

Walking The Maze ...

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Every problem-solving activity in an organization requires some learning. Both the stakeholders and the facilitators of the organization need to learn as they go through change. This paper describes our first experiences with facilitating process improvement and problem solving by focusing on congruence, building trust relationships, systems thinking and lots of "letting go."

In the context of a group of four European development labs in a global telecom organization, a small Engineering Process Group (EPG) team with mostly engineers had a commitment to work on process improvements. The authors of this paper got involved in their respective roles of internal consultant and quality assurance manager when the team lead left.

And of course, all commitments have a goal. What was the EPG supposed to do?

- The organization had an explicitly described process improvement goal of getting to Capability Maturity Model (CMM) level 3 (and higher).
- Make It So!

Our understanding of the CMM model started with the framework of software process maturity [[CMM95](#)] shown in Figure 1.

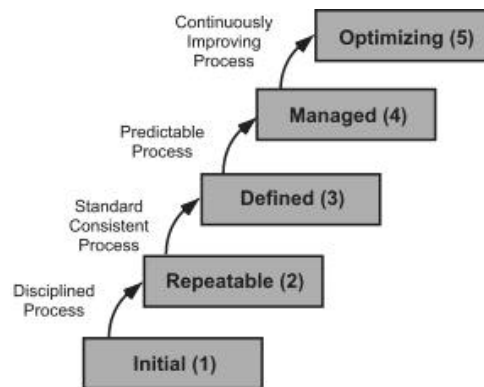


Figure 1: The five levels of software process maturity in CMM

The five levels can be briefly described as:

- In Initial state the software processes are *ad hoc and chaotic*, success depends on individuals and heroics.
- The next level is called Repeatable. Cost, schedule and functionality are being tracked and the process is fairly disciplined to repeat earlier success.

- In the Defined phase the processes for management and building are documented, standardized and integrated in one software process that can be tailored to a project's needs.
- In Managed condition the product and the processes by which these are produced are well understood, measured and controlled.
- And on the final level, Optimizing, processes are continuously improved by using feedback from the development processes and trying out new stuff.

Danger Ahead

Besides the framework, the [\[CMM\]](#) model comes with an enormous stack of guidelines for designing the development processes and mountains of checklists of what needs to be in place for moving from one level to the next.

After reading and reading and reading some more, we realized we were heading for many disasters. And asking the "old hands" in the organization about our chances didn't make us feel any better. On the contrary, now we could see danger lurking everywhere:

The often-used visualization of the framework in Figure 1 suggests we'll be walking up a staircase to "Heaven". And who doesn't want to go there? This can land us in a mode of wanting to do "everything" from the model down and never getting around to doing anything. We could end up trying to force reality to behave as we would expect by our models, instead of solving the problems we were experiencing in serving our customers more effectively for our organization's business purpose.

✓ Danger Number One: A Staircase to Heaven

There are many people in the industry that have visionary preferences. Visionaries like working with ideas and models and to them the CMM model can look like an architectural description for designing a universal successful system. The system in this case being a company or an organization. And any model that attempts to serve all by including solutions to the problems is by definition a repeatable state model. Meaning that it will, by use of its own standardized and consistent processes, get in its own way if it wants to leave the state it is in.

✓ Danger Number Two: Encapsulation

There are also many organizers among the people in the industry, especially in management. Organizers like order and system and can easily see the CMM model as a set of checklists of which all items need to be in place. If we were to just put a structure in the company or organization by following the checklists we run the risk of solving some non-existent problems and also of not solving some of the actual problems for having a for our products and environment effective process. That would not be very productive either.

✓ Danger Number Three: Going Through The Motions

Our conclusion: The CMM model likely contains useful organizational design guidelines in the form of Key Practices, and some extremely useful checklists, but it is very important to be aware of the dangers when using it. And neither the described organizational goal nor the CMM model itself are giving us enough of a transformational model or process definition of how to get there for solving the actual problems.

