

Modeling IV&V

A small group of individuals began meeting on Monday evening to see what insights they could gain from modeling the technical frameworks, guidelines and standards followed by NASA IV&V.

Those documents were initially considered for inclusion

- IVV 09-1, Rev N, January 27, 2011 (IV&V Technical Framework)
- S3105, Rev B, January 27, 2011 (Guidelines for Writing IV&V TIMs)
- S3106, Rev B, February 23, 2011 (PBRA and RBA Process)
- T2103, Rev B, February 18, 2011 (IV&V Project Execution Plan Template)
- IVV 22, Rev D, July 29, 2010 (Risk Management)
- IEEE Std 1012 – 2004 (Software Verification and Validation)
- IEEE Std 1028 – 2008 (Software Reviews and Audits)

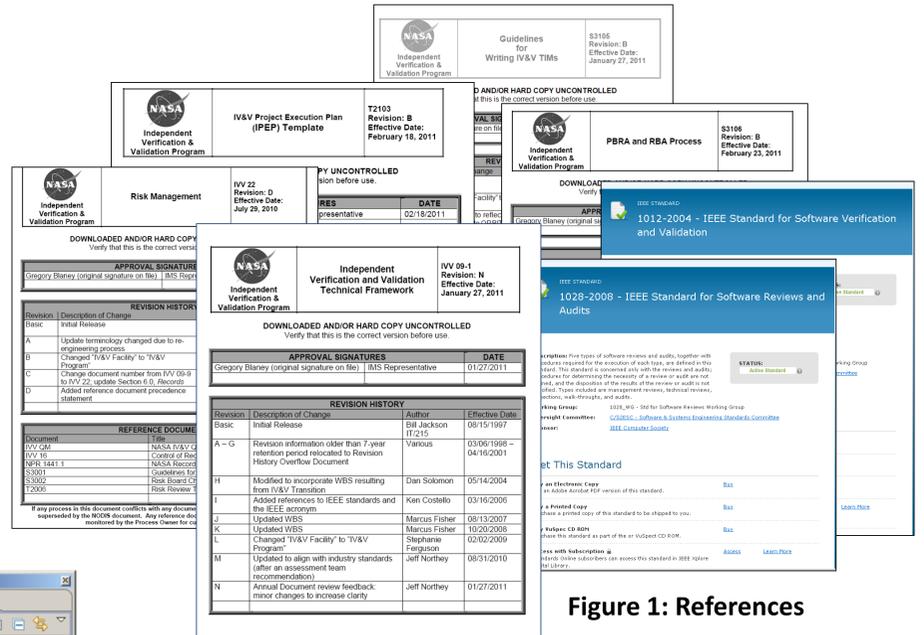


Figure 1: References

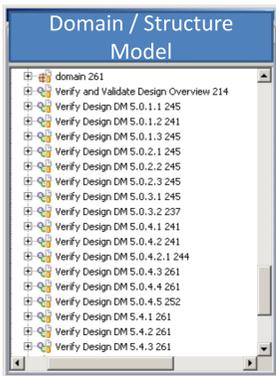


Figure 3: Structure

structure: this package uses various UML structure diagrams to show the domain concepts, and relates them to the referenced source documents. Figure 3 shows some of the class diagrams derived from IVV 09-1's Validate and Verify Design. These diagrams show the iterative development of the domain model from the reference documentation. Figure 5 shows four iterations in the development of the domain model.

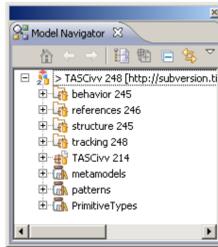


Figure 2: Project Structure

Project Structure

references: The references package contains proxies to reference data outside of the model. In this case that includes the documents listed above as well as issues, assessments and non model graphics. This allows full trace-ability between the model elements, source materials, and analysis work.

tracking: The tracking package contains use case diagrams of progress made on this effort of modeling the IV&V process. It is used to track hours spent on modeling, names of the modelers, what has been accomplished during each modeling session and action items to be performed between sessions.

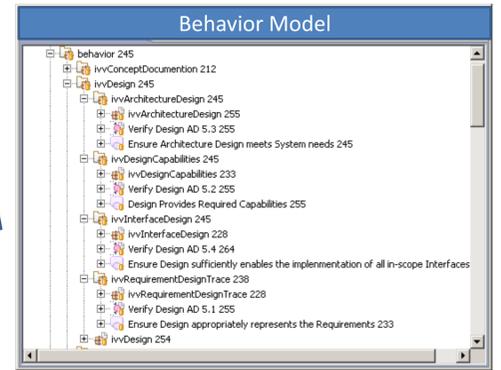


Figure 4: Behavior

behavior: The behavior package contains the work that utilizes the UML behavior diagrams. Figure 4 shows some of the activity diagrams derived from IVV 09-1's Validate and Verify Design. These diagrams attempt to capture what the source materials says and not what it should say. Issues capture any suggestions for improvement. The IV&V model essentially IV&Vs IV&V. Figure 6 shows an example of one Verify and Validate Software Design behavior.

