



NASA FAA Upper Class E Traffic Management (ETM) ETM Research Transition Team (RTT)

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Research Transition Team (RTT) Overview



Research Transition Teams (RTTs) serve as the inter-Agency forum to collaboratively explore concepts, develop prototypes, and demonstrate possible technologies, capabilities, and ecosystem to enable large-scale future operations

- **Overarching Goals**

- Provides a forum for NASA and FAA stakeholders to plan and conduct research, and utilize the outcomes
- Focuses on exploring operational concepts, engineering, data management, standardization, security, interoperability, and performance challenges in order to realize future implementation efforts

- **Execution**

- June 2021 to March 2024 (ETM Operational Maturity Level ((EOM) Level 1)
- TBD (EOM Levels 2/3)



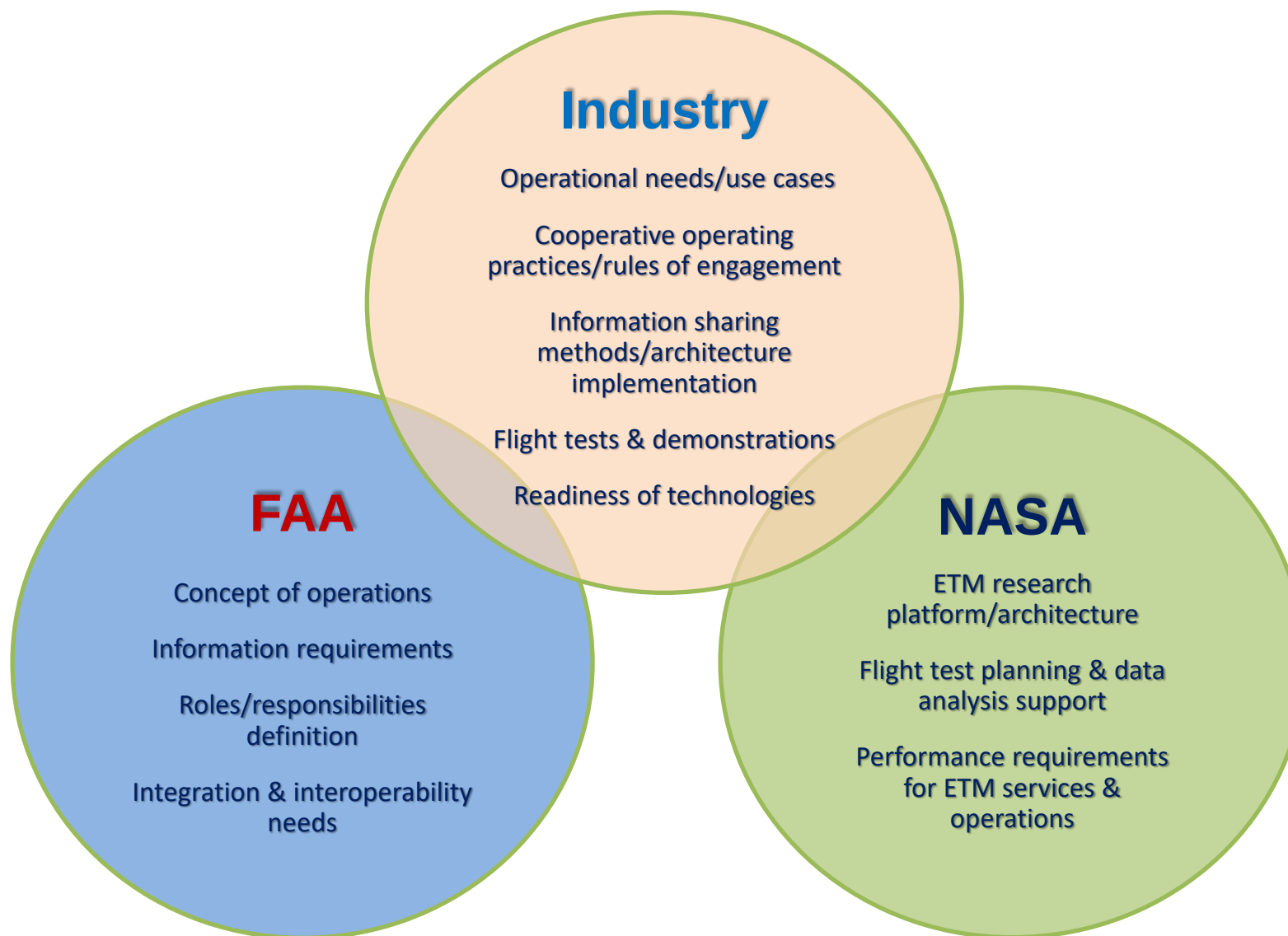
ETM RTT Objectives

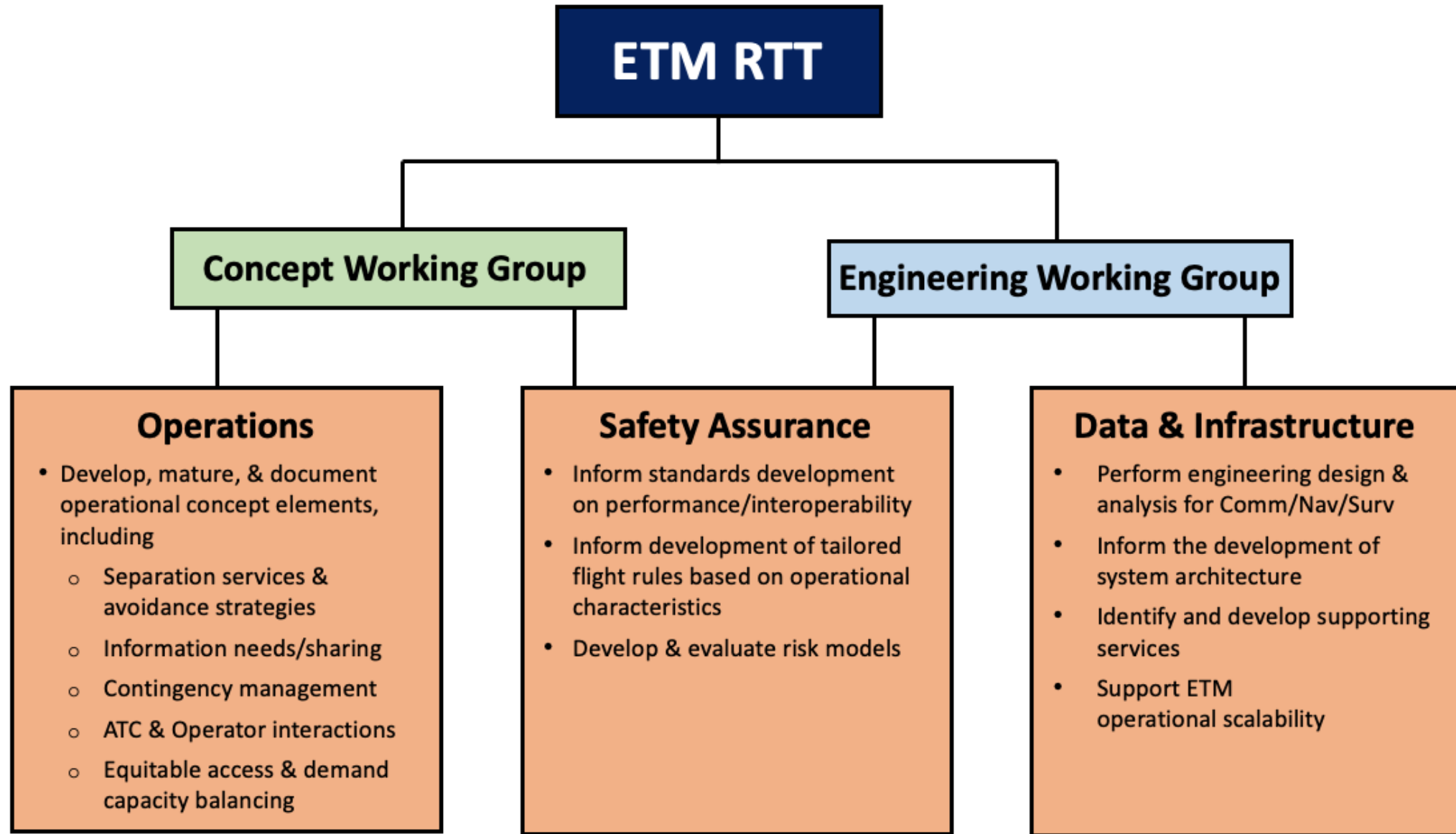


- Ensure key stakeholder interests are represented
- Define and build consensus between the FAA, NASA, and industry stakeholders on the concepts associated with ETM with consideration for scalability and global operations
- Research and mature increasingly complex ETM operational scenarios/use cases, technologies, information flows, and roles and responsibilities of those entities interacting with ETM and capture the key elements for future ConOps versions
- Decompose the ConOps and perform engineering analyses to support the development of necessary systems, information architecture, processes, and procedures
- Conduct joint evaluation activities with ETM stakeholder community on solution concept of operations and associated scenarios/use cases
- Complete a technology transfer to the FAA and industry via Research Transition Products (RTPs)



