



**Systems Thinking:
consensus on the
Darwinian approach
to software process
improvement**

Contributors:

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Systems thinking: consensus on the Darwinian approach to software process improvement

Sue Rule draws on the expertise of Clifford Shelley of Oxford Software Engineering Ltd. (OSEL), co-ordinator of the BCS Software Process Improvement Network (SPIN) and Ken Dymond of Process Transition Inc., SEI Transition Partner and author of the definitive “A Guide to the CMMI”, to consider the current and future state of the CMMI.

Watts Humphreys’ original concept of the CMM was all about growing software capability - hence the name, “Capability Maturity Model”. The model was intended to be a guide on how to achieve this enhanced capability through improving the software process.

The CMM was therefore never intended to be a goal of itself, but an enabler of change and evolution.

In his article Energising the CMMI, **Clifford Shelley** succinctly summarises the situation the model finds itself in today:

“CMMI is recognized across the industry as a framework for software development and management processes and a model for process improvement. It has been adopted world wide by many and diverse software development organizations.

Too many organizations are taking too long, or failing to reach their potential with CMMI.”

Along with this recognition CMMI is also gaining an unfortunate reputation for poor return on investment. Despite careful planning, the introduction of process improvements, methodical training, and ongoing appraisals and process development, the anticipated outcomes can be slow to manifest as schedules slip, budgets escalate, ‘real’ work gets in the way, and the benefits of organizational maturity remain tantalizingly out of reach. Something is not right. Too many organizations are taking too long, or failing to reach their potential with CMMI.

Some - but not all - of this is due to the complexity and comprehensiveness of the model (and the marked preference by users for the staged approach); some to the expense of assessments; and some to the caution, timidity even, that assessments expected to demonstrate organizational maturity tend to encourage.

Process improvement teams, whether internal to the organization or contracted in from elsewhere, almost inevitably focus on the requirements of the CMMI model and the desire to achieve recognized organizational maturity. And this is reasonable. After all it is this that is usually set as an objective and used as the indicator of success. There is often little time, or inclination, to ensure that new CMMI compliant processes work well (let alone better than those they have replaced) or work well together. Indeed it is often unclear what ‘better’ means or how this would be determined; it is beyond the scope of any appraisal where conformance and ‘reasonableness’ are the yardsticks. It is often thought that ‘performance’ can be determined later as part of ongoing improvement when process monitoring and control are in place. This rarely happens.

As a result, process improvement work within the context of CMMI is often of unknown or little real value and can actually damage performance as model conformance issues and SCAMPI planning and preparation dominate the SPI



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agenda, stifle innovation and inhibit useful change. Critically, this will be recognized and noted by those affected by the work.

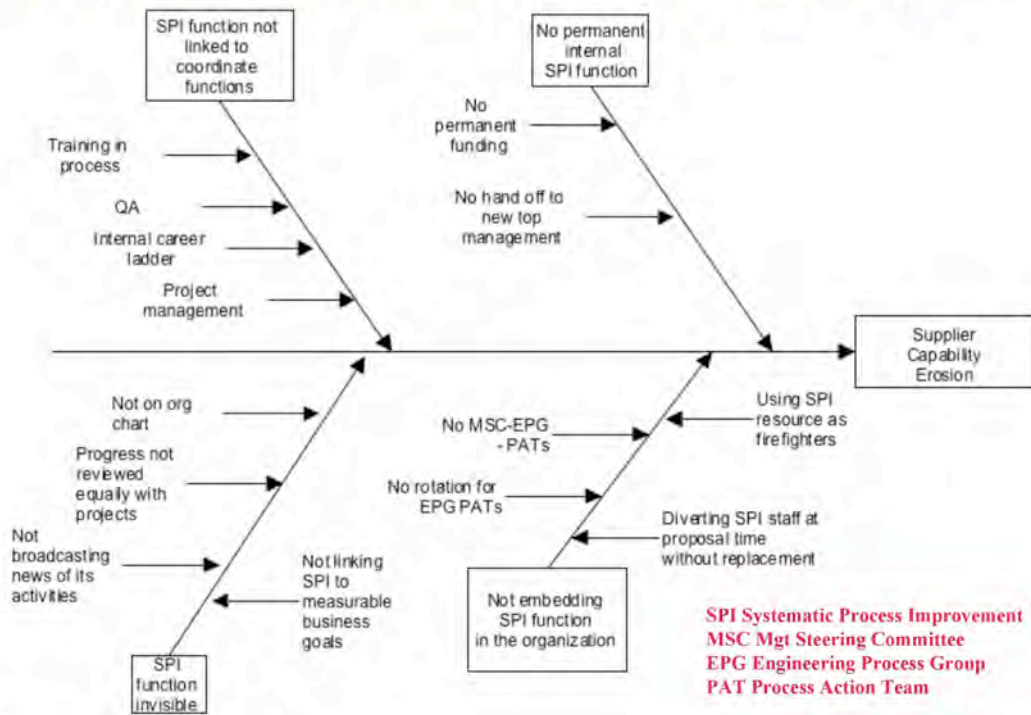
You know CMMI is a powerful toolset for process improvement, not a recipe book; it’s a specification for high performance system development, not a design; it needs to be used, not copied. But somehow as work proceeds the emphasis shifts...”

