# ATEC VV&A Program

Joint VV&A Meeting
14-15 Nov 01

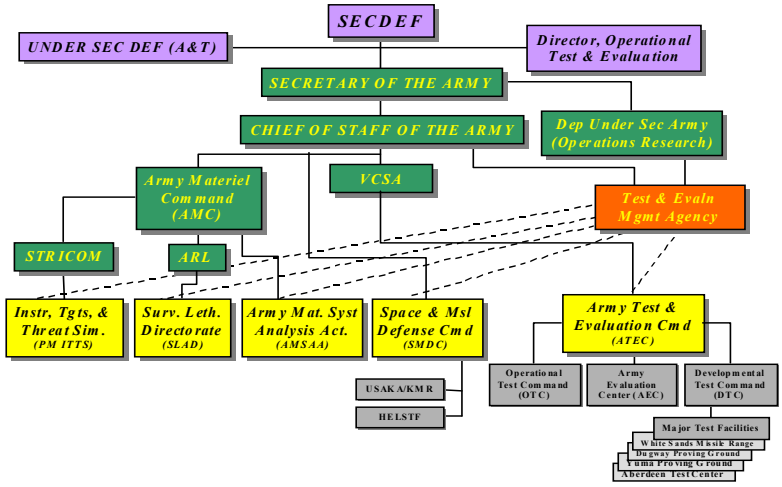
U.S. Army Evaluation Center
Technical Support/Methodology Division

U.S. Army Developmental Test Command
Technology Management Division

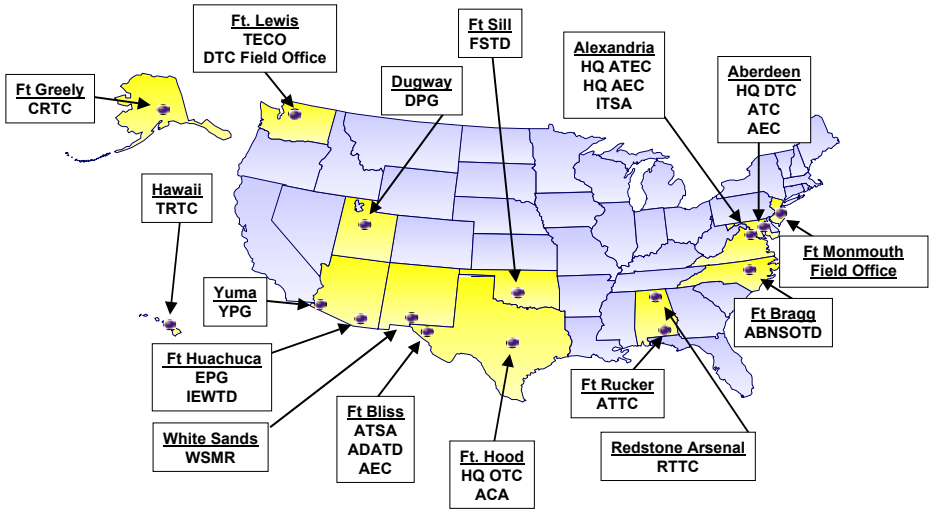
# Agenda

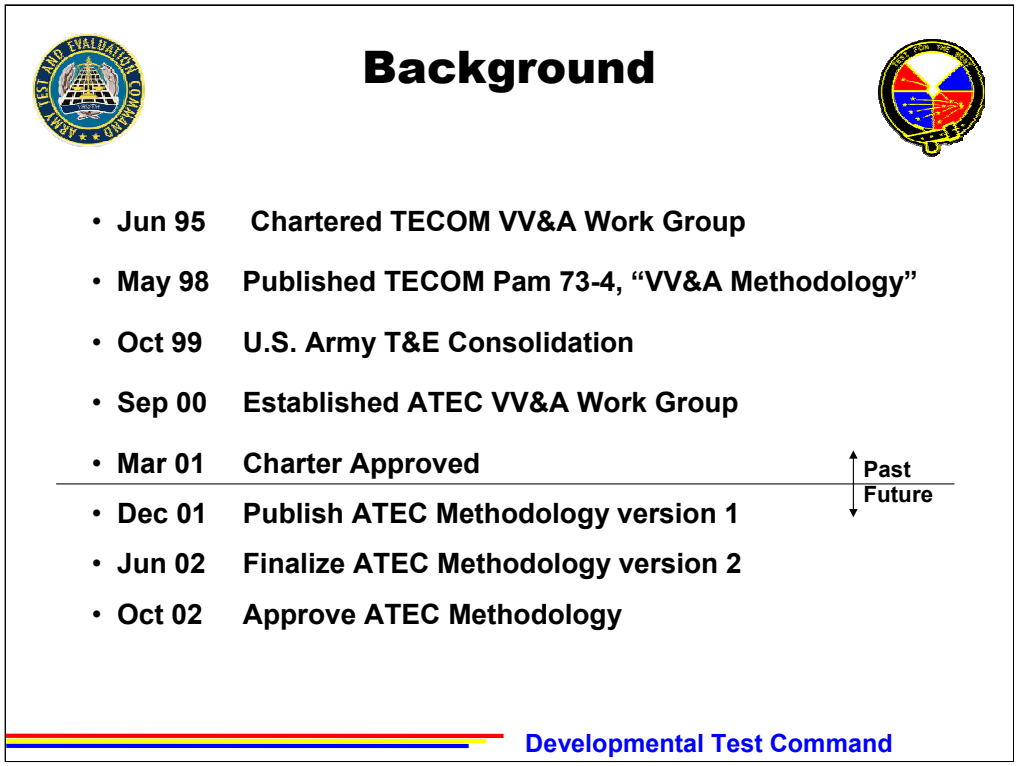
- Who is ATEC?
- Background
- VV&A Definitions
- T&E Perspectives
- Observations and Lessons Learned
- VV&A Methodology and Guidance
- Conclusions

