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Model-Based Software Process Improvement

The SEI's Capability Maturity Model Integrated (CMMI) is the most prominent example of a model based approach to process improvement.

The CMMI is organized around a set of Process Areas (PAs). The PAs are divided into groups associated with what are called maturity levels. In the CMMI, most basic management practices are considered part of maturity level 2, while most software engineering practices are associated with level 3. Level 4 is about process and product quality management, while level 5 includes processes for process optimization and technology change management.

An organization that has practices that meet all the goals of maturity level 2 is characterized as a level 2 organization. An organization that cannot demonstrate that its practices meet all the applicable level 2 goals is considered level 1 by default. An organization that meets the goals of all the PAs at level 2 and level 3 is a level 3 maturity organization and so on.

The CMMI also offers an alternate approach call the "continuous representation", where individual PA's are rated on a maturity scale of 1 - 5. This allows the organization the flexibility to tailoring its maturity goals based on business needs for particular PA's.

As organizations move up the maturity ladder, they are more likely to produce higher quality products with more predictable costs and cycle times. The higher levels are more likely to correlate with higher productivity and shorter cycle times as well.

The idea of model based software improvement is very simple. First pick the applicable Process Areas. Next perform an assessment of organizational practices relative to the model. The organization practices do not have to conform exactly to the representative practices included in the model. They just have to meet the stated goals of each PA. Based on this comparison, assign a maturity level to the organization and produce a list of strengths and weakness relative to the model.

The output of the assessment is used to prioritize areas for improvement. The idea is to improve deficient practices at the lower maturity levels first and systematically move up in maturity level over time using additional assessments to measure progress.

Focusing on the lowest level practices puts a firm foundation in place before tacking the higher level processes and it give the organization time to internalize the changes. This approach nicely avoids the twin problems of putting practices in place before required supporting practices are available and trying to do too much too soon.

So model based improvement has a lot of very attractive features. One of the most attractive ones is the level goal itself. The numerical level gives organizations a metric that that can be easily understood, can used to measure progress, and can used to benchmark against other organizations.

SEI has defined a formal appraisal methodology and provided a lead assessor training and certification program. This means that assessment results, particular those obtained using a third party assessor, will be reasonably consistent and can be used to benchmark against other organizations. In fact SEI

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maintains a publicly accessible database of assessment results giving the number of organizations at each level by industry and the average time for an organization to improve from one level to the next.

Model-based improvement offers a lot of advantages. Unfortunately, there are also a lot of potential pitfalls that must be avoided. (cf. Model-Based Improvement Pitfalls), and it would be wrong to imply that model based improvement is the only way to go. There are other improvement models, e.g. Six Sigma and TSP are good alternatives for some organizations. It is also possible to combine a model based approach at the strategic level with a Six Sigma approach at the tactical level or to use a model based approach to provide the organization infrastructure to support a TSP implementation.

PS&J has worked with software metrics for years in the context of CMM, Personal Software Process, Six Sigma, and CMMI. If you want to put a cost-effective CMMI compliant metrics framework in place, we can help you with training, and consulting services.

Launching a Model-Based Software Process Improvement Initiative with PS&J

PS&J offers a systematic approach to model based software process improvement designed to move your organization forward rapidly and to achieve measurable improvements in cost, cycle time, and product quality.

Our approach reflects many years of experience with the CMMI and with other improvement models such as Six Sigma. It has been designed to help you avoid the typical pitfalls of model based improvement and provide you with the best return possible on your process improvement investment. We don't accept the notion that adding process discipline adds overhead. In fact it is quite the opposite. Processes haven't been improved until there are measurable reductions in cost and cycle time. We can show you how.

Our team has been working with the CMM and CMMI for nearly 20 years. PS&J Software Six Sigma is an SEI Partner for CMMI and offer the training course "Introduction to CMMI" as well as SCAMPI assessments under SEI license. We can help you implement the Measurement and Analysis PA effectively and efficiently and we can help integrate existing Six Sigma and CMMI initiatives, allowing your organization achieve maximum synergy and minimum duplication of effort. Since we are an SEI Partner for TSP, we can show you how to use TSP to reduce your time to move up the CMMI maturity ladder from years to months.

Our team members have led organizations up the maturity ladder and have managed large-scale corporate wide assessment initiatives. Over the years, the key thing we have learned is that an organization must focus on making measurable improvements in the practices used every day by individual software developers. The organization's CMMI level needs to be a by-product of this activity. The focus always needs to be on business results. Ultimately a practice that does not contribute to meeting a business goal or that results in a net increase in overhead is ineffective, no matter how it compares to a process model.

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If you are just starting out, let us help you find the right path. If you have been involved in model based improvement and think that it has added a lot of overhead without fundamentally improving productivity, cycle time, or product quality, we can help you get on track.

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