And right there is danger number four: If our management process were in a "defined" or "higher state," we could be given a clear picture of the current situation, of where to go, and what boundary conditions to use in the solution space. Yet the "where to go" is unknown territory or at best not charted yet. And if our management process could help us better, we would already "be there" and we would not have been given this assignment.

✓ Danger Number Four: A "Doing Nothing" Paradox

When we "do nothing" we will still stand here at the edge of the Maze tomorrow ...

Alignment of Purpose

After having been to one or two of the [\[Weinberg\]](#) or [\[Satir\]](#) workshops, and having read a number of books and articles, to really learn change artistry a real life experience would be needed to learn at some time.

Our requirements to make such an experience safe were:

- To make a commitment to ourselves for learning about change and effectiveness;
- A support network spanning boundaries, providing us with some sanity. We have such stability [\[Bij&Fokma\]](#);
- A safe training Maze in which our effort can only cause us "training pains", for we are still in the process of finding our own way. Our organization is providing us with such an opportunity.

We had a deal.

Reframing CMM to Cultural patterns

We clearly needed to reframe our problem to give us a better sense of direction, to provide us with some clues on "how to get there" and to arm ourselves against the dangers we could already see and the ones we could not see yet.

What we don't see, our invisible processes, usually gets grouped in the concept of "culture." We concluded that we needed to include cultural and human interpretations of CMM and we translated the CMM levels to the cultural patterns of Gerald M. Weinberg [\[Weinberg97\]](#).

In CMM level 1, initial, we are in a cultural variable state. A way of development that has proven itself useful enough to be repeatable has not been found yet. Products are made with variable success, and there is no configuration control and no project planning based on experience. This may cause problems to not be recognized due to a focus on other, seemingly larger, problems. The question "Why is this happening?" when a problem "shows up" during development, serves to find "Who is to blame?" for we cannot afford to be held responsible.

In CMM level 2 repeatable, we are in a cultural routine state. One way of development is used that has earned its existence by proven success. There may be small differences and changes, but the essence of the used processes is the same. The set of available management tactics and strategies is small. Yet, many other tactics and strategies are known as possibilities but are not used often because of the risk involved. If something new is tried, it must be an immediate success, or we will fall back to our former ways. Especially for organizing

successful improvement processes there is no strategic and tactical plan. The question "Why is this happening" is not asked at all because we do not see how we can change anything and if we did, we cannot afford to do so anyway.

In CMM level 3 defined, we are in a cultural steering state. In this state there is closed-loop feedback control of the processes that are used to develop products. New tactics and strategies are collected and compared.

This is where the management process becomes easier by being able to "pick and choose" tactics and strategies as needed, hopefully opening the possibilities for moving to CMM 4, managed, where the organization can anticipate on most problems and effectively deal with them. The question "Why is this happening" serves to answer "How can we change how we do things, in order to solve this problem?"

With this question we realized we needed grounding information for knowing where our entry point is, our "Begin Situation". We needed a first feedback loop, a forward one ... No, we didn't! We already had loads of information.

When you seem to have lost your way, it might be handy to have a look at your map.

Where are we?

The main reason why we were working on process improvements in the first place was a growing list of unfinished and unimplemented process improvement issues. These had become "visible" in the management process because the existing EPG had put an improvement Change Control Board in place; keeping track of all the issues they tried to work on. A Trojan horse.

So what did we find during some rather chaotic affinity grouping exercises?

- Coordination and overview missing of all improvement activities in the organization
- No clear focus on certain improvement activities
- Unclear relations between many different existing groups working on improvements
- Deployment of new/changed processes and procedures is weak
- Support from management for improvement activities is not visible and clear enough through actions
- Working on improvement activities is not seen as part of daily work at all locations
- Project approach for improvement activities is often missing

We also used some information on the context of our organization:

- From serving one customer at a time, we heard regularly about an organizational demand for working more from market perspectives
- We can lose market share in future, if we do not reduce our development interval a.s.a.p. (The Race to Oblivion)
- We will lose our ISO audit certificate if we do not have a functional improvement organization at the next audit

And assessed the organization we were in to be in a "routine" state and the mapping to cultural patterns resulted in the following goal for us:

Provide possibilities and support for progress of the labs towards having effective feedback loop processes for product development.

