



**V&V
AV**

Verification, Validation & Accreditation Recommended Practices Guide

V&V Agent for New M&S



Presentation to DMSO Industry Days

22 May 2000



The Role of the V&V Agent for New M&S Development



- **Presents seven Dimensions of the V&V Effort:**
 - Roles and Responsibilities of the V&V Agent
 - How the V&V Process Interacts with Development
 - V&V Functions (The V&V Process in Detail)
 - Credibility
 - Relationships with Other Roles
 - Documentation and Archiving
 - Cost Implications
- **Includes Hot Links to Elaborations and Special Topic Papers to add detail whenever the reader needs additional information. This approach keeps the core document at a consistent, easy-to-read level of detail.**



V&V Agent for New M&S

- **The V&V Agent is the generic name used in the RPG to represent the people or team who conducts the V&V activities.**
- **Major Responsibilities of the V&V effort are to :**
 - support the accreditation process
 - increase credibility, utility, and quality of the M&S
 - ensure policy compliance
 - provide more useful, better tested, and more reliable M&S products
 - lower developmental and operational risk.
- **The V&V effort is a comprehensive, incremental review, inspection, and assessment of the basic assumptions, interim and final products, and technical outputs of the developer with the goal of finding deficiencies, errors, and omissions in a timely manner to avoid their propagation into the final M&S product.**



Possible Impacts to the V&V Effort

- **Availability of acceptability criteria** - Accreditation Agent is responsible for creating the acceptability criteria early in the program. Failure to do so has an adverse impact on the V&V and Development efforts.
- **Availability of sufficient resources** - The V&V funding should be sufficient to accomplish the basic activities throughout the program.
- **Accessibility of development products** - The V&V Agent needs timely access to development products, or else the V&V effort will fall behind and can be seriously impacted.
- **Attitude** - A good cooperative working relationship among the major participants is key to an effective V&V effort.



Ten Major Challenges to the V&V Effort

- 1. Determining the Optimum Starting Point**
- 2. Creating an Adequate Plan**
- 3. Determining Adequate Funding**
- 4. Selecting the Right People for Each Activity**
- 5. Access to Developer's Products**
- 6. V&V Tool Selection**
- 7. Appropriate Methods and Techniques**
- 8. Coping with Geographic Separation**
- 9. Locating and Using Subject Matter Experts (SMEs)**
- 10. Supporting the Accreditation Process**

Each of these subjects includes an elaboration that provides additional information and the more critical ones have Special Topic Papers for even more detail. This multi-level approach is used throughout the RPG, when required.



How V&V Applies to the Development Cycle

¹ Requirements & Planning	Conceptual Model	Design	Implementation	Results Validation	Accreditation
Verification	Validation	Verification	Verification	Validation	Support

