

Tutorial Proposal

Software process improvement through process modeling and simulation: an integrative dynamics approach

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Purpose: The purpose of this tutorial is to provide participants with the possibility to learn and get new ideas on the topic of software process modeling and simulation as a means to promote software process improvement.

Category: T1 - Introductory

Length: Half-day tutorial (3 hours aprox.)

Audience: The tutorial is intended for a wide range of audience. Software project managers, software process managers, software engineering students, and anyone with interests in the field of software process improvement using modeling and simulation techniques.

Description:

Over the past few decades software complexity has significantly increased in such a way that software has replaced hardware as having the principal responsibility for much of the functionality provided by current systems. This increasing role of software, the problems related to cost and schedule overruns, and the customer perception of low product quality have changed the focus of attention towards the maturity of software development practices. Although the software industry has received a significant help by means of CASE tools, new programming languages and approaches, and more advanced and complex machines, there is a lack of process analysis tools for organizations interested in improving their process performance.

Dynamic modelling and simulation as process improvement tools have been intensively used in the manufacturing area. Currently, software process modelling and simulation are gaining an increasing interest among researchers and practitioners as an approach to analyse complex business and solve policy questions.

The aim of this tutorial is to present an alternative approach for software process management and improvement which is based on the application of System Dynamics modeling. Systems Dynamics makes it possible to integrate the many different elements that interact in and define the software process such as people, product, methods, tools, procedures, etc. The many complex interactions that take place among all these elements and which finally determine the progress of software projects, make it hard to analyze, design and experiment different software process improvements. Given the dynamic nature of the software process, in this tutorial we will present the rudiments of System Dynamics and its application to the software process modeling and simulation. Then, the state of the art will be described, to continue with the main part of the tutorial which is the use of a formalized method to easily model and build software process dynamic models. After that, it will be time to use the models to design process improvements and analyze its effects, as well as use the dynamic models together with other integrated techniques. Finally, other approaches to model the software process will be discussed and how all these methods complement each other will be presented.

Presenter's experience in the field: Dr. Mercedes Ruiz, and Dr. Isabel Ramos, are both specialized in the field of software process modeling, simulation and improvement. Isabel Ramos developed a reduced dynamic model for the software process and applied data mining techniques to obtain management rules for software projects. Mercedes Ruiz developed an integrated dynamic framework for software process improvement. The framework made an intensive use of the Systems Dynamics theory together with other principles such as the aggregation and decomposition principles, and the integration of other techniques such as algorithmic models for the software process, data mining, metrics systems, etc. Dr. Miguel Toro has a wide experience in the field of Systems Dynamics. He is the author or co-author of many papers related to the area. The models and framework developed by the presenters have been validated with real data from software projects developed for the regional government in Andalucía (Spain) and have been presented and published in several international conferences and journals (Prosim, Profes, Inspire, SQM, SQJ, JSS). They have also taught several courses in the field of software process modeling and simulation.