Open Ended Planning

With this reframing, we could focus on "how can we support problem solving, in order to have more effective management feedback control in our labs?"

Using an open-ended planning is in alignment with our approach. Open ended planning uses feedback loops for revising the Plan and Mind Map, grounding and stabilizing the change processes.

The purpose of a feedback loop is to improve our effectiveness. Negative feedback loops have a focus inside the organization. Whether where we are going is in alignment to our purpose and goals. These types of loops can change our inner culture and behavior. Positive feedback loops align our organizational goals and purpose to the environment. Focus is mainly outside of the organization. These types of loops can change our survival strategies. In the "orthodox" organizational structure, negative feedback loops mainly exist on the tactical level, making learning from others outside of the organization hard, and positive feedback loops tend to live more on the strategical planes, making it hard to learn from experience and keep up with changes.

Since we are moving into uncharted territories, we would need both types. After every feedback loop, we can come back with information based on which management can manage more effectively, allowing management to keep a close eye on the necessary change processes.

Change is not a trusted component in routine processes. Introduction requires management and support.

An open ended planning can create the necessary space for an exchange of information, stepping back and managing unexpected or re-aligning purpose events that are bound to happen when entering into such uncharted territories.

The intermediate steps and feedback loops in an open ended planning can help us prevent the in routine much feared "failed" state. Instead, our management process can go into a well-at-least-we-now-know-more-about-the-complexity-of-this-problem-and-it's-obvious-we-initially-missed-some-information state. And now, yes now ... now we have more information by which we can tune for speed in the fastest lane on the Highway of Process Improvements ...

Our Mind Map

Well, that **was** the theory. An overview of our Initial Mind Map through the Maze and our first feedback loops are given in figures 2 and 3.

To set up our open ended planning we applied a concept explained in the “[Cathedral and the Bazaar](#)” [\[Raymond97\]](#), which is thought to be the root cause of why the Linux community has become so successful.

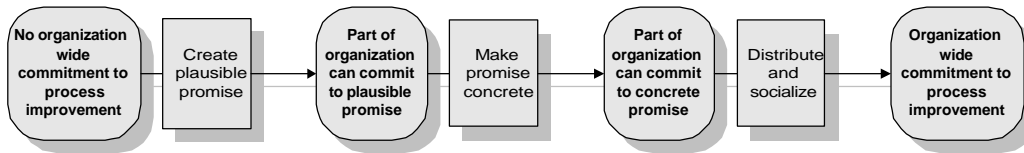


Figure 2: Our top-level conceptual open-ended planning. The rounded squares represent (sub) states and the normal squares “what needs to happen” to get from one to the other.

In our case, another transformation of our goals:

We need to evolve and socialize an improvement organization as framework for introducing problem solving.

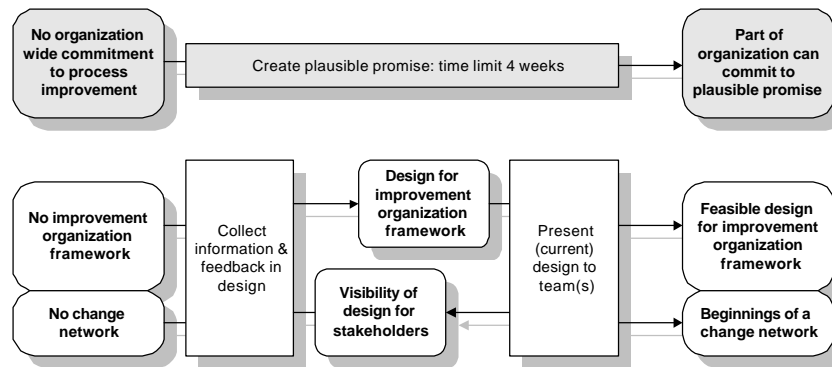


Figure 3: Using our top-level picture and list of problems we planned the first step in our big picture planning of figure 2.

