

## Abstract

Software Process Improvement (SPI) has become one of the most widely used approaches to increase the capability of software organizations since its introduction by Watts Humphrey in the late 1980's. Most software organizations do, however, struggle to find a good balance between SPI investments and returns. Far too many efforts fail or the resulting process is not used as intended or not used at all. The reasons are many, such as commitment and management attention, change management and reactions to change, knowledge barriers, and low deployment focus. This was also the situation within one development unit in the telecom company Ericsson in Gothenburg, Sweden.

A first and necessary step towards SPI success is SPI implementation. To get satisfying return on SPI investments, new or modified processes must be implemented and used in practice. The benefits of new or updated processes that are not implemented in practice remain limited. There is unfortunately a gap between software engineering as it is actually performed and as it is intended to be performed as a result of SPI initiatives. While this gap is emphasized in current SPI literature and provides both understanding and approaches for SPI challenges, the awareness and knowledge about the assimilation gap (Fichman and Kemerer, 1999) and its practical impact on SPI is not well understood. Therefore this research focuses on this implementation gap to answer the main research question: How can SPI change agents improve implementation of software processes?

The research was organized as an industrial PhD project where collaborative practice research was adopted. One SPI manager within Ericsson (the author of this thesis) worked as a leading SPI change agent and researcher for an SPI unit in close cooperation with her colleagues in the SPI unit and SPI experts from academia. Case studies and action research were the main research approaches used. The research provides understanding of the SPI change agent role in relation to software process implementation together with guidance on how to improve the performance of change agents. The results are presented in this summary of the thesis based on the findings in six individual papers that have been published during the project.

The research contributions are summarized in the following ten lessons:

1. Software organizations can improve SPI change agents' knowledge through action learning efforts. Such efforts tend to increase implementation success.
2. The combination of high process push and high practice pull tends to result in high implementation success whereas other combinations tend to result in lower success.
3. SPI initiatives exposed to criticism and feedback are likely to experience chaos. This chaos should be recognized as an important opportunity for improvement. SPI initiatives experiencing chaos tend to have higher process implementation success in the end than those that proceed unnoticed.
4. SPI initiatives lacking agile capabilities cannot effectively sense and respond to new employees as organizational mergers take place. Lack of agile capabilities tends to affect implementation success negatively.
5. SPI change agents' distribution of effort over the phases of the IDEAL model affects implementation success. SPI initiatives spending more effort during deployment tend to have higher process implementation success than those spending less.
6. Dedicated SPI initiatives supporting one engineering project tend to have higher implementation success than generic SPI initiatives supporting several engineering projects.
7. SPI initiatives executing several iterations, in which practitioners are exposed to change in ways that make them understand how the new process will impact their daily work, tend to have higher implementation success than SPI initiatives only executing one iteration.
8. SPI change agents can use an agile guerrilla tactic to cross the chasm by successfully connecting to early majority adopters. SPI change agents using the guerrilla tactic tend to be successful in implementation of new or modified processes.
9. The traditional CMM mindset assumes a rather stable environment and has become a supertanker in today's dynamic business environment. SPI initiatives practicing the CMM mindset tend to have low SPI implementation success in dynamic contexts.
10. SPI initiatives using a motorboat tactic based on an agile mindset tend to have higher SPI implementation success than SPI initiatives using the supertanker tactic.

**Keywords:** Software Process Improvement, Software Process Implementation, SPI change agent