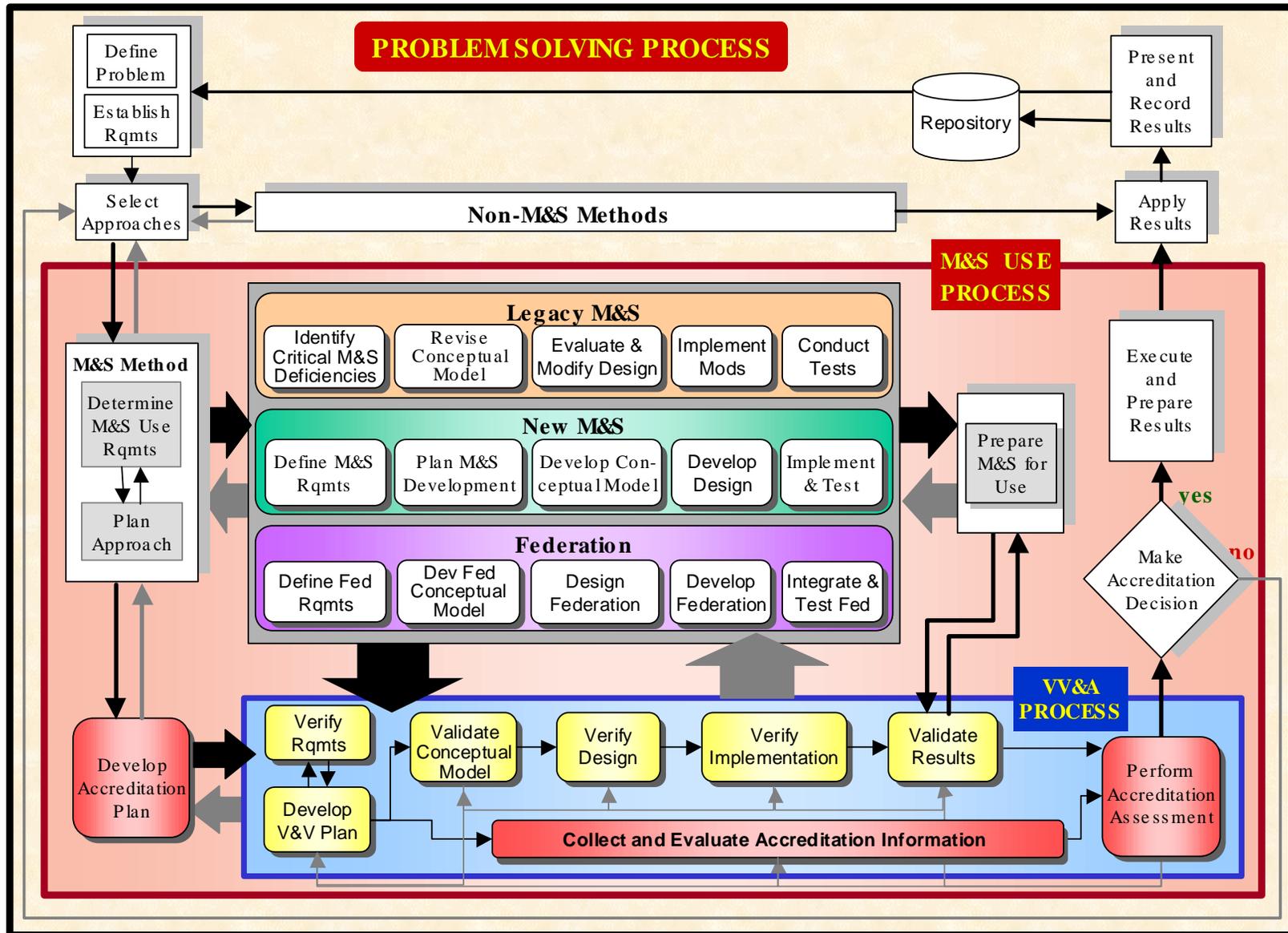
²**“Verification is the process of determining that a model implementation accurately represents the Developer’s conceptual design and specifications.” Answers question, “Did we build it right?”**

²**“Validation is the process of determining the degree to which a model is an accurate representation of the real world from the perspective of the intended use of the model.” Answers question, “Did we build the right model?”**

¹Requirements Verification and V&V Planning are concurrent processes.

²Definitions from DoDD 5000.59.