Implementation

We socialized a document containing an evolving prototype description in which we could unite and keep track of perceptions. A brainstorm on paper, a breeze, so to speak. The document served as

1. “Foreign element” [\[Satir88\]](#) [\[Weinberg97\]](#)
2. “Hat hanger” for the transforming ideas and perspectives
3. Visibility instrument

The operational guidelines for our socialization strategy contained:

- Building on what is already there. It took many people a lot of energy and effort to get the organization to where it is. There are sound reasons for why things are done the way they are. So we need to look for small changes while avoiding the trap of wanting to find the smallest change with the largest impact.

- Get (more) data on former improvement efforts by reading (old) documents and interviewing the (cynical) “old hands” to find out what worked before and what didn’t and why (for how)?
- Interviewing as many key staff members as possible within 4 weeks, on all functions and levels in the development process on what could make an improvement organization work for us
- Integrate the collected information in the model of the evolving improvement organization.

In short, the EPG members were doing presentations, collecting feedback, interviewing loads of different people in one-on-ones, and collecting valuable information from documents and the professionals in the support networks.

Emerging Big Picture

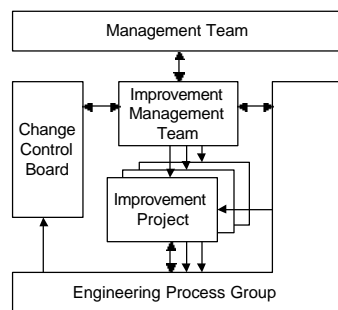


Figure 4: The emerging picture encompassed most of the existing structures and teams, with a few changes and additions.

From the gathered information, a simple picture of product information flow and the socialization process a framework picture emerged (figure 4) with the following boundary conditions, recommendations and action items:

1. An improvement management team must be put in place for purposes of visible strategic management of the improvement efforts.
2. A change agent network can be evolved from the EPG for the introduction, distribution and deployment of solutions.
3. Newly formed quality and/or process improvement teams will only be formed as the need arises and will use a project approach where possible.
4. The Improvement Change Control Board and Improvement Management Team can serve all departments in Europe related to our type of product.
5. A representative from the testing and integration department must be on the Change Control Board, closing the release cycle loop and serving as a living “thermometer” of “how well we’re doing”.
6. At least one person from development must be added to the Improvement Change Control Board to provide the perception of someone that walks the land instead of looks at the map: The CCB will have to do affinity grouping of problems, and this person can add first hand information on the complexity of and on possible connections between issues.

And we planned for the next step in our planning (figure 5).

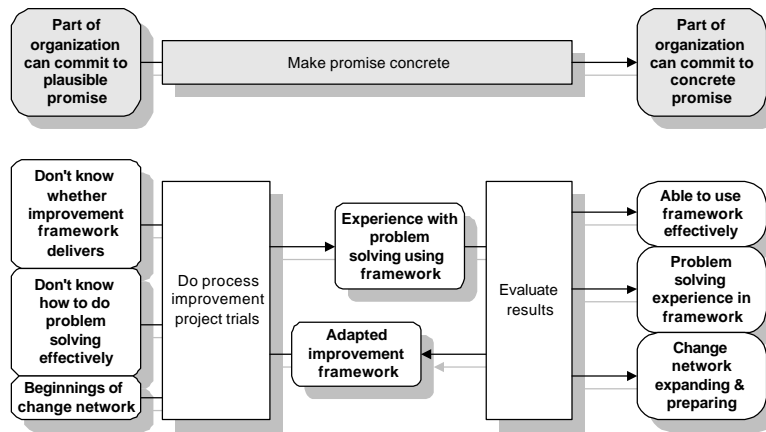


Figure 5: The next step contained integrating the collected commitments (side effect of the socialization process ;-), operational testing of the framework, introducing problem solving and expanding the “change network” from the EPG for easy distribution of information and solutions.

And the Bad News is ...

Nothing human is strange to us and of course we forgot several key people and missed out on a lot of useful information.

