Virtual Airspace Modeling & Simulation - Technical Interchange #1

System-Level Integrated Concepts (SLIC)

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Outline

- Criteria for a successful meeting
- SLIC Goals
- Approach
- Concept Development Process
- Concept Development Timeline
- Concept Development Framework
- Gathered Concepts
- VAMS Participant interactions
- Key Challenges

Criteria for a Successful Technical Interchange Meeting

We all achieve a common understanding of:

- The project goals and approach
- The concept-development goals and approach
- The project terminology
- The necessary interactions between the concepts, modeling/simulation and assessment group

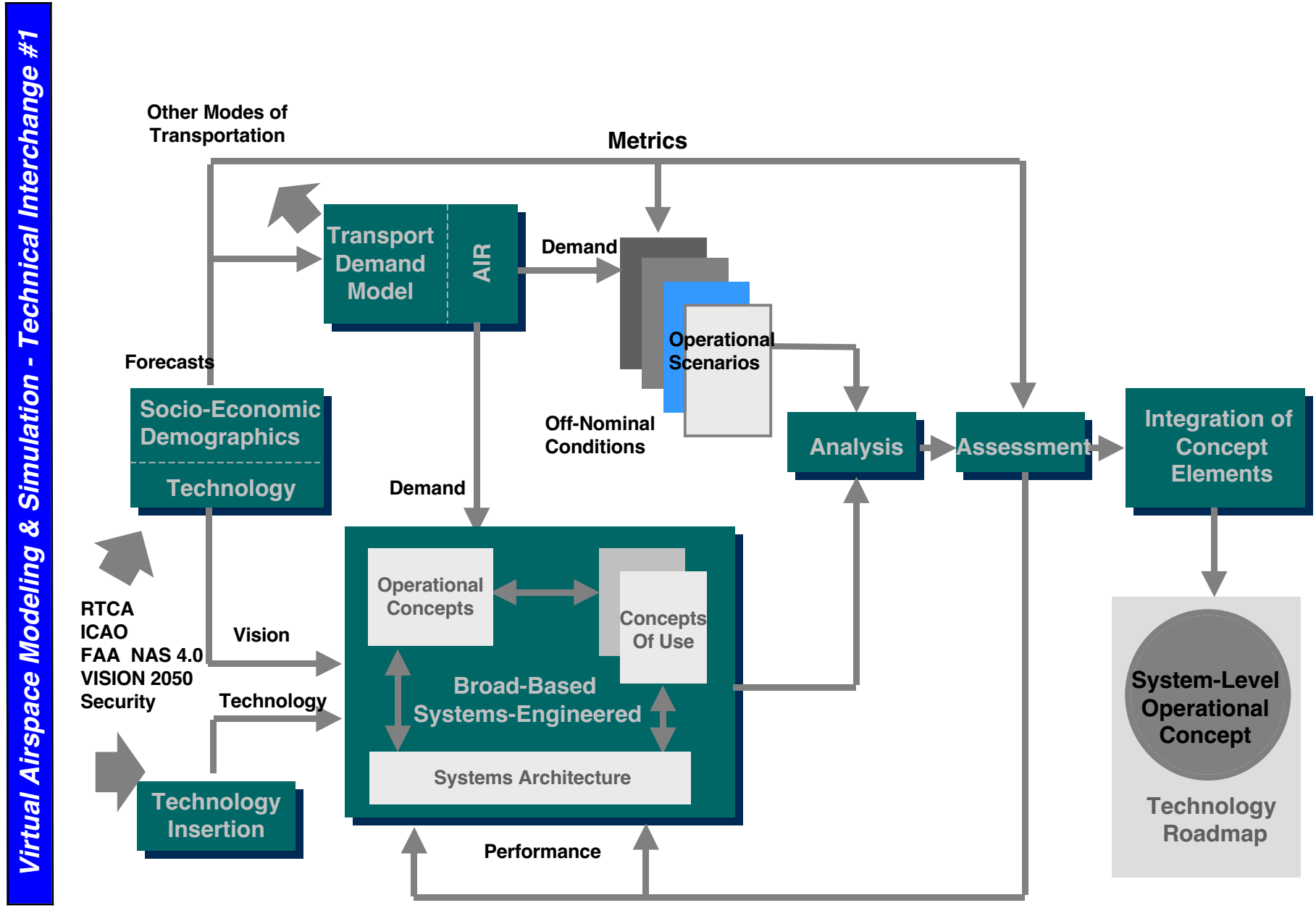
SLIC Goals

- The goal of this concept development effort is to produce, and evaluate the benefits of, a **Unified Capacity-increasing Concept**.
- Develop **Technology Roadmaps** to layout out how such a concept can be developed and implemented in the NAS.

