

V-Model 97 aiming to become CMM-compliant standard

The V-model 97 is one of the most commonly used process models for software and system development in the German-speaking countries. The CMM (Capability Maturity Model) for software forms the basis for the assessment and improvement of development processes in numerous organizations around the world. The Software and System Processes Center of Competence in the Siemens Corporate Technology department (ZT SE 3) evaluated the compatibility of the two models.

V-Model 97 and the CMM are well-established models for software development and process re-engineering. The V-Model 97 describes the activities performed in a software or system development project on the basis of four submodels: system development, quality assurance, configuration management and project management. The content and structure of the documents to be created in the project are developed with the aid of templates, while supplementary manuals provide information on such subjects as process tailoring or the selection of a suitable life-cycle model. Information is also available on the assignment of methods and on tool requirements for development process support.

The Capability Maturity Model (CMM) is a reference model for the assessment and improvement of software development processes (see also C. Stobbe, *Aiming for the Optimum*, Software@Siemens, August 1998). It is used to determine the maturity of the development process in an organization on the basis of a five-level scale. Except for the first, of course, each level of the CMM places additional demands on the development process. These requirements are formulated by way of key practices, which in turn are combined to form a total of 19 key process areas. Compliance with the requirements is appraised in a process assessment with the determination of the degree of maturity. The key practices then serve as a guideline for process improvement.

Calculating Compliance

To serve as a basis for calculating the degree of compliance of the key process areas with the V-Model 97, Siemens' Software and System Processes Center used the CMM's maximum level of detail. Each key practice and subpractice of the CMM was assigned to the corresponding element in V-Model 97 and the degree of compliance was ascertained.

The results reflect the concept of the V-Model 97 as a standard for project execution. The V-Model 97 fulfills the CMM level 2 and level 3 requirements by as much as 70-percent or more. The main strengths of the model, which originated in Germany, lie in the submodels, while its weaknesses chiefly



involve supplier management and communications within the project.

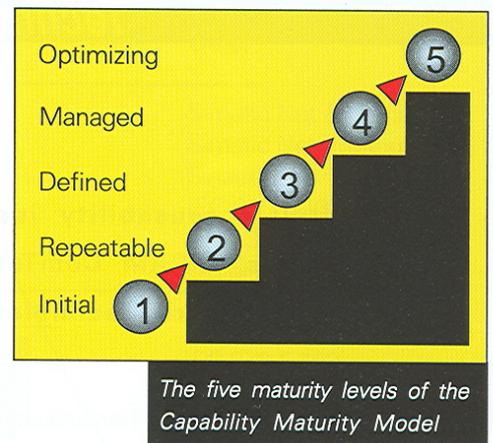
Organizational aspects which the CMM anticipates from level 3 upward are scarcely found in V-Model 97. Accordingly, compliance levels in this sector fall below 30 percent. The V-Model 97 covers the more advanced requirements of levels 4 and 5 only to a limited degree (i.e. with respect to such factors as reuse and ongoing process improvement). Overall, the V-Model 97 fulfilled 62% of requirements at level 2, 32% at level 3, 10% at level 4 and 12% at level 5.

Validation with Siemens Process Assessment

In order to verify the findings, validation was carried out on the basis of the questionnaire used in a Siemens Process Assessment, which is based on the CMM. The same strengths and weaknesses were recognized in V-Model 97 as in direct use of the CMM. The degrees of compliance on the different maturity levels are also close to those obtained for the CMM: 68% at level 2, 38% at level 3, 8% at level 4 and 11% at level 5.

Using the Siemens Process Assessment algorithm, the overall maturity level obtained for V Model 97 is 2.0. As shown in practice, V-Model 97 is ideally suited for controlled project execution. Because of the model's original design, however, organizational aspects tend to be underrepresented. Thus, a maturity level of two seems appropriate. The maturity level of one, which was computed with the SEI algorithm, appears incongruous for V-Model 97. Since not all goals of the CMM on level two (see above) can be achieved, the restrictive assessment algorithm used by the authors of the CMM at the Software Engineering Institute (SEI) of Carnegie Mellon University does not permit classification of V-Model 97 better than maturity level one.

The clear structure of V-Model 97 offers excellent expansion and improvement capabilities. The results of the project will therefore be used to help develop V-Model 97 into a CMM-compliant standard. The findings were obtained in collaboration with the Institute for Information Sciences at the Technical University of Munich.



Further information

CMM:

<http://www.sei.cmu.edu/cmm/>

V-Model 97:

<http://www.v-modell.iabg.de/>

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