

### Title of Paper

## Continuous Improvement Framework for Global Software Development

---

### Presenter

Tihana Galinac / Ericsson Nikola Tesla (HR)

Presentation material prepared jointly with Željka Car / Univ. of Zagreb, Faculty of Electrical Engineering and Computing (HR)

---

### Instructional Level

Introductory     Intermediate     Advanced

---

### Target Group

Managers, decision makers and specialist interested in the knowledge and efficient usage of state of the art in software quality management

---

### Keywords

- Assessment Models and process improvement (cMMi®, spicE, TMM, Tpi, Automotive spicE)
  - Development Models (V-Model XT, Scrum, RUP)
  - Application Lifecycle Management
  - Code Quality Management
- 

### Abstract

#### Overview and Motivation

Rapid development of the telecommunication industry progressively introduces new and enhanced functionalities into existing software systems thus increasing the system size and complexity. The software systems of telecommunication equipment become very large software systems where high reliability requirements are even harder to reach. The most common project type for development of such system is globally-distributed projects which complicate critical coordination mechanisms.

On the opposite side increase of competition at all levels of the value chain has strong influence on the business success of the telecommunication software production, impacting all three dimensions: time, quality and cost [1]. To reach the business needs, the development organizations are forced to implement continuous improvement programs. In very large organization and especially in globally distributed environment the implementation of continuous improvement programs is full of challenges.

In this presentation we will present the main challenges of implementing continuous improvement programs in a global software development. Furthermore, we will present the framework for implementing improvement program in global software development organization and discuss it along with other existing quality management models used in software development. The framework will address the identified challenges. The experiences from an industrial application of the proposed framework will be summarized and presented.

#### Global development and improvement programs

Global development organizations met different challenges such as decrease of communication possibilities and effectiveness, diversity of cultures, lack of awareness, and incompatibility of processes,

---

---

practices, habits, and tools [2]. All mentioned challenges give great opportunity for organizational improvement. Unfortunately, the same and more complex problems arise when leading the improvement projects in such globally distributed environment. Recent research efforts in implementing continuous improvement programs concerning software development processes (SDP) and software product quality (SPQ) could be divided into four main categories:

- ❑ improvement methodologies and improvements of SDP and SPQ
- ❑ change management while improving SDP and SPQ,
- ❑ measurements of SDP and SPQ,
- ❑ control of SDP and SPQ.

Different studies explore methodologies needed for management and execution of continuous improvements and their efficiency and effectiveness on overall organizational business [3], [4], [5], [6], [7]. Significant effort is invested into finding the best set of measurements needed for decision making [8], controlling and monitoring of the process, and most efficient control mechanisms based on different prediction criteria [9].

In this presentation we will focus on problems of leading improvement projects in globally distributed environment and will present the framework that has been successfully applied in industrial case study [3].

#### Aspects of improvement program

In the presentation we will present an improvement framework that has been successfully implemented in a global software development for telecommunication industry. There are four main aspects that have to be investigated while applying proposed improvement framework. These aspects are:

- ❑ organizational,
- ❑ change management methodology,
- ❑ improvement methodology,
- ❑ toolbox used.

The presentation will propose organizational setup that is needed for driving continuous improvements within a global organization. Furthermore, it will present change management and improvement methodology based on Six Sigma. Along with change management and improvement methodologies the effective set of tools will be presented. The effectiveness and efficiency of proposed framework consisting of above aspects will be elaborated in detail and future directions and/or guidelines for proposed improvement framework implementation will be given.

#### Conclusions

Nowadays the importance of continuous improvement programs continuously increases. Different researchers report their experiences of applying some of the improvement programs and discuss the main benefits. In this presentation a selected improvement approach is elaborated with evaluation of experiences gained through its application in a real industrial project.

#### Benefits for audience

The presentation will give an insight into challenges of implementing continuous improvement programs in a global software development. It will propose the framework for implementing the continuous improvements into global organization. How a development organization can overrun specified challenges will be presented based on the gathered experience in managing implementation of proposed framework. An introduction for application of a proposed improvement framework that is validated on a real industrial project will be given. The best practices identified after first round of application of improvement framework will be communicated to the audience.

#### References

- [1] M. Argawal and K. Chari, "Software effort, quality, and cycle time: A study of CMM level 5 projects," IEEE Transactions on Software Engineering, vol. 33, pp. 145–156, 2007.
  - [2] J. D. Herbsleb, "Global Software Engineering: The Future of Socio-technical Coordination",
-

- 
- Proc. of the Future of Software Engineering (FoSE) 2007.
- [3] T. Galinac and Ž. Car, "Software verification process improvement proposal using Six Sigma," Springer ser. Lecture Notes in Computer Science 4589, pp. 51–64, 2007.
  - [4] T. Galinac, "Six Sigma methodology for software development process improvement," in MIPRO'06: Proceeding of the 29th International Convention, pp. 128–133, 2005.
  - [5] M. Murugappan and G. Keeni, "Quality improvement – the Six Sigma way," in Proceeding of the Asia Pacific Conference on Quality Software, 2000, pp. 248–257.
  - [6] R. E. Biehl, "Six Sigma for software," IEEE Software, vol. 21, no. 2, pp. 68–70, 2004.
  - [7] L. Mathiassen, O. K. Ngwenyama, and I. Aaen, "Managing change in software process improvement," IEEE Software, vol. 22, no. 6, pp. 84–91, 2005.
  - [8] T. Dybå, "An empirical investigation of the key factors for success in software process improvement," IEEE Transactions of Software Eng., vol. 31, no. 5, pp. 410–424, 2005.
  - [9] F. Breyfogle, Implementing Six Sigma. Hoboken: John Wiley & Sons, 2003.
- 

### Biography

Tihana Galinac, M.S. has seven years of experience at Research and Development Center of Ericsson Nikola Tesla, Zagreb, Croatia. She has been a project manager for software process improvement projects. She received her B.Sc. and M.S. degrees in Electrical Engineering from the Faculty of Electrical Engineering and Computing of the University of Zagreb, Croatia in 2000 and 2005, respectively. She is a Ph.D. student at the Faculty of Electrical Engineering and Computing of the University of Zagreb and a researcher in research projects funded by the Croatian Ministry of Science, Education and Sports, dealing with software development processes and project management. She is a member of IEEE and the vice president of Engineering Management Society IEEE Croatian Section. She is Six Sigma Black Belt. Since December 1, 2007 she is a teaching assistant at the University of Rijeka, Faculty of Engineering, Croatia.

---

### Contact information of Presenter

M.S. Tihana Galinac

Affiliation: Teaching Assistant, University of Rijeka, Faculty of Engineering  
Until 1.12.07., Project Manager for Improvement Projects, Ericsson Nikola Tesla  
Vice President of IEEE Engineering Management Society, Croatian Section

Full Postal Address: Vukovarska 58,  
51 000 Rijeka, Croatia

E-mail Address: [tihana.galinac@riteh.hr](mailto:tihana.galinac@riteh.hr)

Phone Number: +385 (0)99 382 0750

Fax Number: -

---