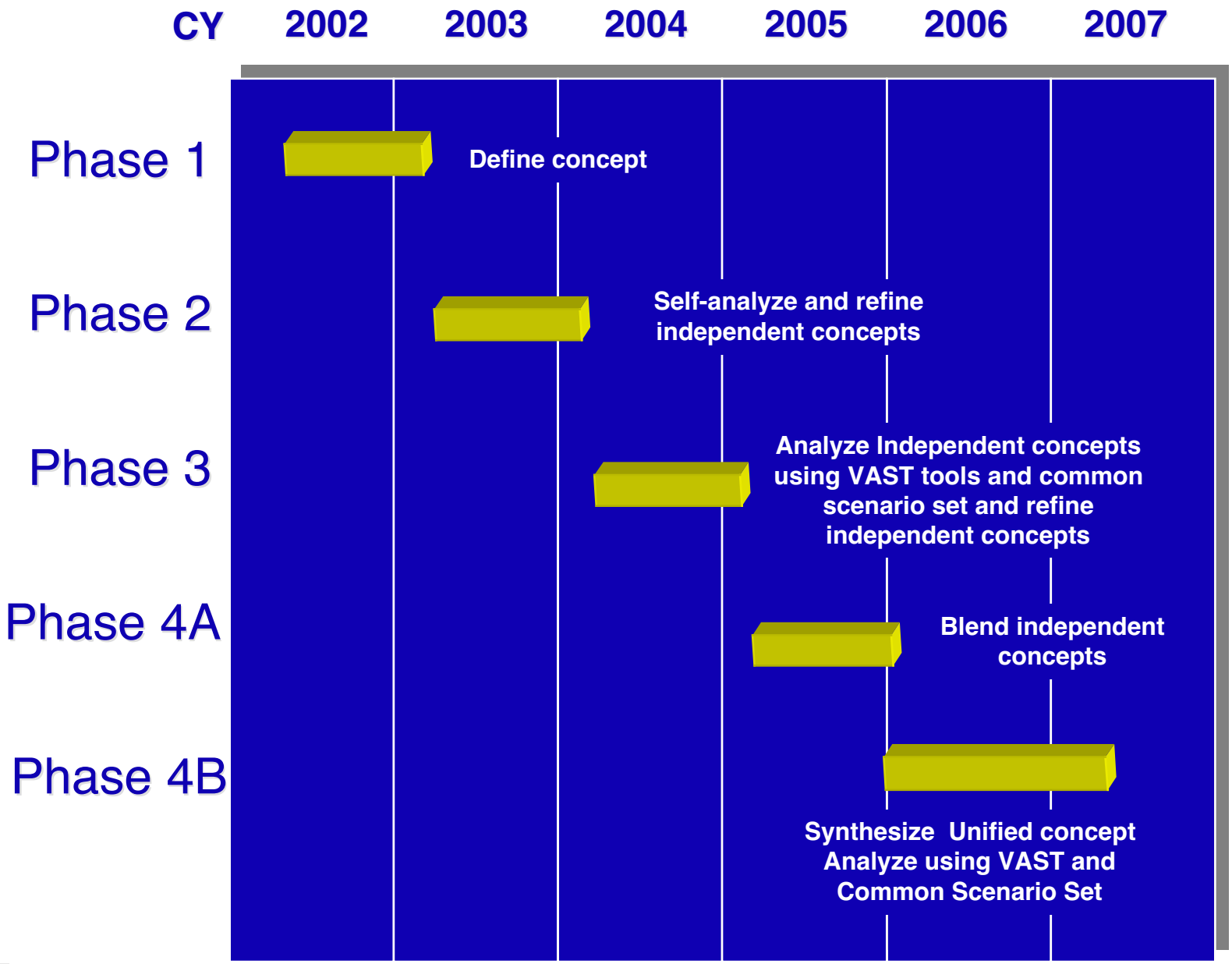
SLIC Approach

- Gather Concepts from industry, NASA, universities, and other sources; concepts cover distinct domains of the Air Transportation System (surface, terminal, en route, and gate-to-gate)
- NASA's baseline references include OEP, RTCA 2005, ICAO...
- Concepts will address NASA's long-range Aerospace Technology Enterprise goals (3X increase by 2022)
- Develop and Analyze Independent Concepts
- Integrate and Synthesize the independent concepts into a unified capacity- increasing system concept
- Analyze the unified capacity-increasing concept

Concept Development Process



SLIC Timeline



Summary of Concept Development Phasing

Phase	Work Requirements	Scenario Requirements	Tools for Evaluation
Phase One	Develop concept	Develop concept specific scenario	N/A
Phase Two	Evaluate and refine concept	Use concept specific scenarios	Own or available VAST tool set
Phase Three	Evaluate and refine concept	Initial common scenario set	VAST Tool set
Phase Four A	Participate in blending of unified system concepts	Expanded common scenario set	VAST Tool Set
Phase Four B	Support synthesis and analysis of unified system concept	Full common scenario set	VAST Tool Set

Concept Common Framework

- All concept developers shall describe their concept using a common framework, the "guidelines", to facilitate:
  - Modeling and simulation of concepts
