

Acquisition Executive Board (AEB) V&V Working Group Status



V&V Summit 2010

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Date: 10/14/10



Federal Aviation
Administration



Briefing Topics

- Objectives and Philosophy
- Criticality of Useful Data
- Accomplishments
- Focus Areas
- Next Steps



AEB V&V Working Group

Who: FAA V&V experts under the AEB

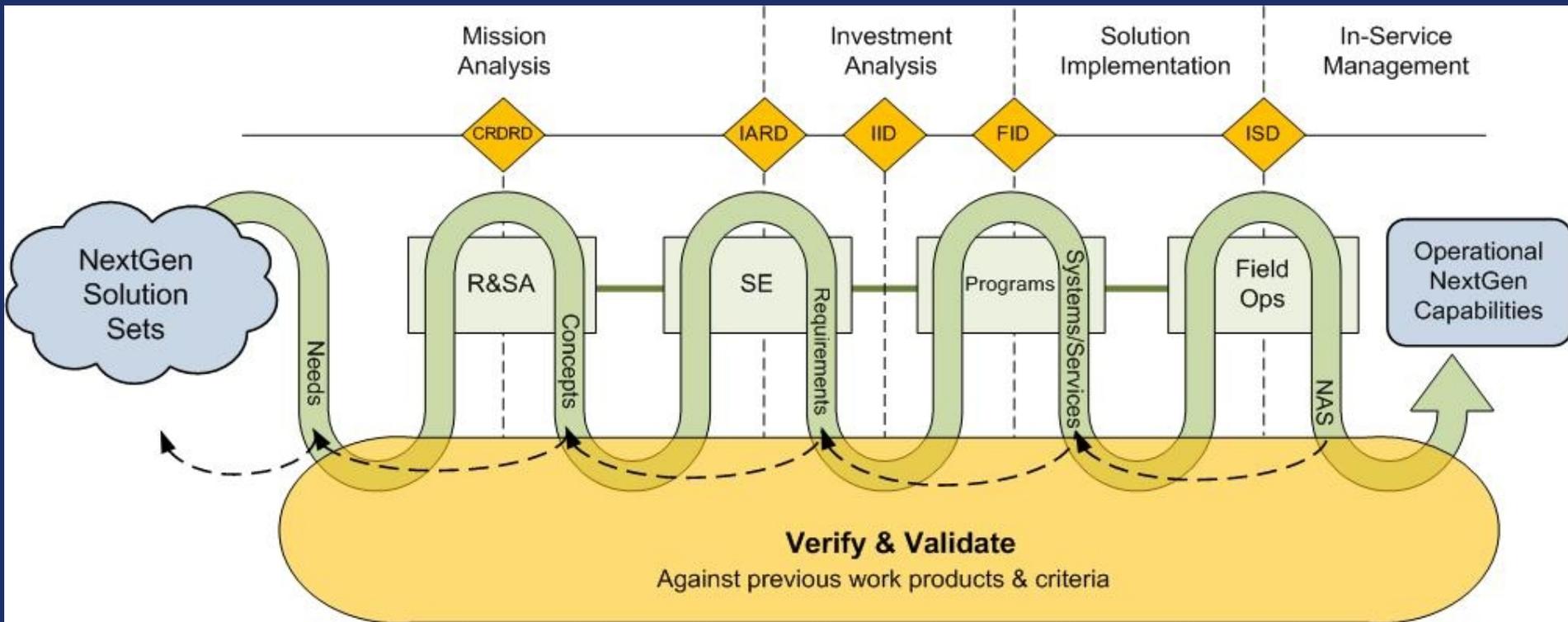
Mission: Establish a common V&V philosophy

- Across the AMS lifecycle (MA, IA, SI, ISM)

Objectives: Recommend V&V policy changes and improvements

- Identify and define V&V improvement opportunities in MA, IA, SI, and ISM
- Identify and define FAA V&V best practices