# Army Test and Evaluation Community

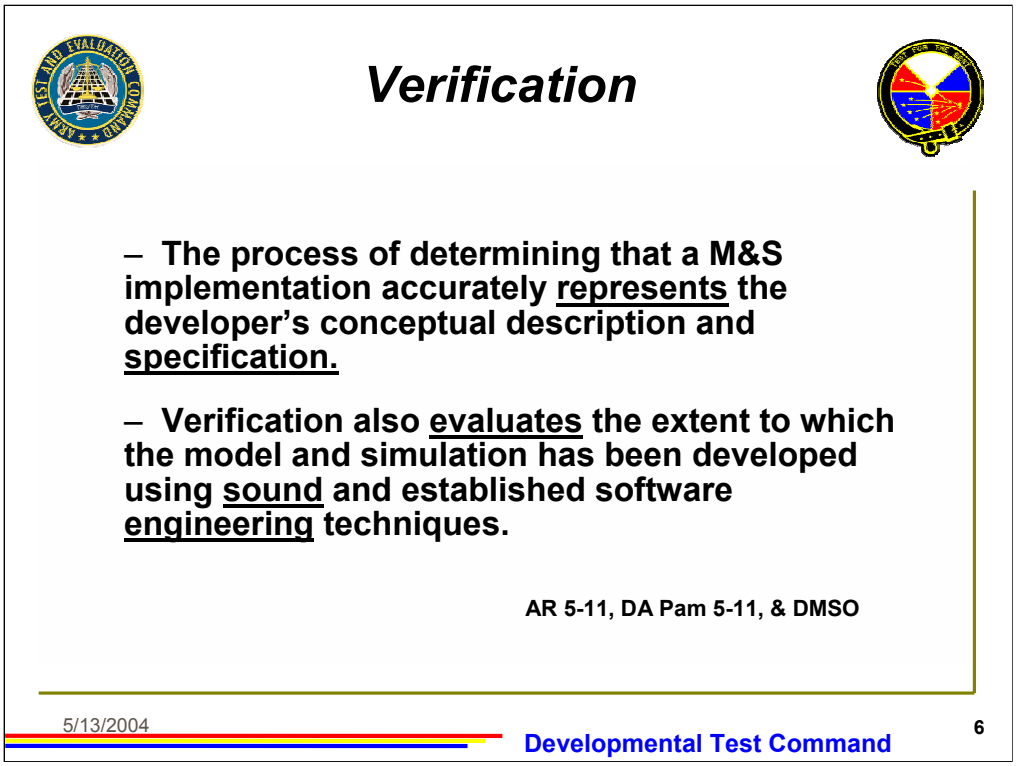


# ATEC Locations

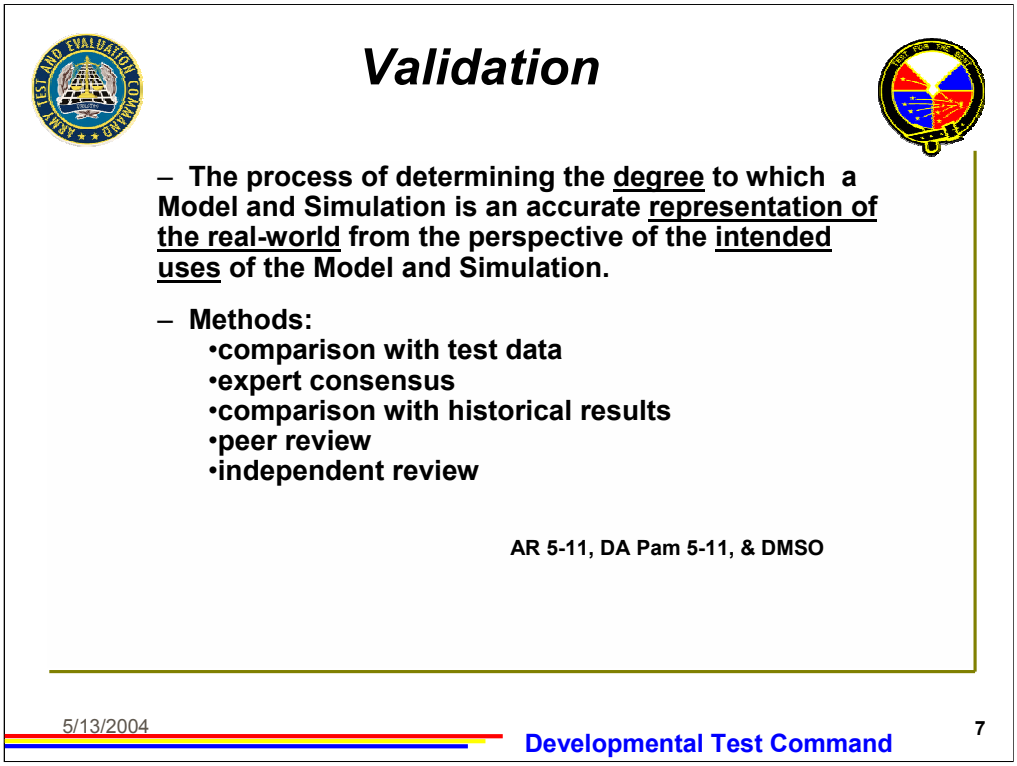




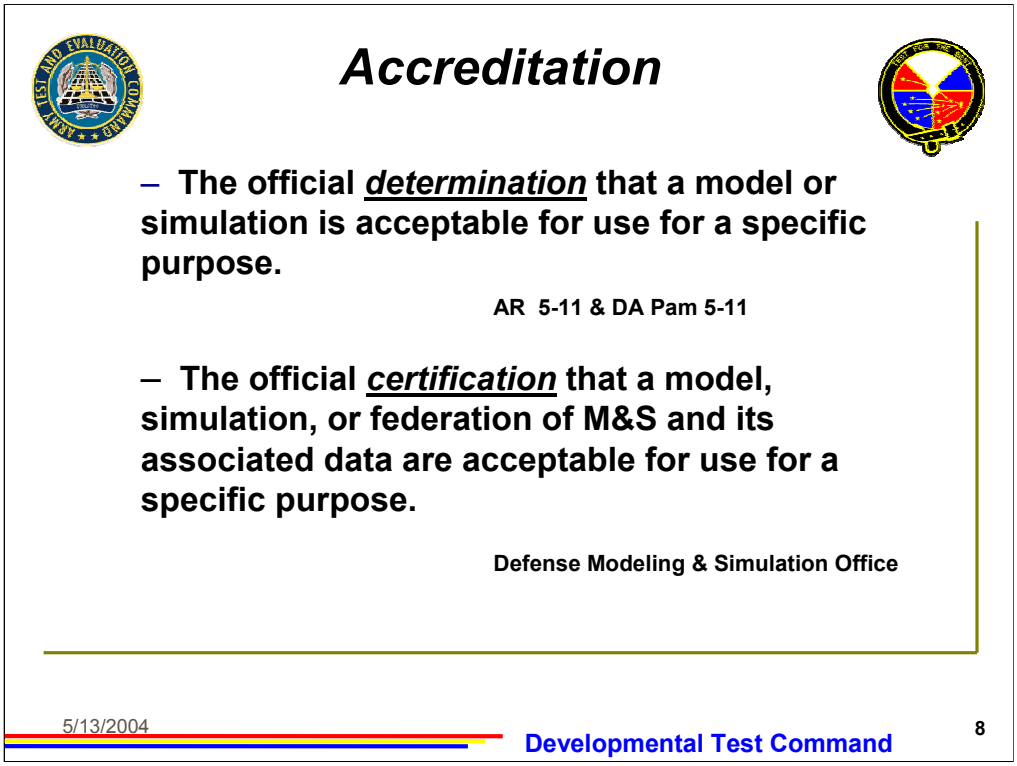

First, I'll show you talk about our VV&A/C working group and who are involved. I'll then explain the objectives of this group and some of their accomplishments to date, and finally, layout the milestones for their effort.