The most important thing that we “forgot” was to double check management incentive beforehand. In our culture, management carefully manages, and sometimes too carefully. They feel safe, but at times you hardly notice them. And then there is their hectic schedule, just getting eye contact is hard, let alone schedule a meeting.

Management says they are all for improvements and seem to support it, but when we interviewed supervisors we were told that management wasn’t “really in there”. And that perception was impossible to match with a vision of “steering state”.

We had observed a number of situations where supervisors, when they felt pressured by time, just cancelled or postponed improvement efforts and focused on production. This is not resistance; it can also be our reward system placing its own incentives in people, and the effects of “having been the best in our field” and yet another causality loop.

The organizations managerial tools appear not to be in alignment with the expressed organizational demand for interval reduction

Several types of small management interventions can influence causality loops, and an “amend reward system” intervention and some of its possible effects on our planning are shown in Figure 6.

The context of our site is the Dutch socialist legislation system, protected by layers of bureaucracy. Unions, protecting the “weak” from harmful management processes, negotiate framework contracts. The problem is that it is nearly next to impossible to “tinker” with the reward system, not even for a “good” cause. Even for our management. Seeing the respective histories of France and Russia, we would expect something similar for the sites there.

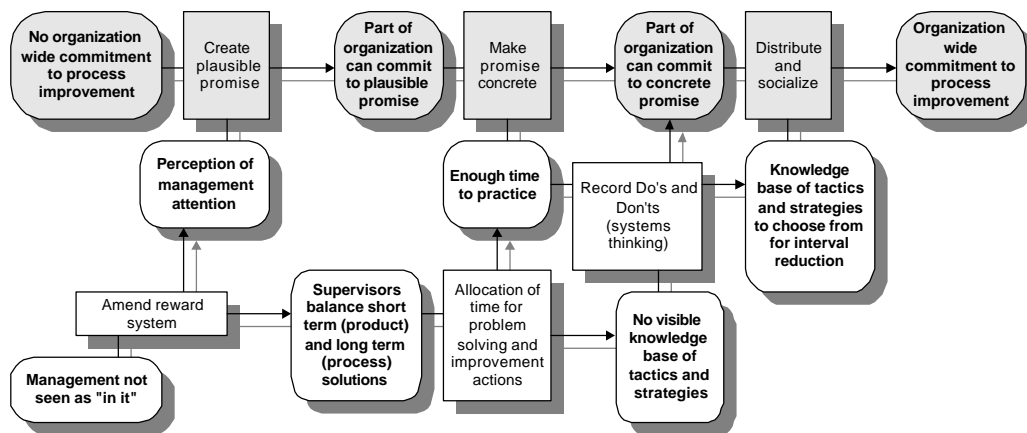


Figure 6: Our Bazaar type open ended planning with additional managerial feedback loops and possible side effects

And it is a real problem. Individually, people can place tremendous value on a reward system and how it is deployed, as it can contain lots of “hidden” messages for many people.

So maybe we could “shunt” the experienced reward system for the value being placed on it, and it’s gap with the organizational demand for process improvements. And then there are the other possible management interventions.



As it happened, at the time there was a discussion on the [\[Shape\]](#) forum on “unseen” effects of reward systems. After having gotten the approval to use the “banana award” idea from the Shaper who posted it and the approval of one of the department heads for putting our idea to the test, the EPG designed and built a reward system using information from that discussion thread [\[EPG\]](#).

Energy Risk Management

Another observation we brought back with us from the Maze of Perceptions, was that there were departments, groups in departments and individual people from which we could not expect much support for the transition process, possibly because of:

- The Not Invented Here Syndrome
- Being too loosely coupled to the product group organization
- Not expecting to need many improvements in the (near) future

We stopped spending our time and effort in these groups, because of our risk analysis in energy cost/benefit ratio. Alignment of purpose leading to a win-win is highly unlikely from our context. No Deal and No Problem. But, some requested we keep them informed about our progress. And curiosity killed Schroedinger's cat!

Newsflashes

The following is state information on the organization, her improvement framework and her culture at the time of writing (timestamp: December 2000):

IMT team to make management process visible - Within a few months the Improvement Management Team, initially populated with only people from our location, had representatives from all four geographical locations of the organization in Europe. The team makes decisions on which improvement activities to focus on first and tracks strategically important improvement projects.

