ACAST Workshop 2005

Space-Based Technologies Project

Integrated CNS Infrastructures Subproject Review

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Integrated CNS Infrastructure Subproject Review

Related Presentations

- Subproject Overview – Steve Mainger
  - Transitional Architecture
  - Global A/G Network
  - Spectrum Research

- Spectrum Research
  - Larry Foore, NASA Glenn Research Center
  - Detailed Spectrum Research Plans

- NASA Secure Mobile Networking presentation
  - Will Ivancic, NASA Glenn Research Center
  - Scheduled for Wednesday at 10:45am

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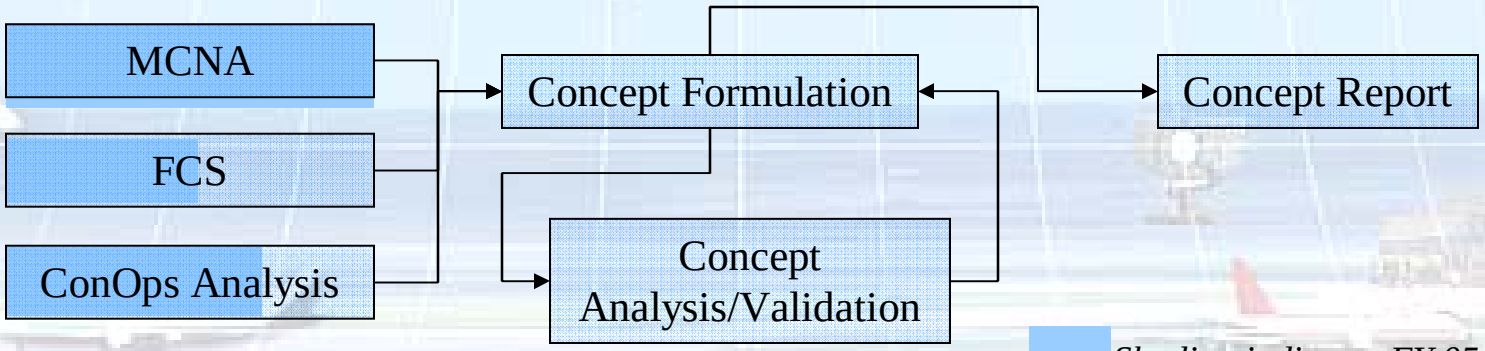
Transformational Concepts

Goal: Define, analysis and validate the operational concepts emerging from industry and government sources that indicate potential to transform the CNS architectures of the national and global air space; produce findings which will contribute to the definition of a Transitional CNS Architecture.

Rationale: The emergence of paradigm altering CNS concepts (such as, network centricity, aviation use of IPv6, etc.) have given rise to the need to sort through these candidate concepts and prepare a recommendation for continue analysis which will lead to the development of a transitional CNS architecture

Final Product: Transformational Concept Report due 2QFY06

Approach:



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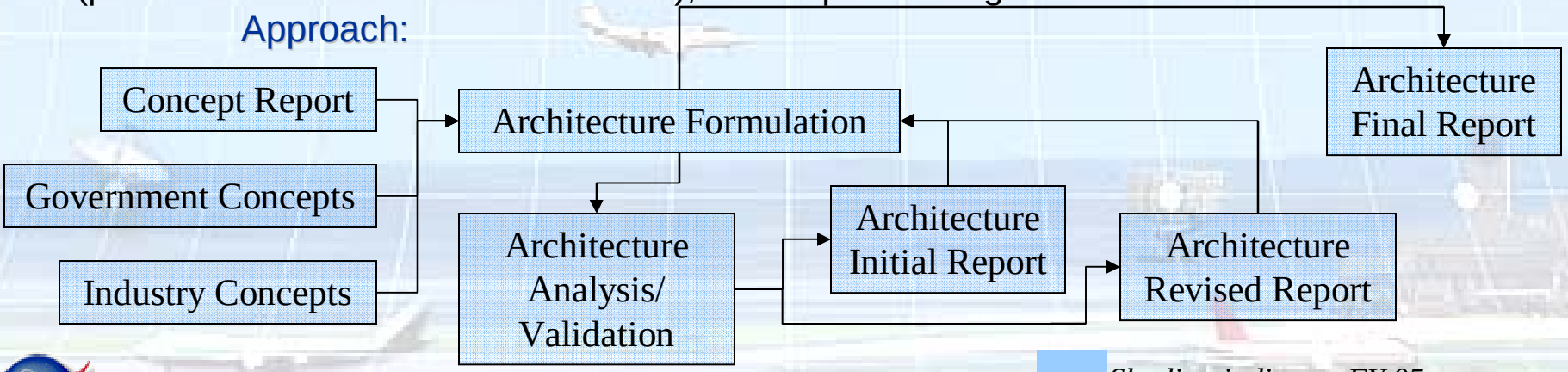
Transitional Architecture