ETM RTT Collaboration







ETM RTT Leadership Team



Name	Organization	Role
Sherri Magyarits	FAA	RTT co-lead & CWG co-coordinator
Jaewoo Jung	NASA	RTT co-lead
Jeff Homola	NASA	CWG co-coordinator
Michelle Cady	FAA	EWG co-coordinator
Min Xue	NASA	EWG co-coordinator



Concept Working Group (CWG)



- Responsible for providing a viable conceptual approach to addressing the operational challenges of the future Upper Class E airspace environment
- Defines the concept for ETM operations, to include:
 - Overall conceptual principles and assumptions
 - Operations, supporting architecture, information flows and exchanges, and roles and responsibilities
- Develops use cases that span the forecast range of Upper Class E operations
 - Considers probable timeframe, stakeholder needs, new technologies, and new entrants' performance characteristics associated with enabling the use cases to help prioritize focus
 - Ensures adequate coverage of ETM operations and associated information exchanges



CWG Focus Areas



- Pre-flight and transition to Upper Class E airspace
- Operating altitude within Upper Class E airspace
- Flexible floor of a cooperative environment
- ETM services
- Separation management and negotiation
- Descent from Upper Class E airspace to landing
- Contingency management



Engineering Working Group (EWG)



- Identifies and collaboratively researches and develops technical capabilities for ETM stakeholders
 - Supports future ETM system implementation, operations, and safety assurance
- Works in conjunction with the CWG to identify the engineering, infrastructure, and information exchange gaps and/or deltas associated with ETM concepts, strategies, and system capabilities
 - Supports the development of an architecture and component prototypes for use in simulation, evaluation, and demonstration of the ETM operating environment.