Conceptual View of V&V Philosophy



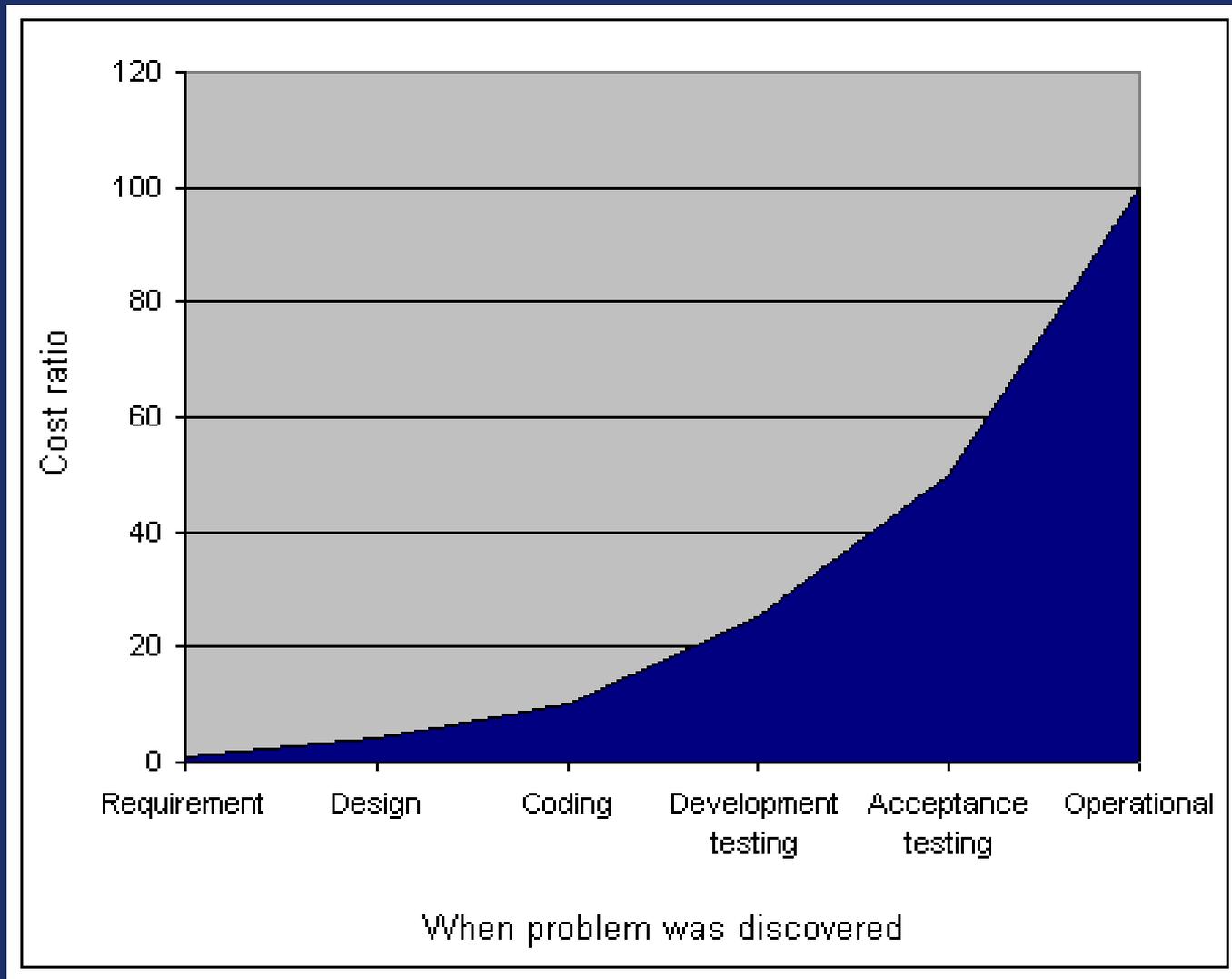
How important is the data?



When would the data be most useful?