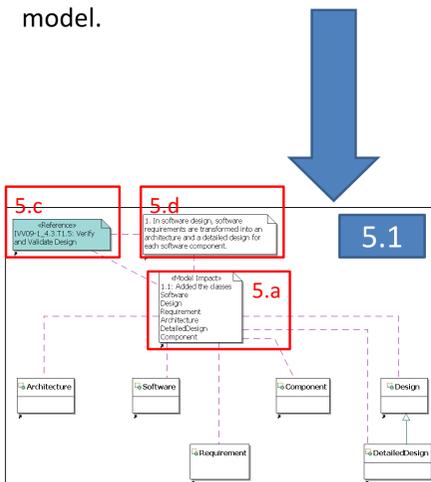


Figure 5 key features

- 5.1 Analysis of 1st sentence impact on classes.
- 5.2 Analysis of 1st sentence impact on attributes.
- 5.3 Analysis of 1st sentence impact on operations.
- 5.4 Analysis of 2nd sentence impact on classes.

- 5.a Impacts are documented.
- 5.b Decisions during analysis are documented.
- 5.c Link back to IV&V reference proxy.
- 5.d Sentence under analysis on diagram for clarity.

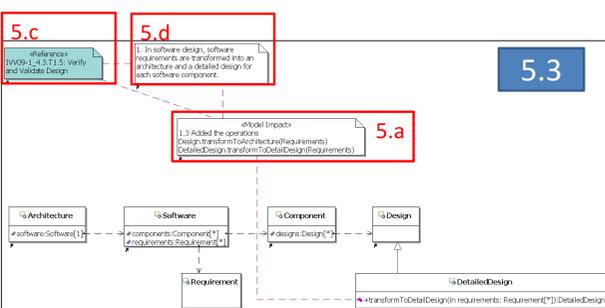


Figure 5: Iterative Domain Model Development

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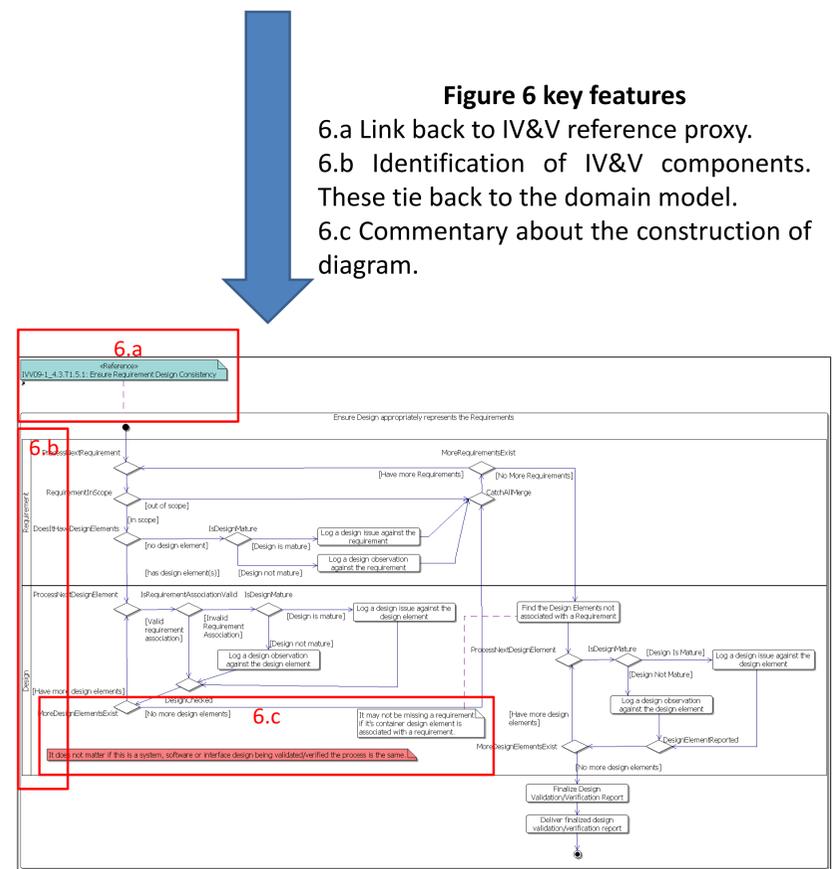


Figure 6: Behavior Model Development

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Don Kranz Phil Loftis
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Karl Frank Aaron Rosier