  - Evaluation and assessments of concepts
  - The eventual blending of the concept.

Concept Guidelines and Criteria

Concepts include:

- Issues
- Assumptions
- Challenges
- Operating domains
- Core Ideas
- Functions
- Roles/Resp of Human/Mach
- Performance
- User interfaces
- Architecture
- Controls philosophy
- Error Recovery ideas
- Metrics of goodness
- Technology requirements
- Costs/Benefits
- Conceptual competitors

Evaluation Criteria address:

Functions
- Safe
- Useful
- Effective
- Definable
- Practical
- Stable
- Robust
- Reliable
- Self-Diagnostic
- Adaptable

Performance
- Available
- Accurate
- Responsive
- Predictable
- Time/Effort Saver
- Maintainable
- Compatible

Feasibility
- Documented
- Transition
- Constructible
- Producible
- Environmentally Compatible
- Affordable
- Model-able
- Revolutionary

Gathered Concepts - NRA

Boeing	Air Transportation System Capacity Increasing Concepts Research	Gate-to-Gate
Metron Aviation	Technologies Enabling All-Weather Maximum Capacity by 2020	Gate-to-Gate
Seagull Technologies	Concept PTP: Massive Point-to-Point and On-Demand Air Transportation	Gate-to-Gate
Northrop Grumman	Centralized Terminal Operation Control	Terminal
Metron Aviation	Capacity Improvement through Automated Airport Surface Traffic Control	Surface
Optimal Synthesis	Surface Operation Automation Research (SOAR)	Surface