EWG Focus Areas



- Engineering design and analysis for Communication, Navigation, and Surveillance (CNS)
- ETM operational scalability evaluation
- Information management and security, interoperability, and cross platform networking for system operations
- Joint simulations, evaluations, and demonstrations with NASA, FAA facilities, and ETM community for ETM maturation



ETM Operational Maturity Levels (EOML) 1



	EOM Level 1
Complexity	Low
Level of Automation/Services	• Service-based conflict detection/Strategic coordination • Service-supported conflict resolution option generation • Manual operator conflict resolution • Manual contingency management/alerting
Operation Characteristics	• Slow moving operations • Uncrewed • Intent sharing • Limited flexible floor • Early service supplier functionality
Vehicle Types	• Balloon • Fixed-wing HALE (slow) • Airship
ANSP Services	• Full services during transit phases • Services for operators not participating in cooperative environment
International Coordination	• CAA-CAA



ETM Operational Maturity Levels (EOML) 2



	EOM Level 2
Complexity	Medium
Level of Automation/Services	• Service-based conflict detection/Strategic coordination • Hybrid (automated and manual) – service-supported conflict resolution option generation – operator conflict resolution – contingency management/alerting
Operation Characteristics (EOML1+)	• Crewed • Mix of fast and slow • Limited V2V • Initial third-party services available • Special use corridors (e.g., supersonic)
Vehicle Types (EOML1+)	• Supersonic • Fixed-wing HALE (fast)
ANSP Services	• Partial services during transit phases • Services for operators not participating in cooperative environment
International Coordination	• Service-based support for CAA-CAA