Goal: Define, analysis and validate a transitional CNS architecture with the potential to bridge the gaps and chart a course between current analog systems and the digital requirements of the future.

Rationale: Important ConOps (i.e., FAA SWIM, MCNA, FCS, NGATS (JPDO), RTCA and others) continue to provided direction for the transformation of the NAS. The concepts of global interoperability, network centricity, hybrid satellite/ terrestrial architecture, and data link need to find their place in the CNS architecture and the NAS. The transition strategy for a long-term, high-level CNS architecture is required.

Final Product: Formal analysis of Architectural issues, validate architecture (produce simulations and emulations), and report findings

Approach:



Shading indicates FY 05 progress

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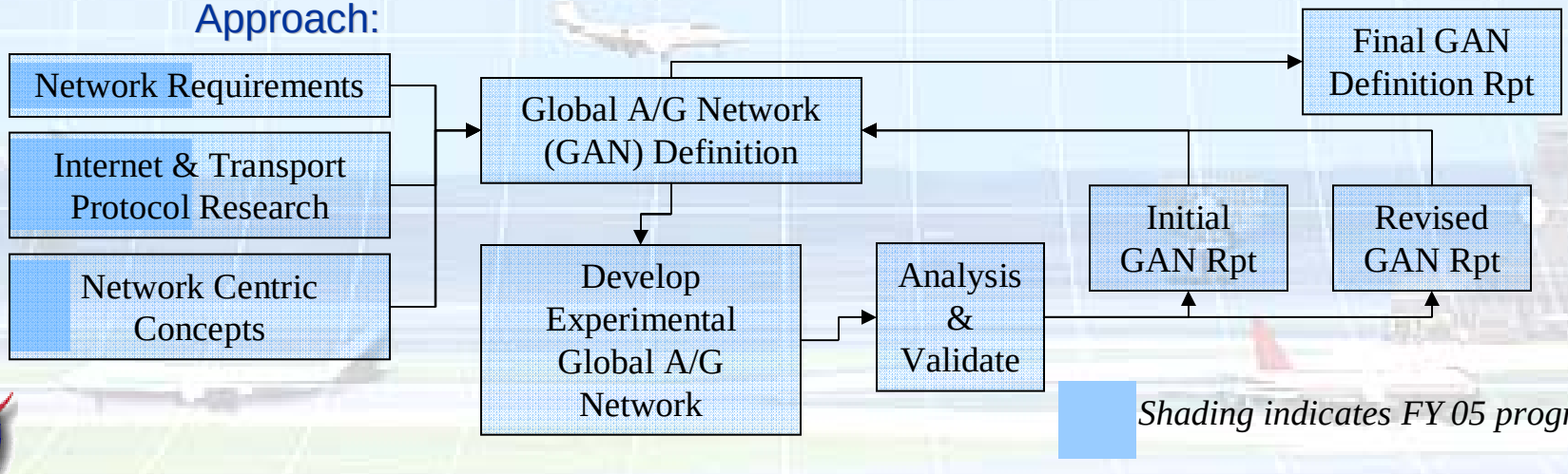
Global Air/Ground Network

Goal: Develop a global air/ground network architecture by defining, validating and demonstrating such a network's requirements, components and interface standards and protocols, and provide technical support for advocacy of these standards and protocols to industry regulatory bodies.

Rationale: The international standardization and coordination of networking standards and protocols; research and experimentation with targeted network standards and protocols; and research to create a roadmap for US & international network standards development are vital to defining an acceptable network solution.