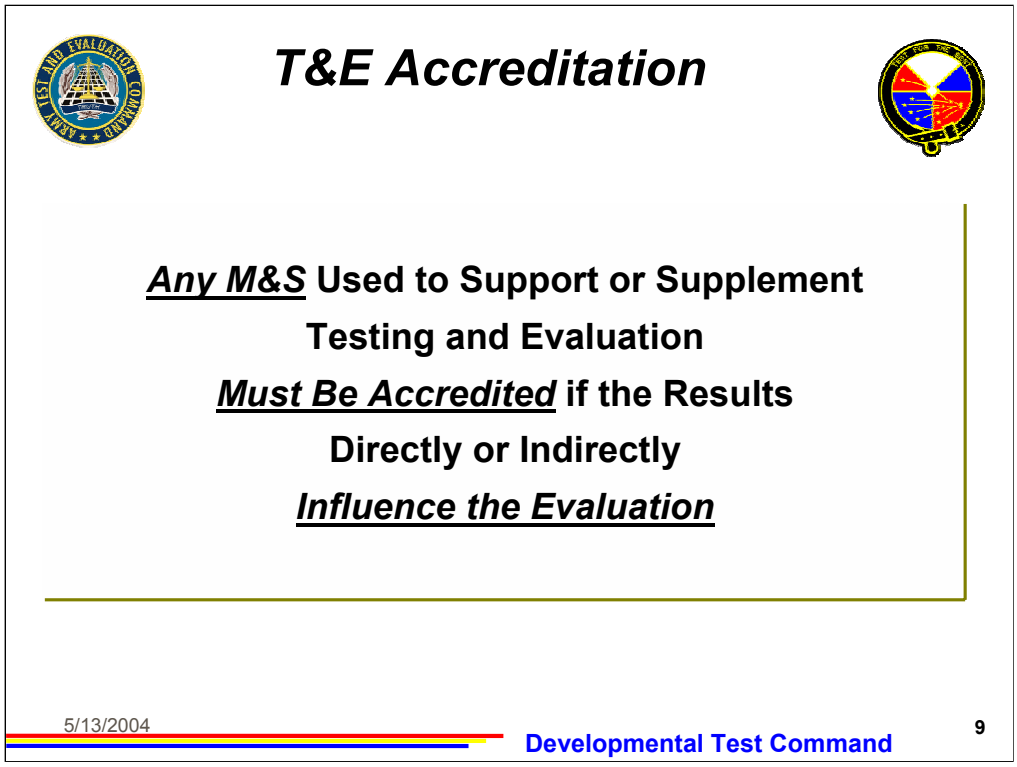

Verification is the process of determining if an M&S accurately represents the developer's conceptual description and specifications and meets the needs stated in the requirements document. Ultimately, the verification process establishes if the simulation correctly performs the intended functions and the extent to which the simulation has been developed using sound system engineering. In testing, the verification of interfaces is of particular importance to ensure that modeled components are able to interact with each other and with hardware components. For example, virtual instrumentation interfaces with models and analysis tools, models interface with synthetic environments, and synthetic stimuli (e.g., HWIL simulations) interface with hardware components.




**Validation is the process of determining the extent to which M&S accurately represent the real world from the perspective of the intended use of the M&S. Validation has to do with the fidelity of the M&S. The fidelity of the M&S is judged by several factors, one of which is its ability to predict the known, or best estimate, of the behavior of the real system when subjected to the same stimuli. If the significant parameters of a real system have been properly incorporated into a model, a simulated experiment should reflect the behavior of a real system, down to some level of detail commensurate with that description.**




**Accreditation is an official determination that an M&S system is acceptable for its intended purposes. It is based on experience and expert judgment and includes consideration of the extent to which V&V has been accomplished. Accreditation is a management level responsibility with assistance from the V&V team. The accreditation decision is based on the experience and expert advice provided by the V&V team. The specific use of the M&S must be considered in the context of its capabilities and limitations.**

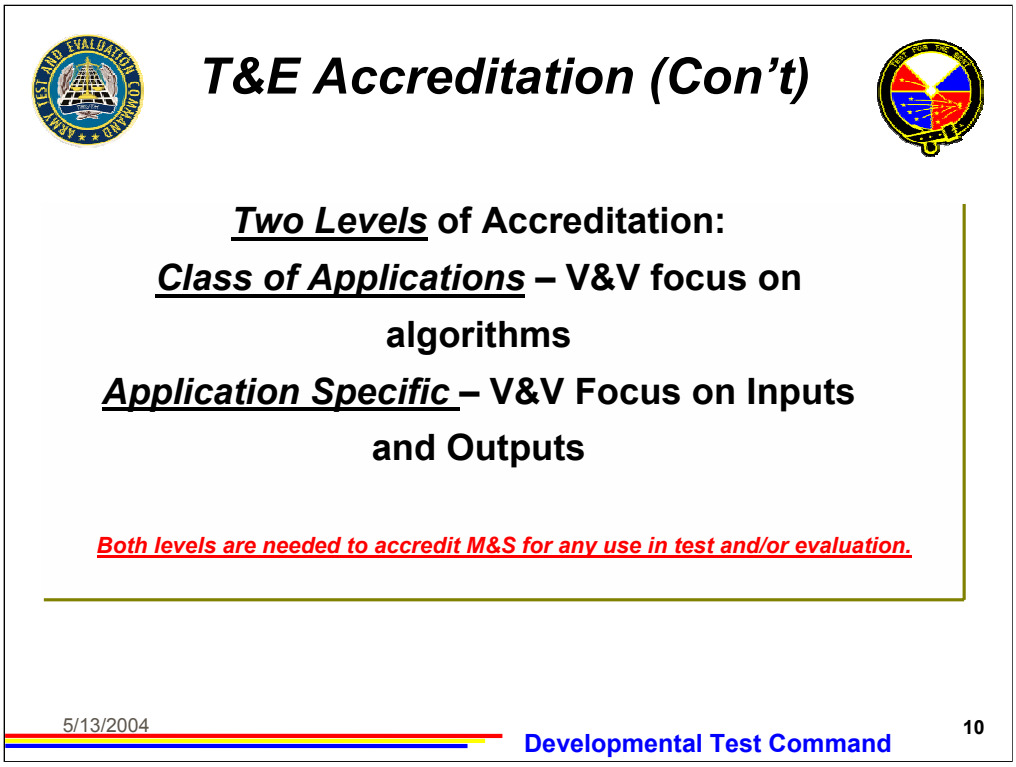



**Accreditation**

**is a process that leads to an official determination that a model is credible and suitable for a particular use**

**must take place for each application of a given M&S (e.g. using CASTFOREM in the evaluation of a tank is not the same as using it for a helicopter).**

