

The Experience Factory: How to Build and Run One

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ABSTRACT

This course presents the fundamental concepts behind software process and product improvement using measurement and evaluation in an Experience Factory Organization. It will provide a set of examples associated with understanding the software engineering process, product, and environment, improving it over time and packaging experience in the form of models and measures to create an experience base that can be reused by future projects. The emphasis of the material is on how to develop and run an Experience Factory.

Keywords

Process improvement, measurement, Experience Factory, Quality Improvement Paradigm, software experiments

OBJECTIVES OF TUTORIAL

The concept of software process improvement has been strongly influenced by evolving paradigms which have been applied to various software production environments. Such approaches as the use of the 'Capability Maturity Model (CMM)' which has been developed by the Software Engineering Institute (SEI) and the use of the 'Experience Factory' which has been promoted by several organizations including the Software Engineering Laboratory (SEL)

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located at NASA/Goddard, the University of Maryland, and Computer Sciences Corporation (CSC) are two such examples of models having a goal of guiding improvement for software in a production environment.

The 'Experience Factory' approach is driven by the concept of continuous improvement for an organization as defined by the particular goals and characteristics of that organization and its own growing set of experiences attributable to ongoing and completed development efforts. The major concept of this paradigm is to facilitate the means for the organization itself to continually capture pieces of information valuable to attaining improvement and to package and infuse the synthesized experience into ensuing and future projects. The 'Experience Factory' operates under the assumption that each organization has its own needs, goals, and characteristics which must be the essential drivers of the organization's software improvement program.

The 'Experience Factory' is a process implemented through an organization by which software experiences are analyzed and applied to develop understanding, process refinement, and technology packaging. The goal is the measurable, ongoing, improvement of the organization's software process and products.

Software improvement via the Experience Factory concept has been successfully applied in major production environments at NASA, CSC, and other software intensive organizations. This tutorial will cover the following topics

and will contain specific examples based on actual experiences from those production environments:

- 1. Concepts of the Experience Factory**
 - Software as a business
 - What is an Experience Factory
 - Supporting reuse of experience and assets
 - The Experience Factory approach compared with other quality improvement approaches
 - Using CMM with the Experience Factory
 - Process oriented concepts vs. Product oriented concepts
- 2. A Sample Experience Factory: The Software Engineering Laboratory (SEL)**
 - Implementation of an Experience Factory in a production environment
 - Applying the 'Quality Improvement Paradigm'
 - Specific examples of completed experiments
- 3. Establishing an Experience Factory**
 - Five steps to getting started
 - Cost of implementing the improvement process
 - Key barriers/How to address them
 - Establishing the baseline
 - Establishing a Software Measurement Program
 - Applying the 'Goal-Question-Metric' Paradigm
- 4. Key lessons and examples of Experience Factory results**
 - Personnel motivation and improved communication
 - Recognizing poor practices
 - Cost of implementation
 - Impact on quality
 - Time to implement
 - Measuring 'Return on Investment (ROI)'
 - Key lessons from past practices
 - Summary benefits and results