Final Product: Experimental GAN Network; Analysis and Validation Reporting; and GAN Definition Report

Approach:



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Spectrum Research

Goal: Perform research necessary to ensure the protection of current aviation bands, identify other bands that may be used for aviation purposes, and develop an aviation spectrum roadmap that will allow the NAS to transition to the future communication system

Rationale: As FAA ATM systems are removed from service (i.e., MLS, …), the spectrum allocated for operations of those system is made vulnerable to speculative reuse by commercial interest. Without sound technical data for the benefits of reallocation of the spectrum to other ATM system uses, the international governing bodies/functions such as the World Radio Conference

Final Product: Recommendations for aviation reuse of MLS C-band allocation; support to FAA Spectrum office for WRC-07

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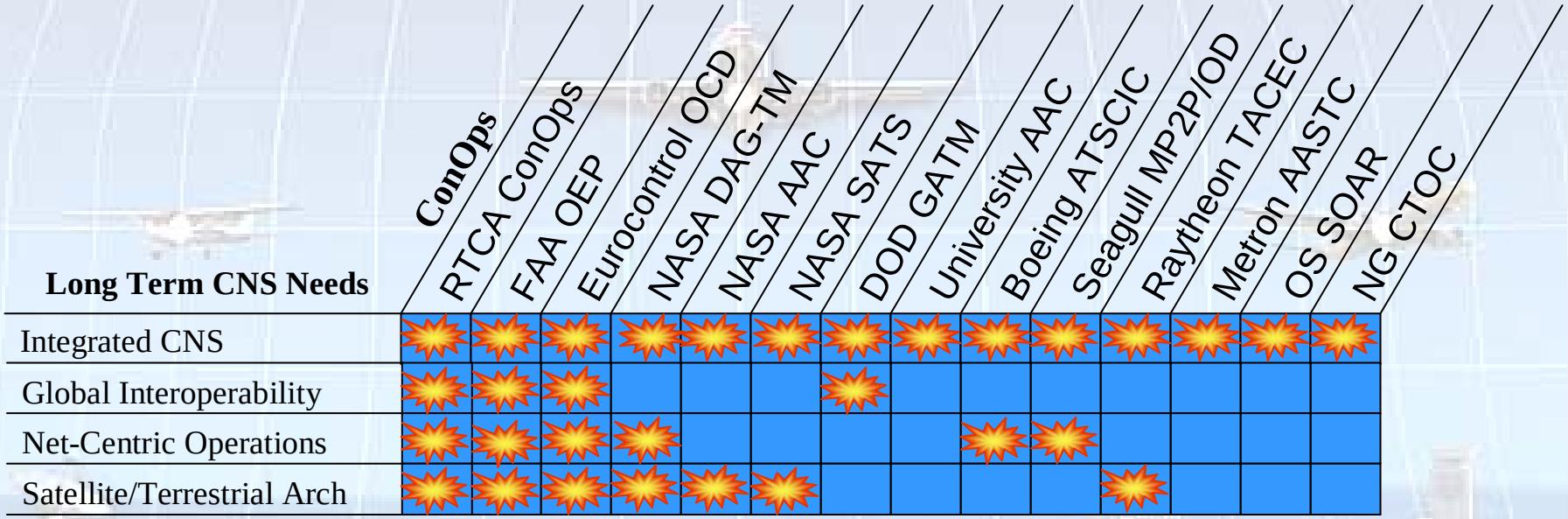
Transformational Concepts – FY 2005 Results and Accomplishment

- **Preliminary requirements analysis results:**



- Early in FY05, Identified several concepts of operations for possibly analysis; awaiting completion of MCNA and phase 1 of FCS before proceeding with complete analysis.

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Transitional Architecture – FY 2005 Results and Accomplishments

- Analysis of government and industry concepts in 1QFY05 identified related ConOps (FAA, RTCA, JPDO, Eurocontrol, others) that should be consider in preparing a notional transition architecture;

- Monitoring of the completion of MCNA and Phase 1 of Future Communication Study has prepared the GRC in-house staff for moving forward on defining a notional transition architecture.

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Global A/G Networks – FY 2005 Results and Accomplishments

- Solicited Communication Requirements from airline and aviation industry; they did react to GAN requirements – moderately good response

- Participate with ICAO ACP WG-N to explore ATN Mobility Requirement using IPv6

- Global Air/Ground Network Supporting Research
  - Network Architecture
    - Investigation of IPv6 – significant body of existing mobility research being leveraged,
    - IPv4/v6 transition mechanisms
    - Multi-homing: off-aircraft and at corporate network

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Global A/G Networks – FY 2005 Results and Accomplishments

- *Global Air/Ground Network Supporting Research* (cont.)
  - Network security
    - Assessment of Certificate/Key Server operation
  - Network Protocol
    - Fundamental protocol research which supports IETF NEMO activities
    - Mobile IP and AdHoc Network Research
      - Existing Space-act with CISCO
  - Transport Protocols
    - Stream Control Transport Protocol (SCTP) – Univ. of Oklahoma grant
    - Host Identity Protocol (HIP)

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Spectrum Research – FY 2005 Results and Accomplishments

Ohio University, in conjunction with the Surface Area Subproject, has performed channel sounding in two major airports.