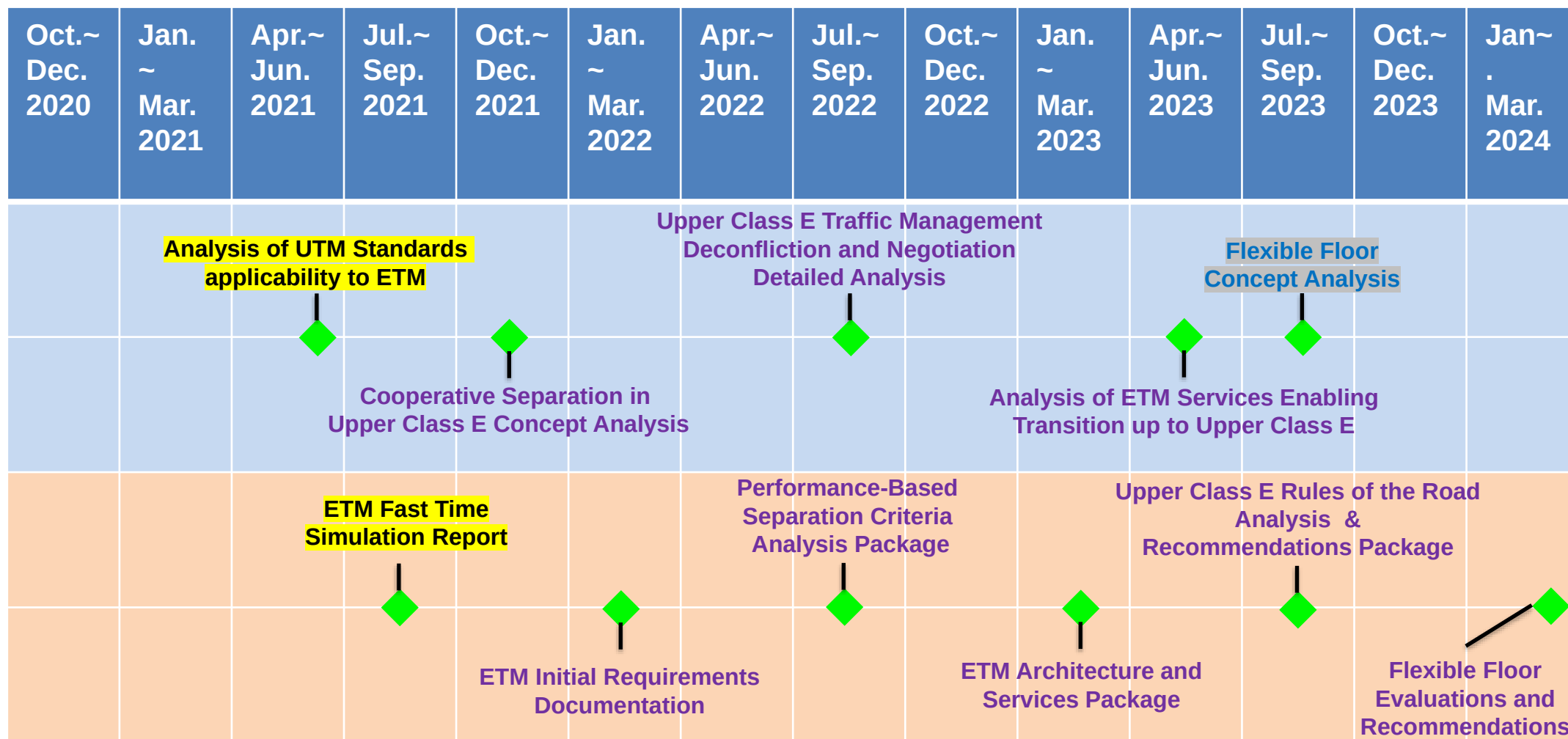
ETM Operational Maturity Levels (EOML) 3



	EOM Level 3
Complexity	High
Level of Automation/Services	• Service-based conflict detection/Strategic Coordination • Automated operator conflict resolution • Automated contingency management/alerting
Operation Characteristics (EOML2+)	• Wide-ranging V2V • Commercial Space operations • Full dynamic flexible floor
Vehicle Types (EOML2+)	• Hypersonic • Space vehicle launch and recovery
ANSP Services	• Services as needed
International Coordination	• Service-based coordination



ETM RTT Activities Timeline



NASA Lead; FAA Lead; NASA FAA Co-Lead