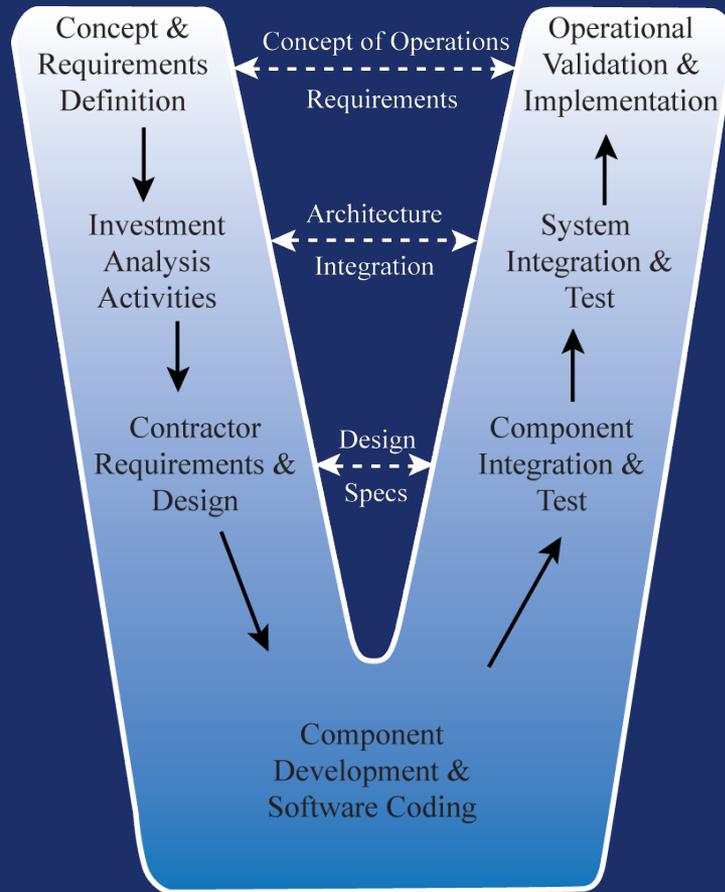
Answer: In time to safely and efficiently act on it.

The Value of Data: Relative Cost to Fix



* Boehm 1981

V&V Data for Decision Support



Decision Elements

- ◇ Operational mission
- ◇ Operational concepts
- ◇ Available technologies
- ◇ Solution sets
- ◇ Requirements
- ◇ Design
- ◇ System performance
- ◇ Implementation plans
- ◇ Criteria for deployment
- ◇ Criteria for operations

V&V Data is Needed to Support Decision Elements Throughout the “V”

Elements of successful V&V

1. Culture and organization that embraces the discipline
2. Policies and processes that support the discipline
3. Methods, test beds, and tools that enable the discipline
4. Responsible agents that oversee, maintain, and sustain the discipline



NextGen Challenges to V&V Elements



1. Capabilities go across domains/services

(i.e. a system-of-systems)

Challenges:

- V&V approach will need to be integrated
- Programs will have increased variables and complexity

2. Operational concepts dramatically different

(For pilot, automation, controller, NAS, and aircraft)

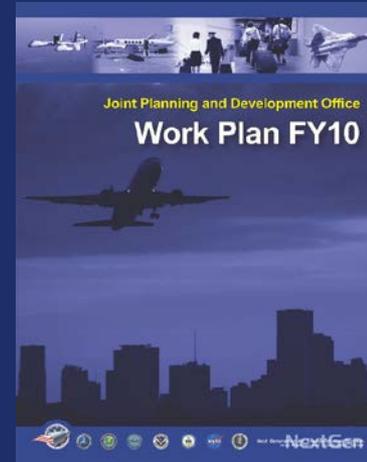
Challenges:

- Operational concepts will be fluid and evolving
- Larger NAS environment to validate (validation of the collective)
- New simulation and modeling requirements