**signature authority is approver of the document in which M&S is used**

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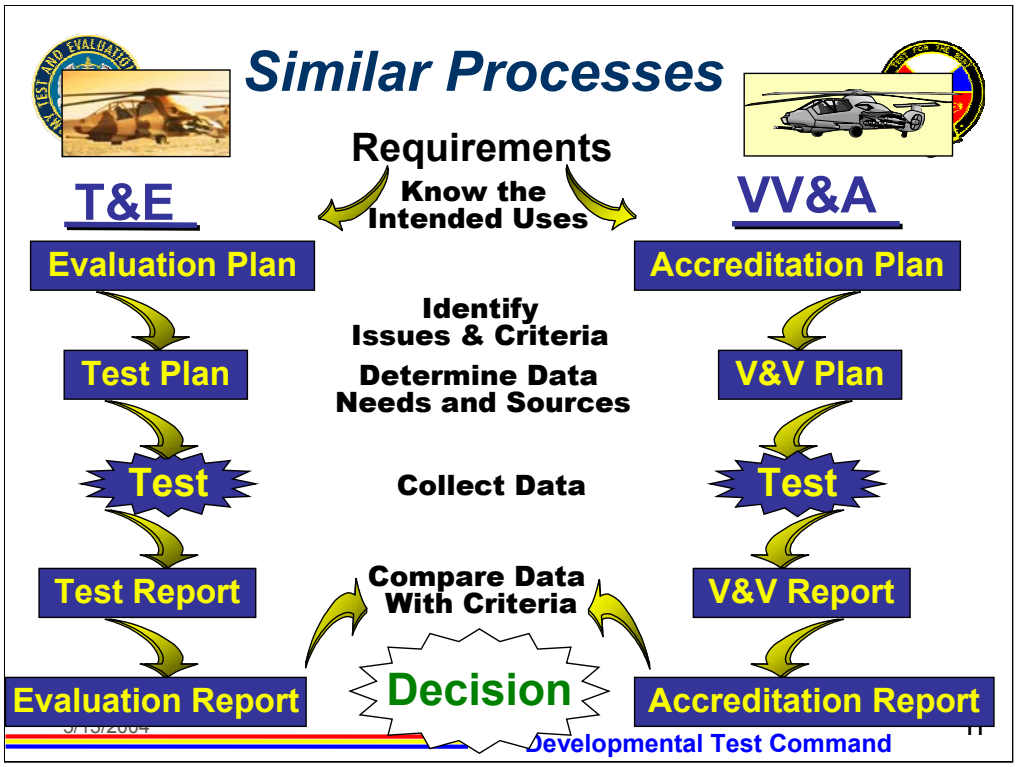
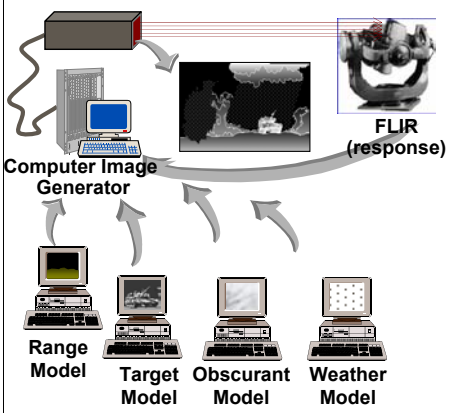



**Chart shows the functions of system Test and Evaluation (T&E) and system model VV&A. Verification and Validation (V&V) is analogous to the test process, and accreditation to recommendation to field. Verification and developmental T&E are both conducted to ensure that design risks are minimized and design specifications are met. Validation and operational T&E are the processes used for determining the extent to which the model accurately represents the real world. Finally, accreditation and the evaluation report are both official determinations of the degree to which the model or system is acceptable and ready for its intended purposes. In either case, the primary objective is to ensure that the system, either conceptual model or hardware prototype, meets specifications, operational requirements, and intended application in support of a milestone decision. Based on these analogies, the basic principle and process of T&E also applies to VV&A.**