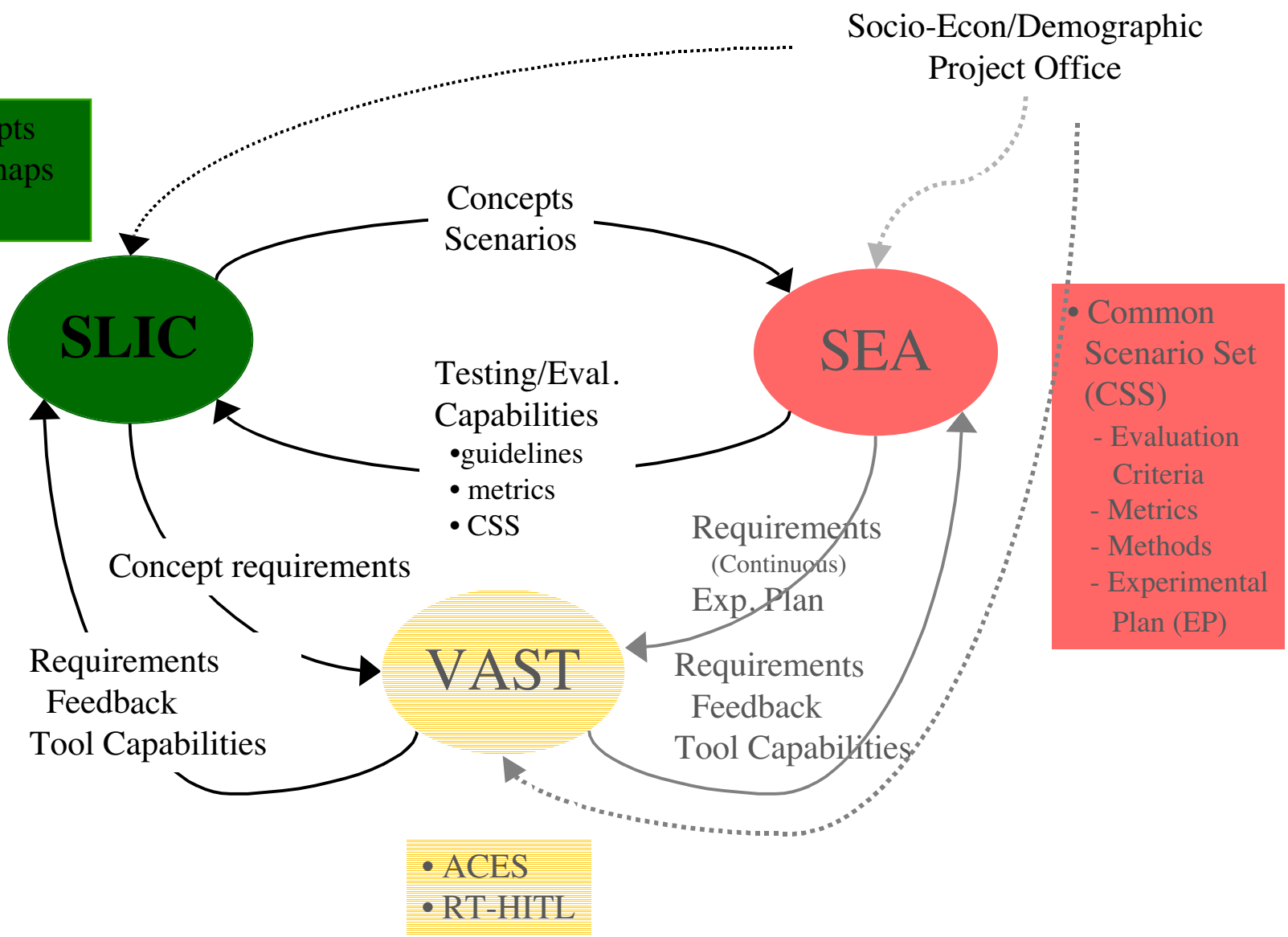
Gathered Concepts - NASA

NASA-ARC	Advanced Airspace Concept	En route
NASA-ARC	System-wide Optimization	Gate-to-Gate
NASA-LaRC	Wake Vortex Avoidance System (WVAS)	Terminal

Gathered Concepts - Others

Raytheon	Terminal Area Capacity Enhancing Concept (TACEC)	Terminal
University Group (Zellweger)	University Concept(s)	System

Sub-element Interactions



VAMS Participant Interactions

- Technical Monitors assigned to each Concept
- Technical Interchange Meetings – two per year
- Concept developer “deliverables”

Key Challenges

- Can the concept be analytically modeled?
- Can concepts be successfully blended?
  - These are topics for the Guidelines Breakout