Overview of improvement activities across 4 sites shows stakeholders the big picture!

Services for affinity grouping of problems, statistical measurements and for scouting possible "road blocks" ahead, are available as of today - The CCB has grouped improvement activities in categories, has produced statistical information and has provided management and IMT with intuitive level information, including on possible problem areas (e.g. related to resources).

Improvement activities using the project approach are in progress, says QA manager

First banana was eaten today! - First banana for efforts in process improvement work was awarded. The Award was presented in public (after respectfully having been asked what and how [EPG]) and grounding reasons for giving the Award were explicitly mentioned. A second Award can be expected soon.

EPG heads for acquiring change management skills - The EPG is on its way to become a Change Agent network for improved information flow between the stakeholders. There are plans to get people trained in change management and quality assurance skills.

"How to continue?" says manager. Does this mean we are heading for "steering"? - A recent reorganization resulted in the question: "How to continue process improvements?" and not in "Will we continue process improvements?" and on top of that, an external ISO9001 auditor made us compliments about the way improvement activities were being managed. Are we now definitely heading for a steering culture? We hold our breath ...

Conclusion

Works for us.

Acknowledgements

We would like to thank all people who were directly involved in and/or supportive of the change effort in the organization and for the opportunity given to us to try help bring such a Mighty Event come about. And the people from our support networks for supporting us in our learning and writing of papers (by fishing, by

brainstorming, by reviewing, by making coffee ...), and if you are missing on the list below, please forgive us; The Maze had us quite confused ... and we appreciated your energy,

Aad Wismeijer, Ank Fokma, Arno Koperdraat, Cor Colijn, Dijon Bruggema, Doeke Fokma, Elisabeth Hendrickson, Erick Silkens, Erik Helbo, Erik Laauwen, Esther Derby, Frans Speelman, Fuzzy, Hester van der Bij, Ino Rots, Ivan (hey, Roomie!), Jacob Pen, James Bullock, Jan Doeke Fokma, Jan Rebel, Jean McLendon, Jerry Weinberg (Yul Brunner ... sigh ;-), Johanna Rothman, Marek Leszak, Marjan Alberda, Mark Rietveld, Martijn Danse, Maureen O'Hara, Pat Sciacca, Paul Kollmann, Sergei Kucheiko, Walfried Veldman, Wim Bax and Wim Weide.

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Nynke Fokma

Nynke spent some years learning some scientific ways and subsequently received her University and Engineering degrees. She has been working in the computer industry since 1985, mostly on a freelance basis in several technical roles. She designed and programmed systems for a wide variety of customers.

Between 1996 and 1999 she participated in Problem Solving Leadership, Congruent Change Shop and System Effectiveness Management, all workshops from Weinberg & Weinberg.

Nynke joined a global telecom R&D organization in 1997 as an internal consultant. She worked in an international team of facilitators supporting quality improvement of the organization's architectures worldwide, where she worked in a three-person sub team evolving and rolling out a retrospective service for company projects. In the Optical Networking line organization she worked with Erwin van der Bij and the EPG team, for facilitating introduction of "problem solving and process improvement" practices in the organization.

On March 1, 2000, she turned independent and set up her own company, Moebius Consultancy.

Erwin van der Bij

After graduating in the field of Computer Science at the School for Technical Engineering in Enschede (The Netherlands), Erwin van der Bij worked a number of years as Software Engineer on the different sides of (operating) systems software. Then he became Software Quality Assurance Manager.

For several years, he coordinated the Software Process Improvement [SPI] programs in his organization. Experiences from these programs taught him that understanding the human side of software development is of great importance for successful product development and SPI programs. Training in Problem Solving Leadership and Change Management helped him to implement SPI programs more effectively.

Currently, he is chairman of an Engineering Process Group (EPG) and an Improvement Management Team (IMT) in a large organization. Erwin van der Bij is a member of the [IEEE] Computer Society.