# Dynamic Infrared Scene Projector (DIRSP)

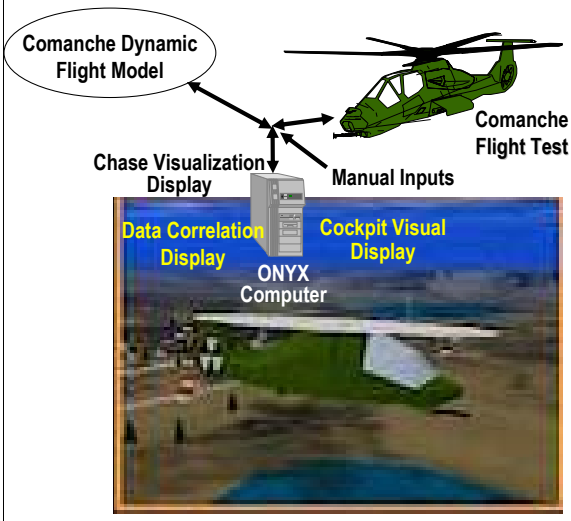



**Input:**
- Terrain Data
- Met Data
- Target Signature
- Target Motion
- Obscurant Data
- System Response

**Output:**
- Dynamic IR Image

**Uses:**
- Synthetic Test Environment
- Training

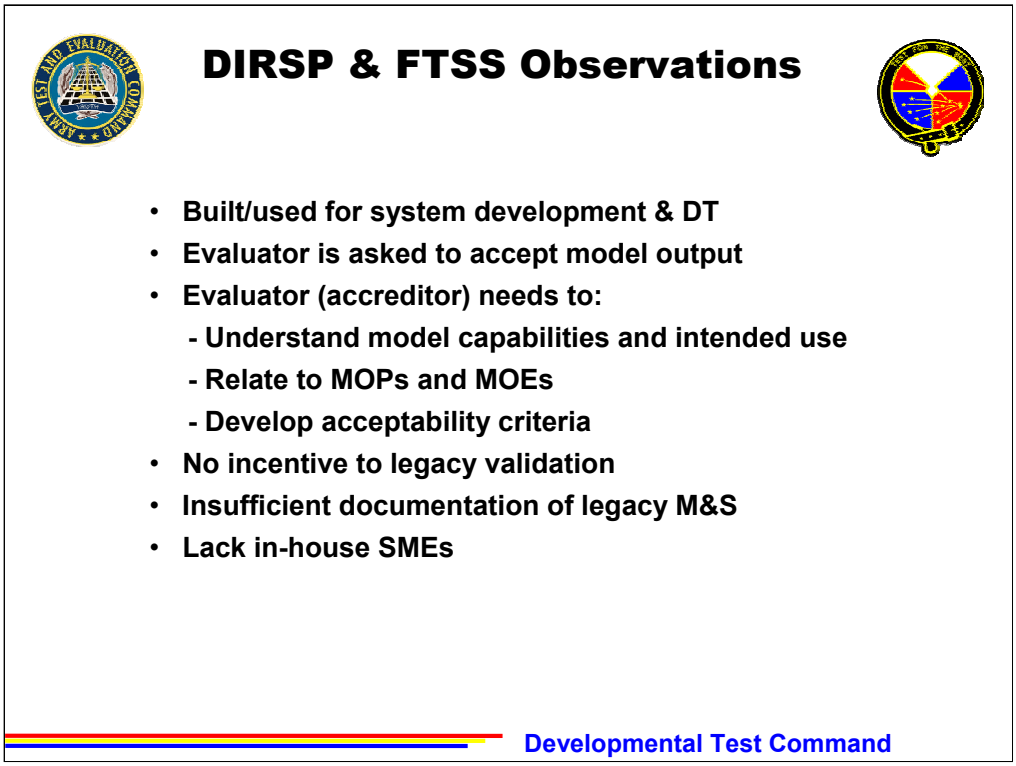
# Flight Test Simulation Station (FTSS)




**Input:**
- Aircraft Data
- Met Data
- Manual Control
- Flight Test Data

**Output:**
- Fly-Out
- Sensor Performance
- Target Effects

**Uses:**
- Test Planning
- Prediction



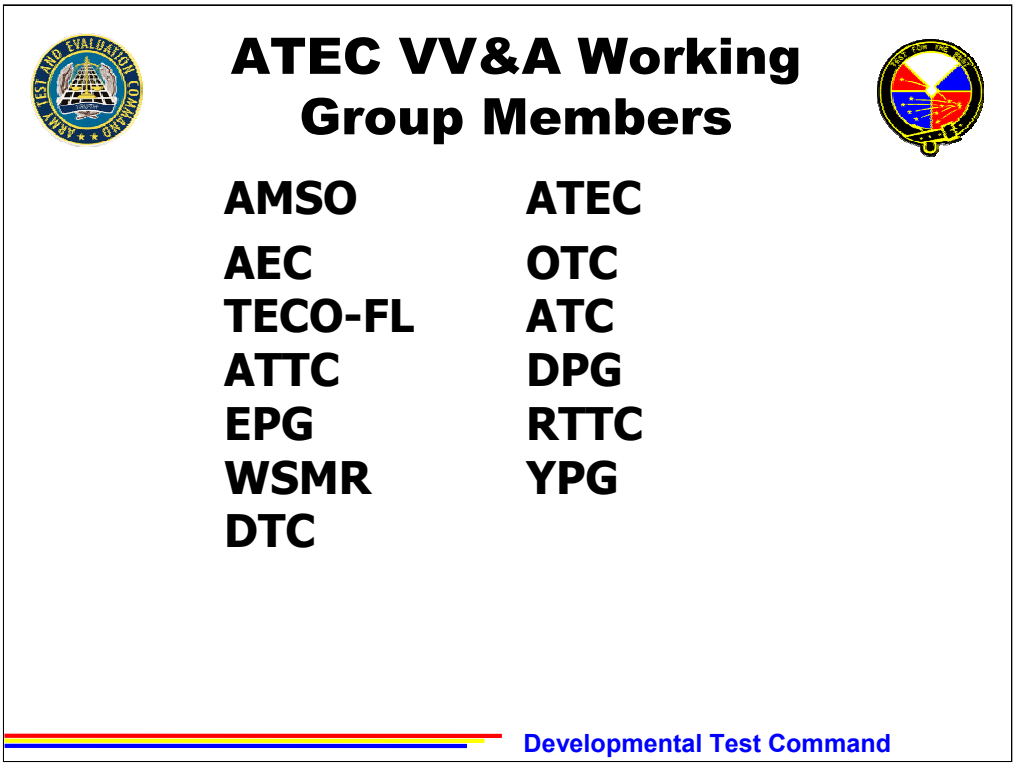

The working group is striving to provide a robust, unified VV&A/C approach and critical assets required to enable the test centers to effectively and consistently:

- Conduct VV&A/C of emerging VPG components.
- Develop VV&A procedures for VPG models, simulations, and hardware.
- Familiarize VV&C process for VPG terrain, synthetic stimuli, weapon system performance data, and other critical data.
- Support VV&A of weapon system models and simulations.

The working group is also identifying skills, knowledge, and required to

# Lessons Learned

- Specify roles and responsibilities.
- Must have well-defined intended use and acceptability criteria upfront.
- V&V tasks must be agreed upon by all parties before implementation.
- V&V is labor-intensive and requires stable & experienced implementation team.
- Need to establish a close working relationship between developer and user.
- Developer needs to maintain good documentation on system changes.
- Be flexible – avoid traditional acquisition approach of fixed specification to prevent acquiring obsolete technology.
- Independent peer review can be very helpful, especially at the onset for conceptual verification.



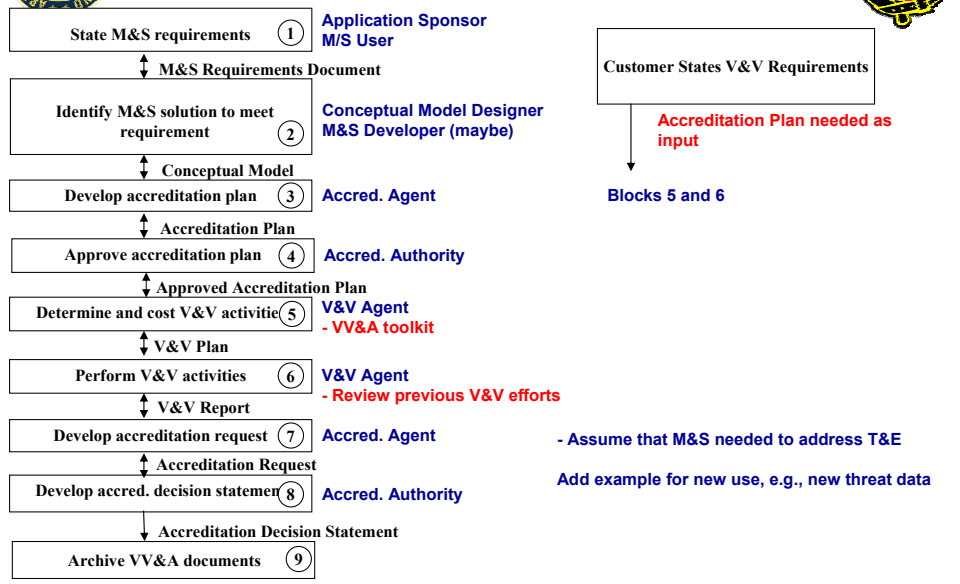

We are developing the VPG as a customer focused acquisition tool which is closely integrated with other appropriate ongoing Army and DoD programs.

RTTC is our VV&A/C Working Group chair. The chair is responsible for coordination among all members. As you can see, we are not working alone. We have participants from the acquisition community, and we are working closely with program offices, OPTEC, STRICOM, AMSAA, just to name a few.

# Methodology Basis

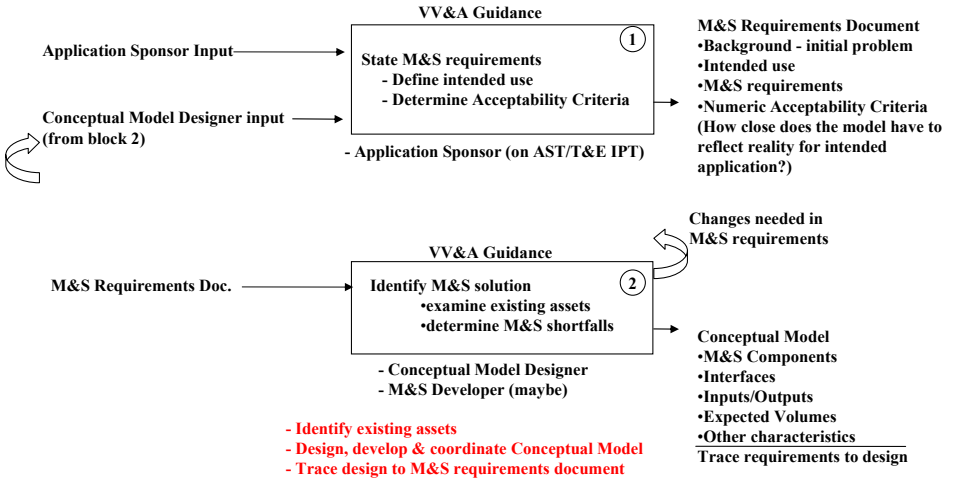
- ATEC M&S Handbook
- OTC TOP and Methodology, 5-291
- DTC Pamphlet 73-4, VV&A Methodology
- AR 5-11 & DA Pamphlet 5-11
- DoD Directives 5000.59, 5000.61, & Recommended Practices Guide
- VV&A ITOP Program