The database of MLS channel power-delay profiles is building;

Funding constraints in FY05 prevented one academic study from being performed, which looked to address the performance of particular wideband data waveforms in the MLS Band.

Performance evaluations of the 802.11a and 802.16a waveforms in the MLS channel are being performed in-house.

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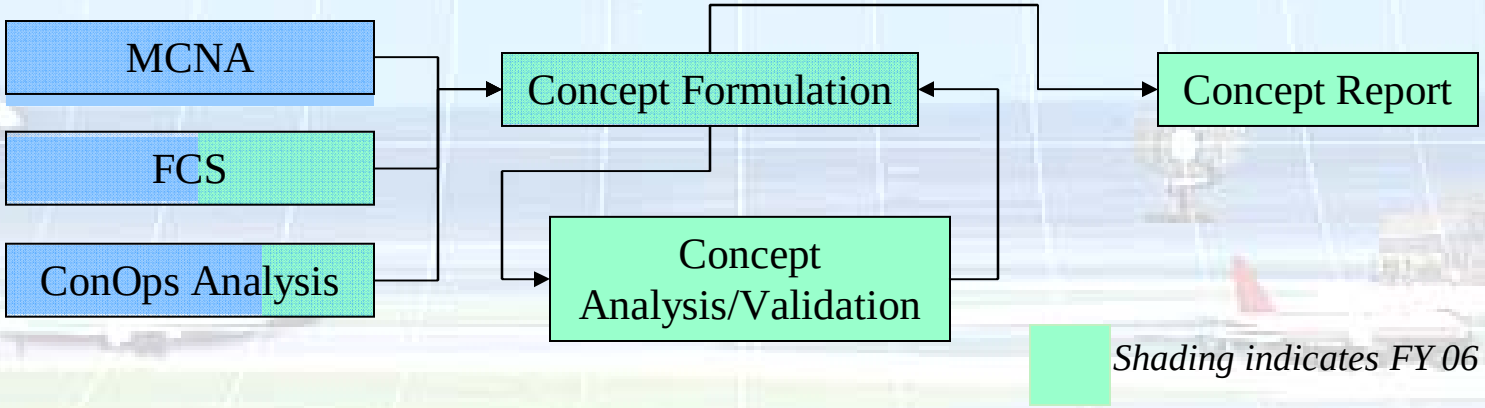
Transformational Concepts – FY 2006 Plans

- Complete Transformational Concept Formulation process
- Perform analysis/validation of transformational concept
- Prepare concept report due 2QFY06



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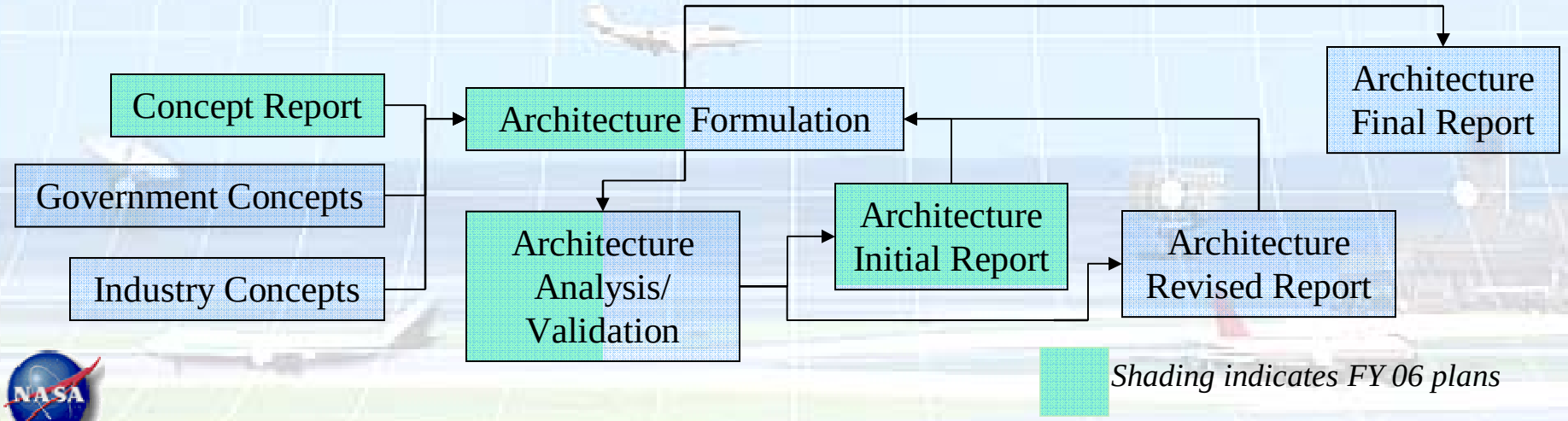
Transitional Architectures – FY 2006 Plans