M&S and VV&A in the Problem-Solving Process





Significant V&V Planning Factors

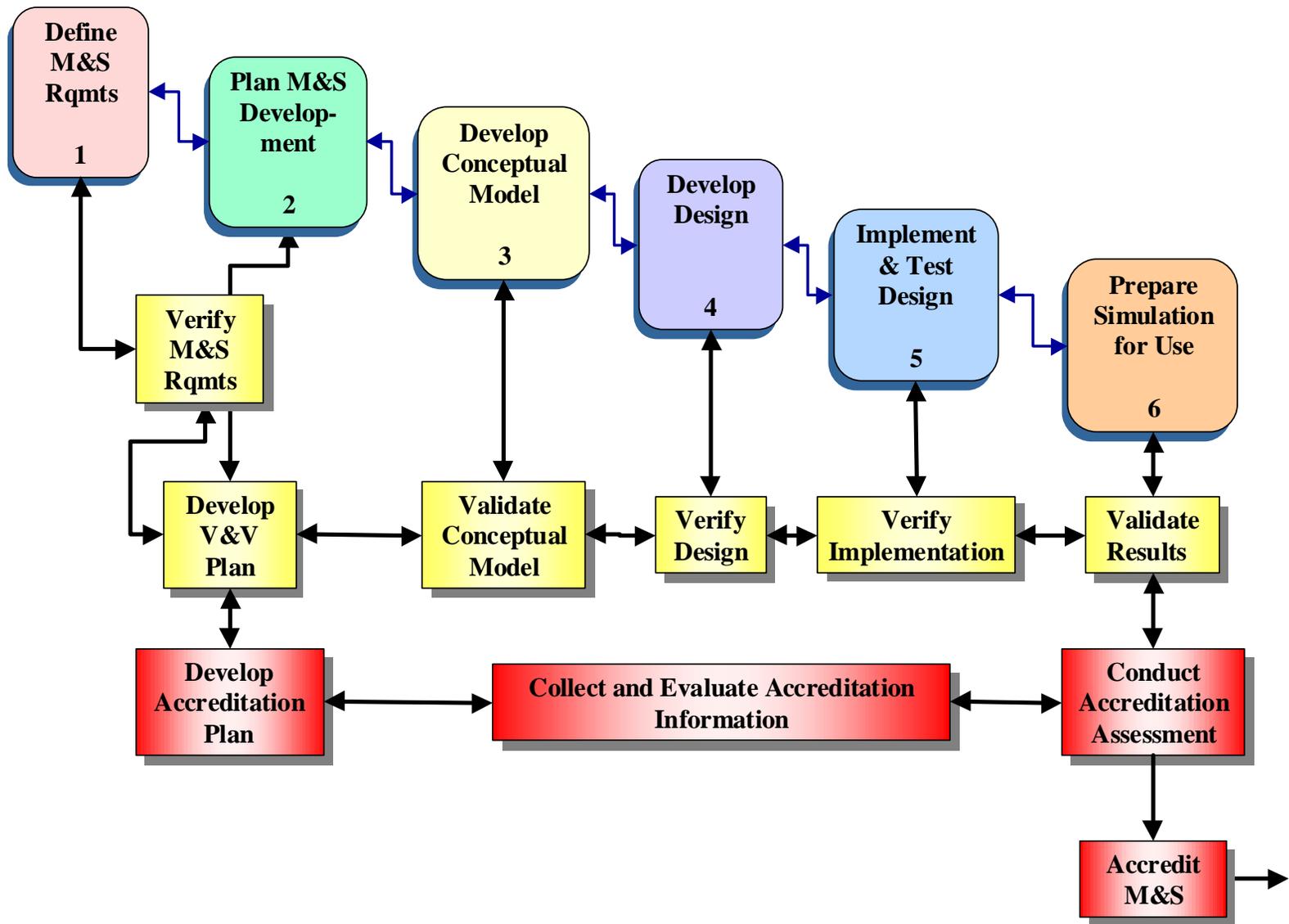
- **Problem Domain**
- **Primary Customer and Other Possible Stakeholders**
- **Degree of Aggregation, Fidelity, and Granularity**
- **Complexity and Size of Hardware and Software**
- **Type Of Development Paradigm (Waterfall, Incremental, Evolutionary, etc.)**
- **Proposed Development Strategy and Engineering Environment**
- **Input Data Sources and Quality of Data**
- **Development Approach (Structured, OO, KBS, etc.)**
- **Accreditation Agent's Expectations from V&V Effort**
- **Specific V&V Roles and Responsibilities**
- **Resources and Schedules**
- **V&V Tools, Equipment, and Facilities and Possibility of Sharing**
- **Tailoring and Leveraging**



Core V&V Processes and Activities

- Largely Incremental and done in step with development process
- Highly tailorable--perform the necessary steps and no more
- Typically 5 to 10 V&V activities per phase based on project needs
- These increments build a large pool of evidence to support accreditation assessment and credibility determination
- V&V usually shares some tools with the Developer and provides its own as well to increase the likelihood of discovering deficiencies and errors.

[Go to block diagram]



M&S Development Process and VV&A Overlay



Remaining Sections

- **Credibility**
- **V&V Agent's Relationships with Other Roles (User, Developer, M&S PM, Accreditation Agent, and Others)**
- **Documentation and Archiving**
- **Cost Implications**
- **References**