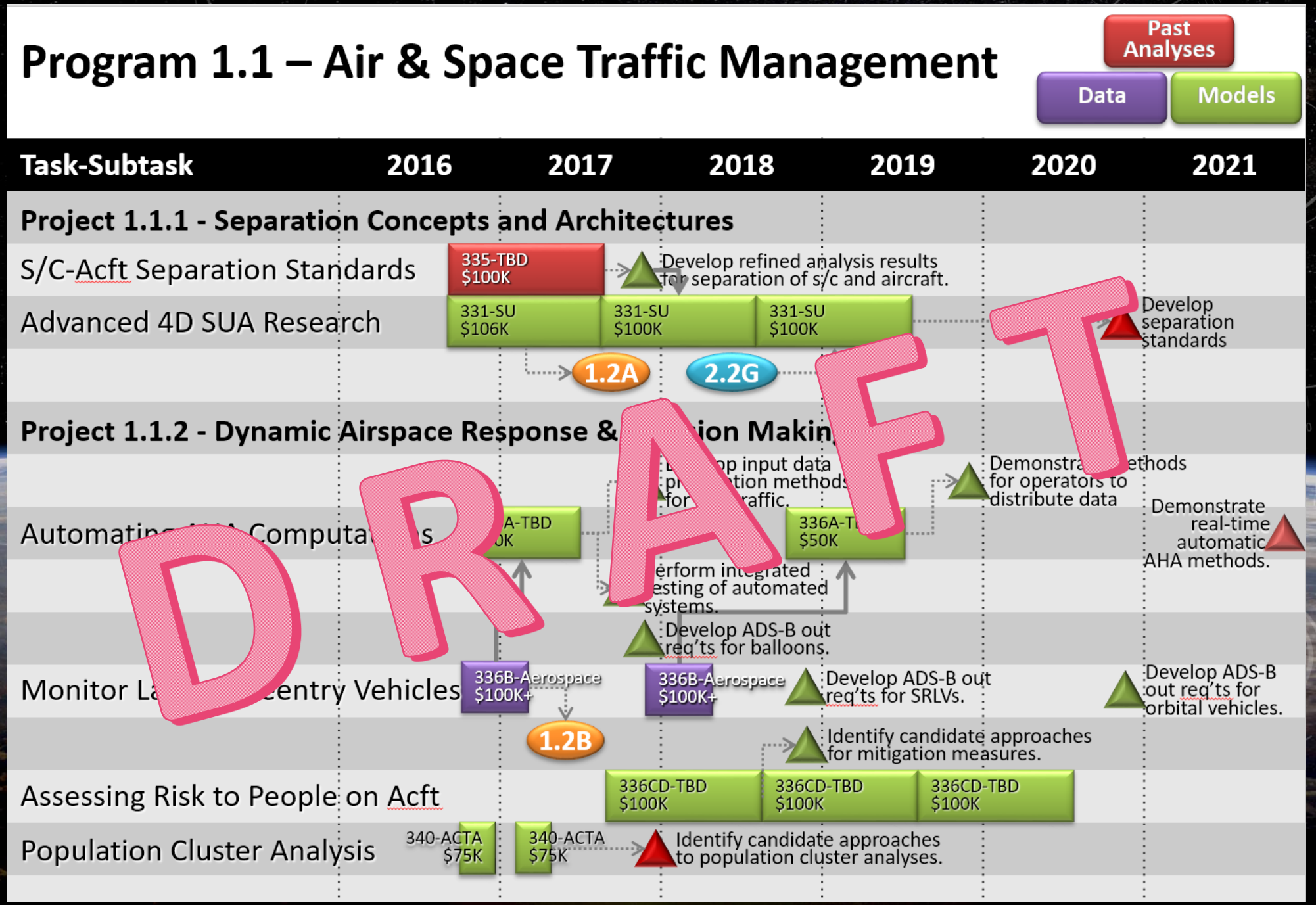
"Human Space Flight Safety" Research Ideas

- Identifying best practice considerations for crew human factors for small winged commercial spaceflight vehicles.