Increasing Emphasis on V&V



- **JPDO**
 - Essential to delivering NextGen Capabilities
 - NASA Aviation Safety Research V&V Program
 - JPDO 2010 Work Plan priority initiative
- **Industry Focus**
 - DOD
 - International (e.g. ITEA)
- **FAA**
 - V&V is a key element to the Tech Center's mission and line of business responsibilities
 - AEB V&V Working Group established



FAA AMS LIFECYCLE
VERIFICATION AND VALIDATION
GUIDELINES
Version 1.0



December 2, 2009



V&V Working Group Accomplishments

- Lifecycle V&V Philosophy Whitepaper- 4/3/09
- Conducted V&V Stakeholders meeting – 10/21/09
- V&V policy changes incorporated into AMS - 01/2010
- V&V Guidelines developed/posted to FAST - 01/2010
- V&V philosophy is addressed in other guidelines
 - Investment Analysis Guidance
 - Service Analysis and Concept and Requirements Definition Guidelines Document



Current Focus of V&V Working Group

- **Provide V&V tools for applying V&V practices**
 - Practical (value added) standards, checklists, and guidance
 - Tools that help to ensure the success of programs
- **Integrate into AMS**
 - Address V&V in the FAST standards and tools
 - Ensure V&V and policy align



V&V Tools: Checklists

- **Provide checklists for each critical AMS work product (document)**
- **Supports assurance:**
 - Quality documents that comply with standards and requirements
 - The work product supports and fulfills needs
- **V&V Checklist Status**
 - PRD V&V Checklist - Complete
 - ISPD V&V Checklist - Under development
 - Planned/Proposed: Con Ops, EA Views, APB, TEMP, System Spec, SIR

V&V Tools: Define Critical Performance Requirements (CPRs) in AMS

– Replaces Key Performance Parameters (KPPs)

- Primary/Must-have requirements
 - Represents attributes or characteristics essential to meeting the mission needs
 - Standardize the terminology and use of CPRs across AMS
 - Documented in the APB and PRD
 - Part of the total program requirements (assessed throughout lifecycle)

– Status

- Description by the V&V Working Group
- Reviewing CPR approach with Systems Engineering
- Plan to replace KPPs with CPRs in AMS
- Need to assess and integrate with policy and guidance

