

PS&J SOFTWARE SIX SIGMA

Measured Managed and Controlled Project Performance

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MODEL-BASED IMPROVEMENT PITFALLS

Model based improvement is a very strong paradigm and forms the basis of many very successful software process improvement initiatives. However, in order to use a model-based approach effectively, you need to understand how to avoid its pitfalls:

- Implementing the practices verbatim
- Delaying your metrics program
- Open loop management
- Strict adherence to the staged representation
- Emphasis on documentation
- Poor organizational alignment

Implementing the practices verbatim

The key practices are meant to be representative. Implementing the practices verbatim can be costly and may not reflect your organization's specific process needs very well. This approach can result in an overly proscriptive process that actually increases costs and slows release cycles. Expending funds to make "improvements" that turn out to be counterproductive is much worse than doing nothing at all. It can rapidly destroy the credibility of your process improvement implementation with management and with the software development staff.

Delaying your metrics program

The models lack an explicit measurable coupling between maturity levels and business results such as cost and cycle time. The models don't require substantial process performance measurements until the higher maturity levels. Consequently organizations that are just beginning a process improvement effort often delay implementation of a measurement program. Without measurements, an organization can achieve maturity level 3 without understanding the true costs and benefits associated with process improvement. Without a solid understanding of the return on investment (ROI) and its relationship to business results, it can be easy to lose sponsorship during a re-organization. Worse yet, without measurement it is quite possible to implement practices that meet the goals of the KPAs (PAs) but are not cost-effective from a business standpoint. The basic problem is that the models provide qualitative KPA (PA) goals and typical practices to meet these goals. If your organization has an efficient implementation of the practices that meets the goals, you can realize improved business results. However, if your implementation is inefficient relative to your organizational needs, you may meet the goals, but at a cost that will outweigh any benefits. Process performance may be static or might actually degrade relative to business goals.

Open loop management

Another consequence of deferring measurements is that even good process will underperform without active management. Management means feedback and control. With active management, actual

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process performance is continually checked against process capability. When they begin to diverge, management actions are used to drive the process back in efficient operation. Without good measurements the process goes "open loop" and tends to degrade in performance over time.

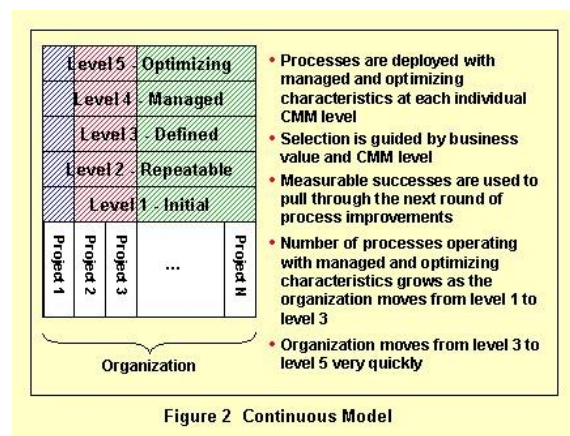
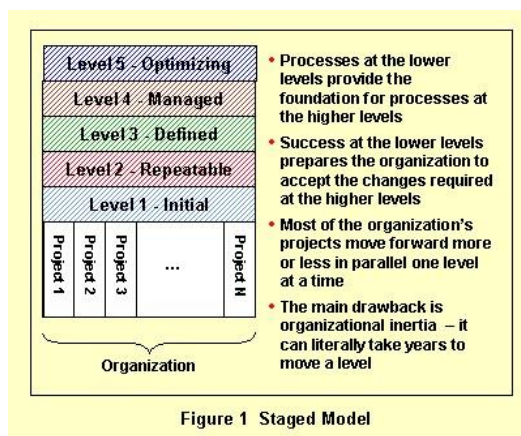
Strict adherence to the staged representation

Often times, the staged improvement model is taken too literally. Inspections are a level 3 practice in the CMM. When implemented effectively and efficiently, inspections can be one of the best ways to quantitatively improve cost, product quality, and cycle time. Many organizations with a level 2 goal ignore inspections totally because they are a level 3 practice. There is certainly room to introduce a few higher maturity level practices early on if there is a good business case for them.

Sometimes, the staged improvement model may not be the best choice for an organization. If applied literally across a large organization, it can result in excessively long cycle times for improvements and repeated, costly false starts. Consider a 500 person software organization with 20 active development projects. In a strict application of the staged representation, we would try and get all projects practicing at maturity level 2 before moving any of the projects to level 3. This can take a very long time. Without the benefit of experience, an organization could roll out an inefficient implementation of a process across an entire organization, expending a considerable amount of time, money, and good will before it can be fixed.

One alternate approach is to select several pilot projects and move them rapidly to a high maturity level. Experience gained from these projects will make it less likely that there are organization wide false starts with ineffective improvements. Having a few projects operating at higher maturity level permits an accurate assessment of costs and benefits. Moreover, these projects will generate pull for other projects to upgrade their practices as well, overcoming organizational resistance to change.

The CMMI offers a continuous representation as an alternative to the traditional staged representation, but many organizations have a "staged" mindset left over from experience with the CMM and they are reluctant to experiment with it.



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Emphasis on documentation

Both maturity models are fairly “document centric”. There is a long list of required policies and procedures that need to be in place for each KPA (PA). These policies and procedures must be available during an assessment in order to provide evidence of the institutionalization of the practices. In the quest for a level, it is easy to generate a lot of policies and procedures that satisfy the KPAs (PAs) but are never used. This is a waste of time and money, and it squanders the credibility of the improvement process. Policies and procedures need to be short and they need to be used by everyone concerned. These procedures are often written to have minimal impact on existing practices in an attempt to shelter a busy development staff from unnecessary upheaval. The problem is that this pre-supposes there is no need for improvement. If the practices of most of the organization are not affected, how can there be a significant improvement? In this case, what is the point of the investment in model based improvement? If you really believe things are fine the way they are, you are better off doing nothing!

Poor organizational alignment

The final failure mode concerns organizational responsibilities. The CMM recommends creating a Software Engineering Process Group (SEPG) chartered with the responsibility of defining and improvement the organization’s software process. The CMMI talks about an Engineering Process Group (EPG), reflecting its broader focus. If the responsibility for deploying improved practices is given to the SEPG (EPG), and the project managers have the responsibility to get product out the door, it is possible to set up a situation where the SEPG (EPG) is busy putting practices in place and the project managers don’t use the new practices on their projects. After all, project managers’ goals are based upon shipping product. They have no incentive to take a chance trying new practices on their project. The result is frustration for all parties and a waste of organizational time and resources. The solution is that senior management must make continuous improvement everyone’s responsibility.

Summary

It should be emphasized that there is nothing wrong with the models. They are just not prescriptive enough to avoid these problems. In some sense the models are like a “necessary but insufficient condition” for improvement relative to business goals. Failing to meet the model goals indicates a high likelihood of consistently missing business objectives. Meeting the model goals can correlate with a higher likelihood of meeting business goals, provided the practices used to meet the goals are efficient and effective. There will be no correlation when the practices are not efficient and effective.

The net result can be the all too typical situation where an organization expends considerable effort moving up maturity ladder without making significant improvements in cost, quality, or cycle time. In some government contracting circles this can be considered an acceptable cost of doing business because contract awards are often predicated on maturity level. In most other business, however, it collapses when someone in management notices that there are significant expenditures without measurable returns beyond a process maturity level.