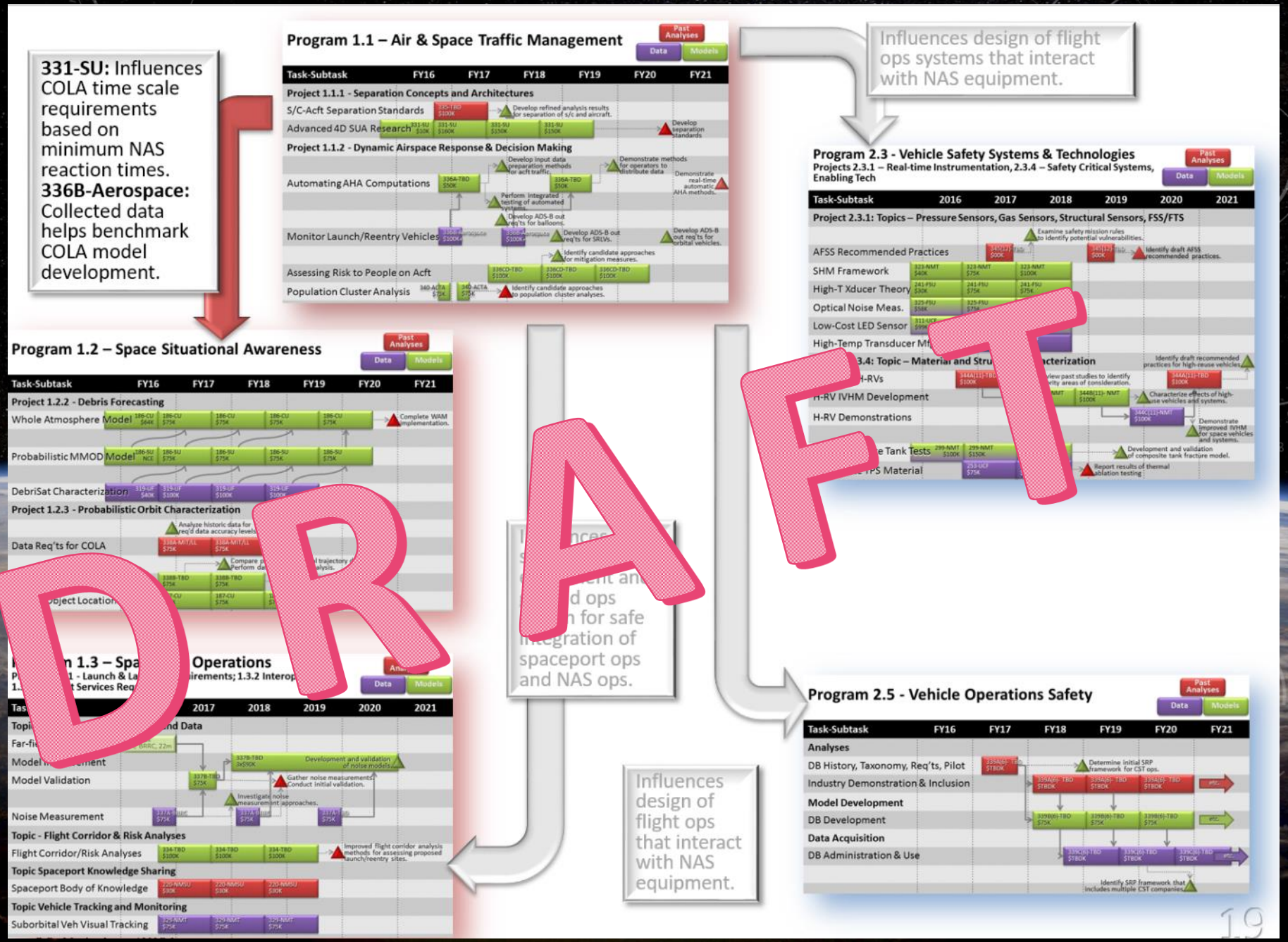
CATEGORIES OF R&D ROAD MAP TASKS



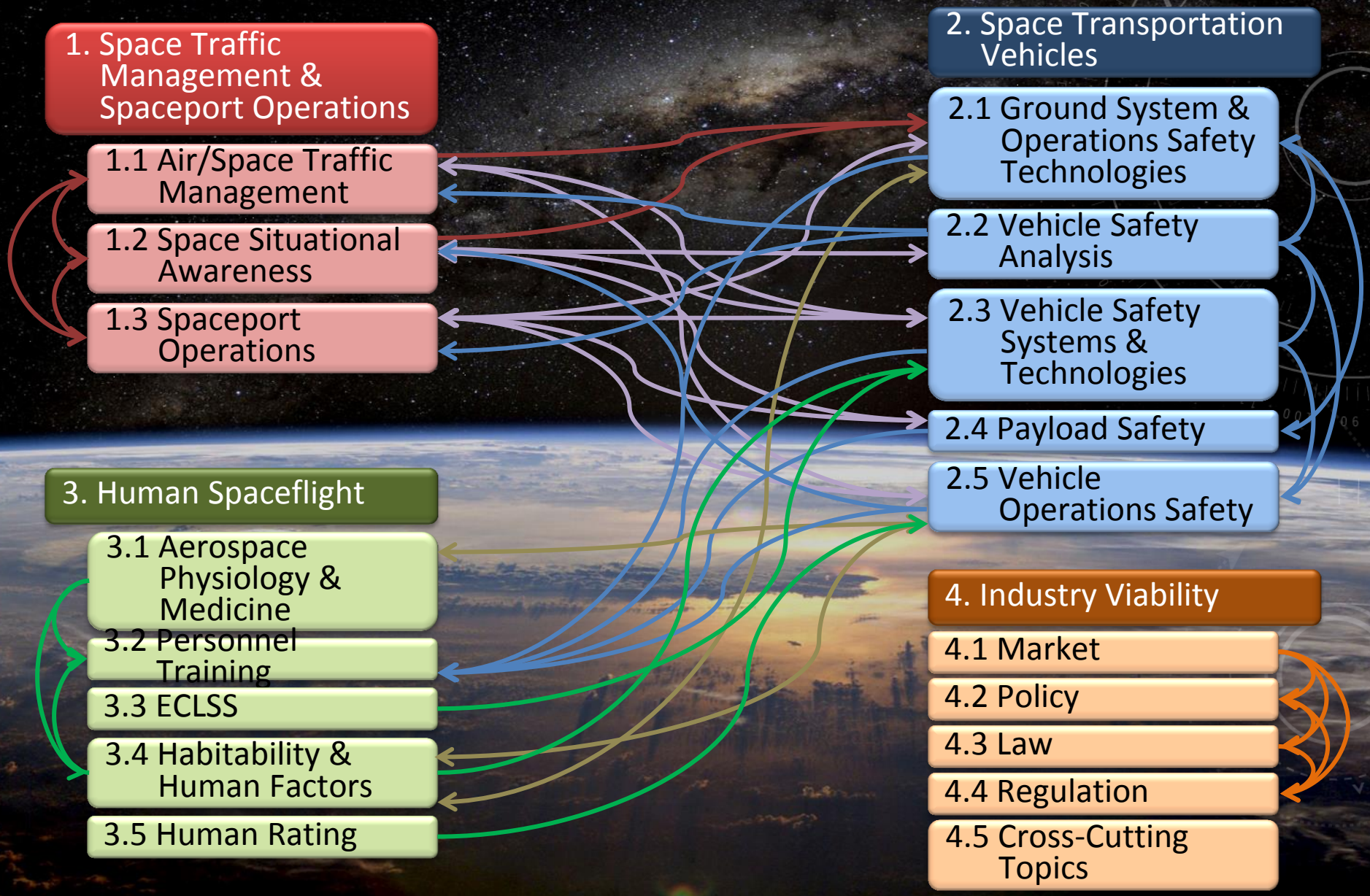
5-YEAR R&D GANTT CHARTS



R&D DEPENDENCIES



R&D RESEARCH AREA LINKAGES



SUMMARY & CONCLUSIONS

- (Note to Ken: “Wing it.”)