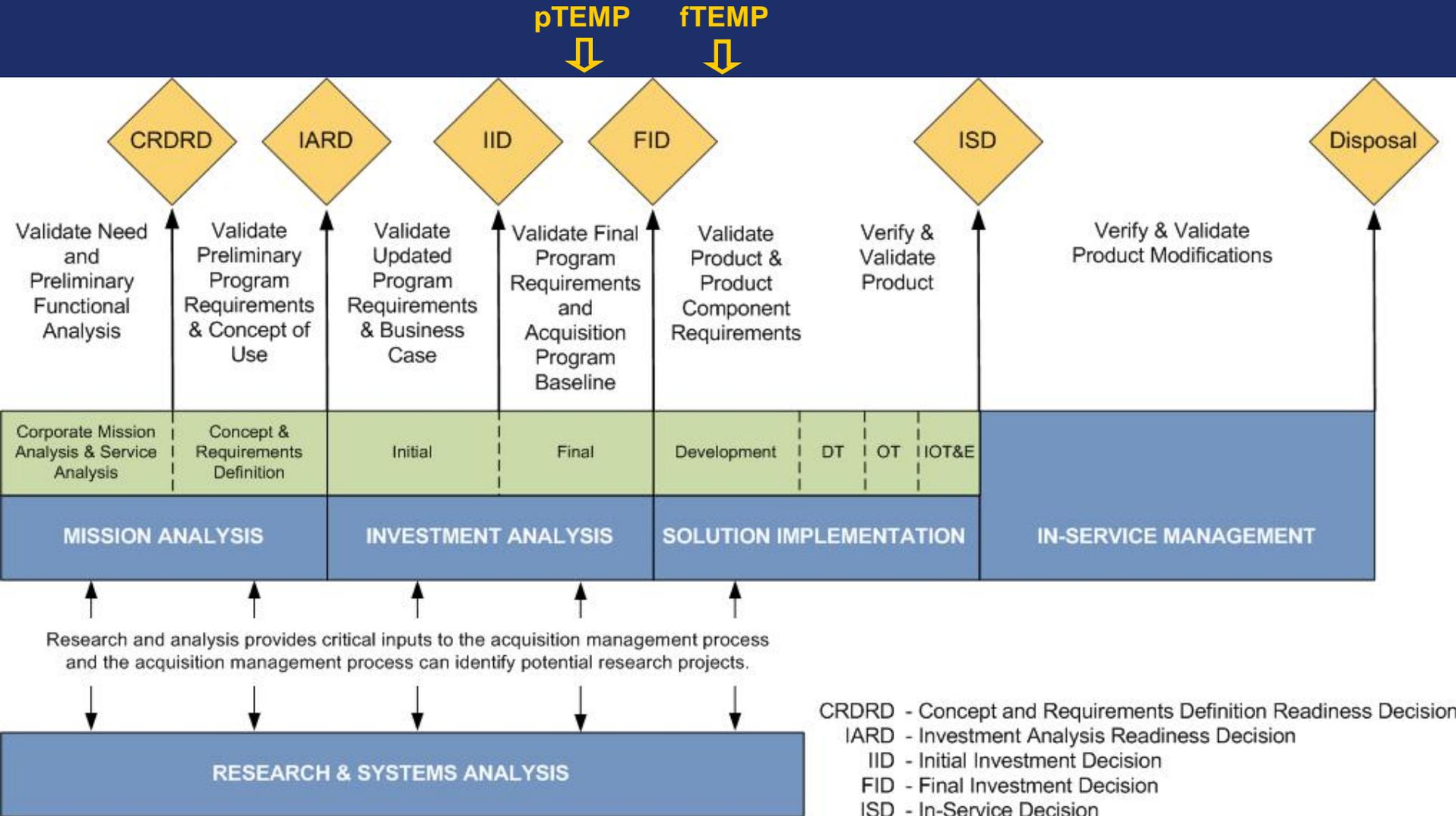
V&V Tools: Critical Operational Issues

- **Key operational capabilities**
 - Measured to affirm that a product meets the needs
 - Ensure capability is ready for operations
- **Assessing AMS COI policies and guidance**
 - Looking at best practices (e.g. DOD) for potential improvements
- **Status**
 - COI standards and definitions working draft complete
 - The V&V Working Group will provide COI standards and definitions for AMS policy/guidance

Reinstitute: Test and Evaluation Master Plans (TEMP)

- **Establish baseline T&E plans and strategies before Final Investment Decision**
 - T&E baselines should be managed by the program throughout the lifecycle
- **Propose a Test and Evaluation Master Plan (TEMP) be required for all programs**
 - Tailored based on program size and criticality
 - Revised/updated (as required)
 - Required TEMPs align with DOD best practices
- **Status**
 - The V&V Working Group has a TEMP definition, process description, and template developed and under review

Integrating V&V and T&E into AMS



Goal: Balanced V&V that Supports the Success of the Programs



V&V Working Group: The Way Ahead

- **Develop and implement focus items into AMS Policy and FAST**
 - V&V Checklists
 - COIs
 - CPRs
 - Formalized TEMP
- **Enhance V&V**
 - Modify associated FAA policies, guidelines, and activities
- **Improve V&V practices to prepare for NextGen**



Backup Info



Summary of V&V Philosophy

- **Verification ensures that a product is built right (according to specifications)**
- **Validation ensures that the right product is built (to fulfill its intended use)**
- **Products are:**
 - Verified against requirements
 - Validated against needs
 - The basis for V&V of future work products
- **V&V supports key program decisions and risk mitigation**
- **Emphasis is on work products developed early in the AMS lifecycle**