Ken Dymond of **Process Transition International, Inc.** makes similar observations, supported by case evidence, in his presentation “CMMI Maturity Levels, Not Acting Your Age and Continuity Erosion - Causes and Cures” delivered to the New Jersey Software Process Symposium in October 2008.

He argues that treating SPI as a technical project reduces it to continually satisfying a big checklist of CMMI practices, ignoring the system aspect, end-to-end product flow.

Process Transition International, Inc. (PTI)

Fish Bone #2 Capability Erosion - Organizing



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“Awarding a maturity level is like taking a weather observation over a few days or weeks and predicting the climate for the next three years.”

The project approach to SPI makes it a temporary thing, with a budget and resources linked to its deliverable - a Maturity level. So in between appraisals, budget and resources are applied to other, more pressing projects and SPI languishes. Viewing a dynamic product flow as a collection of Process Areas treats it as a static entity, rather than a system.

Ken says, “Awarding a maturity level is like taking a weather observation over a few days or weeks and predicting the climate for the next three years. The solution to capability erosion must consider the mechanism(s) underlying continuity and how continuity becomes *evolution*.”

Evolution is controlled change through time - and “The only things that evolve by themselves in an organization are disorder, friction, and malperformance” to quote Peter Drucker. To evolve enhanced capability in software-intensive systems requires direction.

To ensure capability is not only maintained but also evolves, it is necessary to consider both the mechanism underlying Watts Humphreys’ original vision for the model as facilitating the evolution of capability by software process improvement, and the context in which it is operating.

“The only things that evolve by themselves in an organization are disorder, friction, and malperformance” - Peter Drucker

This is what we mean when we talk about “systems thinking” and taking a “systems” approach to software process improvement. The IT professional can deal with the mechanics. The business management team need to be engaged in the context and to give the necessary direction. SPI needs to be part of a strategic transformation programme driven by the senior executive, rather than a superficial activity which oscillates from peaks just before an appraisal to troughs in between, resulting in the damaging effects increasingly evident to SPI professionals. Deriving business benefit from software process improvement demands leadership. It requires knowledge. Decision-making based on facts and evidence.

It also requires the champions of software process improvement to understand the business case for the activity. Effort invested in SPI is always an overhead, and in these days of financial constraint it is an overhead that may well come under the cost-cutting axe unless those engaged in it are able to articulate the argument for doing it in terms meaningful to the business and to the bottom line. SPI is not a re-chargeable cost. To deliver a return on investment in it, it has to be effective at *actually making your processes better!* One of the benefits of proper use of metrics is to make the processes *demonstrably* better, enabling the business to evaluate software as an appreciating asset worth investing in.

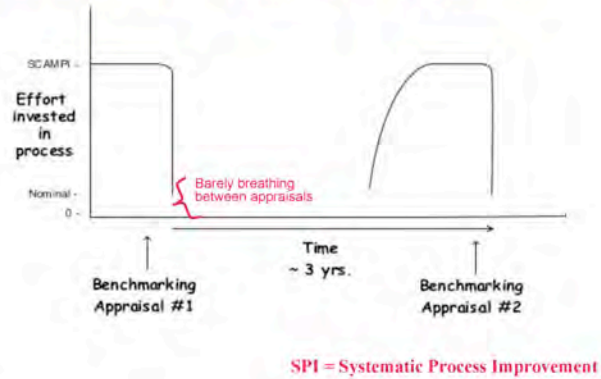
*“One of the benefits of proper use of metrics is to make the processes **demonstrably** better..”*

Ken Dymond’s diagram shows what happens to the investment in software process improvement when it is focused on “passing” an appraisal. Everything is focused into a short period leading up to appraisal. In between, SPI is neglected and starved of funds and resources, so capability slips lower, compromising the effectiveness of the business and requiring even more investment to bring it up to scratch when the next appraisal is due.



