

An investigation into the technology adoption paradox

Urs Andelfinger

Faculty of Computer Science, Darmstadt University of Applied Sciences
Schoefferstraße 8b, D - 64295 Darmstadt, Germany
u.andelfinger@fbi.h-da.de

Introduction

Technology adoption processes for the same technology and using similar introduction methodologies are not always equally successful across different organizations or even within different departments of the same organization. This is what we call the technology adoption paradox.

In our paper we describe an empirical case study into the adoption paradox and we outline potential mitigation strategies as well as directions for future research.

The technology to be introduced is the Capability Maturity Model Integration (CMMI) for process improvement [Chrissis 2006]. CMMI addresses *two dimensions* of process improvement, namely a *technical* dimension which is clustered along twenty-two so called *Process Areas* and a *cultural* dimension which is clustered along five so called *Maturity Levels*.

While CMMI is recognized as one of the leading process quality improvement standards for software development, empirical evidence shows that the timelines for successfully progressing on the maturity level scale are on average approximately 2 years per maturity level.

This led us to investigate if this period can be significantly shortened by guiding organizations new to CMMI through a condensed series of workshops that proved useful in successful adopter organizations of CMMI.

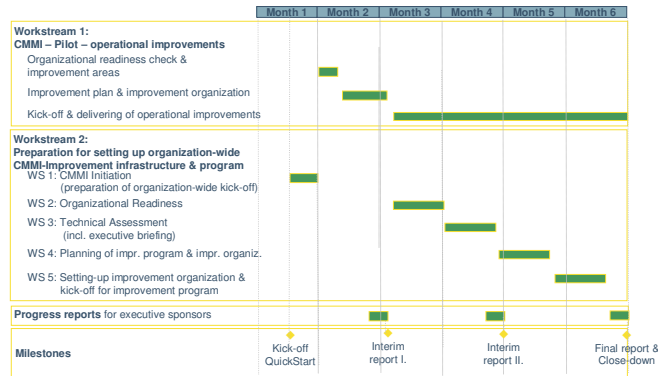
The case study

In our case study, we were approached by a large international bank which was interested in adopting CMMI for their software development business. From the first talks on, their clearly expressed wish was not to invest into a ramp-up phase of several years until reaching CMMI maturity levels 2 to 3.

In response to the stated goals of the bank, we defined a two-stream workprogram for the first six months of the joint CMMI-adoption project. The two workstreams as also shown in illustration 1 were:

- Tactical CMMI-based support for ongoing project work in order to show tangible CMMI-benefits within a time-frame of very few months (workstream 1)
- The standard series of workshops as defined in our technology transition framework in order to prepare the bank to set up a strategic CMMI-adoption project (workstream 2)

Original Timeframe for the two parallel workstreams



© 2008 by Carnegie Mellon University

Illustration 1: The two workstreams in our case study

After the first two months of work with the bank, we were faced with a paradox:

The work in workstream 1 with the short-term quick wins worked very well, commitment of the team was high and results were clearly visible.

The work in workstream 2 however, which was actually intended to be the core of the strategic CMMI-adoption for the bank was halted by the bank's management already during the first workshop.

The paradox that we were faced with was that an organization at the same time

- explicitly declares by its executive management that it wants to adopt CMMI and asked us therefore to support them in doing so
- willingly embarked on the suggested workstream to develop and implement operational improvement work based on CMMI
- virtually boycotted and dropped out of the suggested workstream to develop a strategical implementation plan for CMMI

Analysis of the case study

A comparison of the two workstreams reveals that workstream 1 addresses evident weaknesses of ongoing projects in the bank while workstream 2 tries to define and set up the organizational infrastructure needed to later establish organization-wide improvement programs that will then address multiple types of weaknesses for many projects at the same time. (This was exactly what the bank's executives at the beginning wanted to get out from our project.) While the immediate benefits of workstream 1 are clearly identifiable, this is not the case for workstream 2. In other words, workstream 1 tends to be more a sort of 'technology *installation*' which quickly offers effective improvements while workstream 2 intends to anchor the CMMI technology as part of the organizational culture of the bank. We call the goal of workstream 2 'technology *adoption*' in contrast to pure technology installation. If an organization *adopts* a technology, it regularly and sustainably makes effective use of it. The downside is that this requires a much broader investment in training and technology support than just

technology installation.

This insight was an immediate result from our very first workshop within workstream 1 with the bank's managers. Suddenly they realized that they were hardly understanding the potentials and the cultural implications of the CMMI technology while they were already about to embark on its adoption as improvement infrastructure. And our two-workstream approach was wrongly assuming that the bank had already achieved this level of familiarity with the technology. In terms of Patterson's & Conner's model of technology adoption we tried to work on two different stages of technology adoption at the same time (see illustration 2) – which in the end did not succeed.

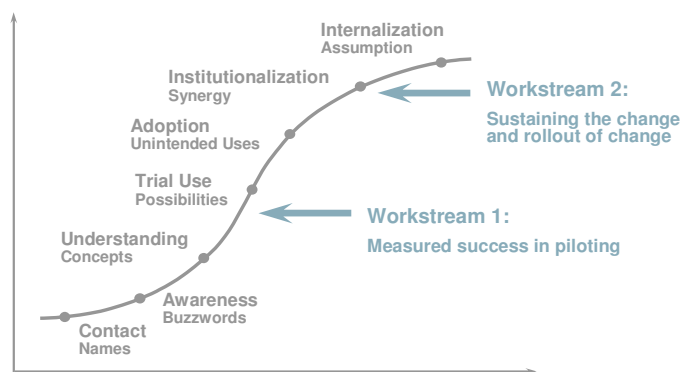


Illustration 2: The two workstreams mapped to the Patterson & Conner model

Lessons Learned

An important lesson learned is that commitment (for introducing a technology) is a strongly situational concept: while in the case study commitment on the operational level was really present, commitment for setting up a comprehensive improvement infrastructure had not been achieved. In the end, we did not balance well enough the level of achieved commitment with the required level of commitment for moving on towards institutionalization of the CMMI technology. As mitigation heuristic it might have helped if we conducted the two workstreams sequentially instead of simultaneously. This might have allowed the organization to develop more trust in the suitability of CMMI for its needs and hence to develop more commitment for its adoption. But as Abrahamsson and Garcia point out, the concept of commitment still awaits more basic and empirical research before we can fully understand and effectively mitigate the technology adoption paradox ([Abrahamsson 2002], [Garcia 2006]).

References

- [Abrahamsson 2002]: P. Abrahamsson: **The role of commitment in Software Process Improvement**. Doctoral Dissertation University of Oulu, 2002
- [Chrissis 2006]: M. B. Chrissis et al.: **CMMI. Guidelines for Process Integration and Product Improvement**, Addison Wesley, Amsterdam 2006
- [Garcia 2006]: S. Garcia et al.: **CMMI Survival Guide. Just Enough Process Improvement**, Addison Wesley, Amsterdam 2006