- Input the NASA developed transformational concept and additional critical government and industry concepts into the Architecture formulation process
- Formulate a notional transition architecture
- Perform analysis and validation of this notional architecture (simulation or emulation of key assumptions as required)
- Prepare initial architecture report by 3QFY06



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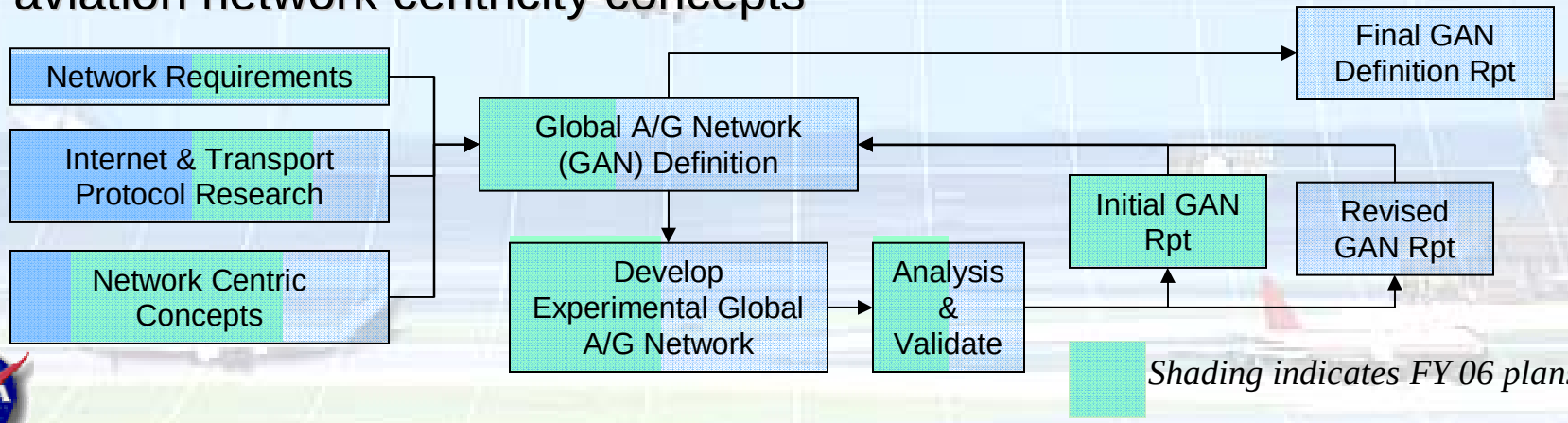
Global A/G Network – FY 2006 Plans

- Develop collaboration with existing experimental build-ups (SWIM or other) of global or air/ground networks to address issues, such as:
  - Policy – identify and influence critical policy shortcomings
  - Identify realizable/ practical network architecture
  - Quality of Service (QoS)
  - Security – mechanisms and procedures
  - Multihoming
- Continue Internet and Transport Protocol Research and definition the aviation network centricity concepts



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Spectrum Research – FY 2006 Plans

Following a successful WRC-07, assess successes and outputs;

- Develop Transitional Plan to support expected aviation traffic increase.
- Identify strategy, with respect to the agenda decided upon at WRC-07, for the WRC-2010.
- SBT Spectrum Final report [FY09] will identify particular studies that will need to be executed for WRC-2010,