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Level Of Investment in SPI - 1. Looking at Capability as Appraisal...



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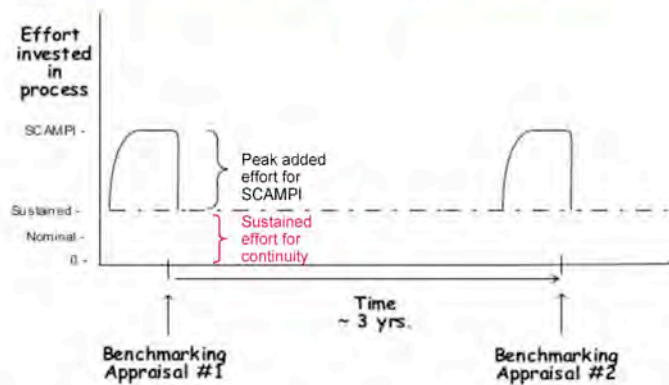
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By contrast when the level of investment sustains continuous software process improvement, the investment is repaid with compound interest, not by a SCAMPI rating but by ever more streamlined processes that eliminate causes of rework and defects and enable a quick, flexible response to market or technology changes.

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LOI to Sustain the Mechanism



TOP #1 effort graph 1/2a.cdd

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As Clifford Shelley says, “Process improvement teams, whether internal to the organization or contracted in from elsewhere, almost inevitably focus on the requirements of the CMMI model and the desire to achieve recognized organizational maturity. And this is reasonable, after all it is this that is usually set as an objective and used as the indicator of success.”

Therein lies the problem. It is a classic case of setting the wrong goal.

The goal which will deliver a return to the business is a transformational improvement in the productivity of its software-intensive systems. This needs to be coupled with alignment to business objectives, so that *efficient* activity is also more *effective*.

Quick-fixes are neither quick, nor fixes. If the collapse of the “house of cards” constructs of the financial sector demonstrate anything, it is that you cannot cheat a complex, chaotic system. It will always come back to bite you.



Contributors to this paper:



Sue Rule has been working on promoting the insight and expertise of software process improvement professionals for the past 3 years. She sees improving the IT community's ability to communicate with the business users of the services they provide as key to the successful realisation of the opportunity to deliver better business value from software-intensive systems. This is where Sue sees her considerable experience as a business entrepreneur, writer and communicator can deliver most value to her colleagues in software engineering.



Ken Dymond is an SEI Lead Appraiser with an international reputation. He was a member of the team that developed the original SEI Assessment Method, and is author of a definitive book on using the CMMI model, *A Guide to the CMMI*. His illustrations using the "Dymond Diagrams" clearly illustrate and aid understanding the specific goals of the CMMI and their interactions.

Ken Dymond's company Process Transition International is an SEI Transition Partner company. Ken and PTI worked with Grant Rule and SMS to pioneer the introduction of CMM training in Europe in the mid-1990s.

Clifford Shelley is organiser of the BCS Software Process Improvement Network (SPIN) and a software engineering consultant with Oxford Software Engineering Ltd. with particular expertise in software process improvement using the CMMI. He has many years experience of software development across several industry sectors and in diverse development and support environments. He has been involved in all phases of software development from requirements capture through to operations and has been responsible for the development of many software systems and products.

A particular strength is his ability to identify workable solutions to pressing software engineering problems in organizations operating within severe resource constraints.

Clifford is a member of the Management Committee of the UK Software Metrics Association, reflecting his long term, wide ranging interest in software measurement.

Software Measurement Services is a specialist, independent UK consultancy working with decision-makers in blue-chip companies and government departments to improve the business outcomes delivered by software and computer systems. Our consultants are at the forefront of developing and supporting best practice in managing software process performance.

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