# VV&A Methodology



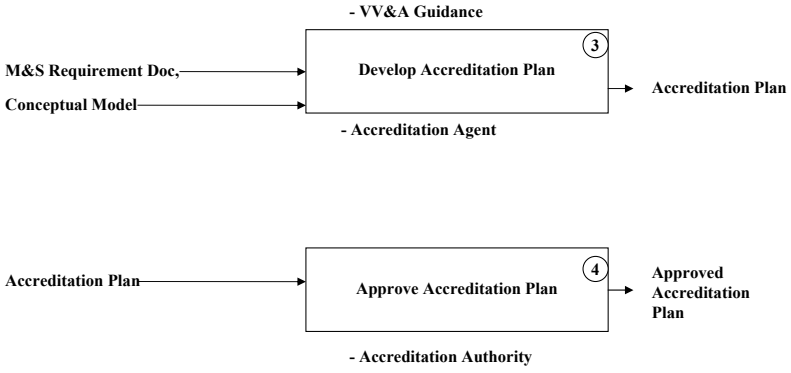
# VV&A Methodology (Con't)

Assume M&S needed for T&E effort
Assume risk analysis has been completed




- Identify existing assets
- Design, develop & coordinate Conceptual Model
- Trace design to M&S requirements document
- Identify components, interfaces, data elements, inputs, outputs, expected volumes, etc.

# VV&A Methodology (Con't)



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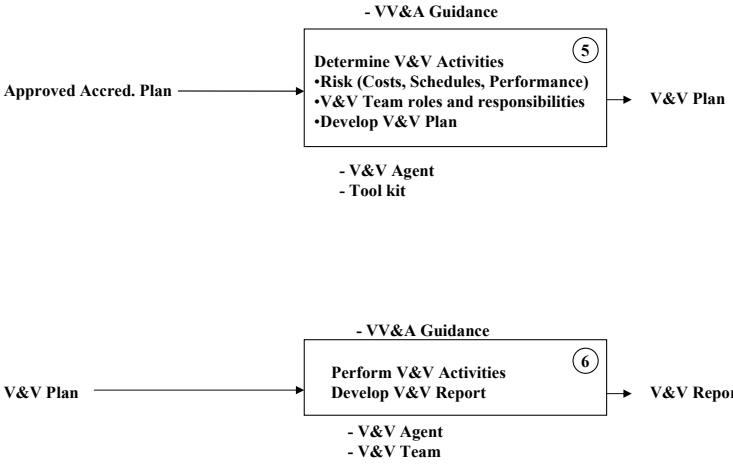

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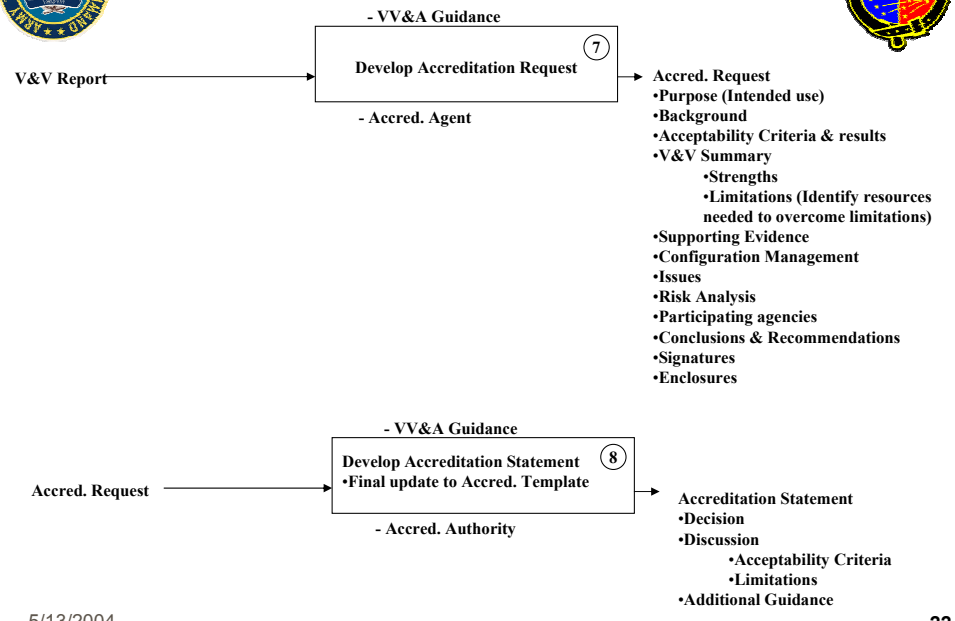

# Conclusions

- Capturing lessons learned to revise methodology.
- Striving for an accepted methodology to ensure that all M&S elements are developed & maintained as a fully accredited system.
- Identifying assets needed for successful VV&A program.
- Developing one Command-wide VV&A guidance.
- Seeking for your participation.