

## **1<sup>st</sup> International Workshop on C# and .NET Technologies for Algorithms, Computer Graphics, Visualization, Computer Vision, Scientific and Distributed Computing**

**Title of the paper:** Editing and Visualization of NC-Code in an E-Learning Project

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**Abstract of your paper** (maximum 500 words):

At the ifab–Institute of Human and Industrial Engineering at University of Karlsruhe we are developing LIVE-Fab (Lernen in der virtuellen Fabrik) in cooperation with the University of Applied Sciences Landshut.

The goal of the project is to give students an illustrative learning model of a production factory in the full range from incoming goods, manufacturing, assembly and quality control. Students should learn and recognize the complexity of production processes. Thus they shall learn the wide range of production processes (incoming goods receiving, manufacturing etc.) and the application of information technologies (NC-programming, assembly planning etc.) in one tool.

LIVE-Fab is a combination of learning and simulation. LIVE-Fab will force learners to work with their knowledge learned of the processes and to transfer it to nearly real-world scenarios.

LIVE-Fab is divided in two parts: The first part is content presentation (lectures) for students; the second part is to apply lessons learned in scenarios. In this second part the complete factory situation is presented through simulation in different scenarios. By recreating the real-world in a simulation based computer model the learners are able to apply newly gained knowledge immediately. Simulation is the key to save time, materials, and machines by using a virtual environment and with it we show students the complexity of the real world by using a virtual environment.

LIVE-Fab is implemented on top of the DotNet-Framework using WebControls, WebServices, and XML etc. WebControls are implemented as an editor for NC-Code (DIN 66 025) to represent students a web based and state of the art learning tool. After NC-Code development the students can simulate their program and get immediate response through a graphical representation of the work done by the program in the browser. The graphical representation is rendered by a WebService which receives model data and execution codes by SOAP. We also implemented our so called "quiz system" (multiple choice questions) using SQL Sever 2000 and a WebService to

deliver SCORM (Shareable Content Object Reference Model) conform XML documents to a Authorware 6 based front-end.

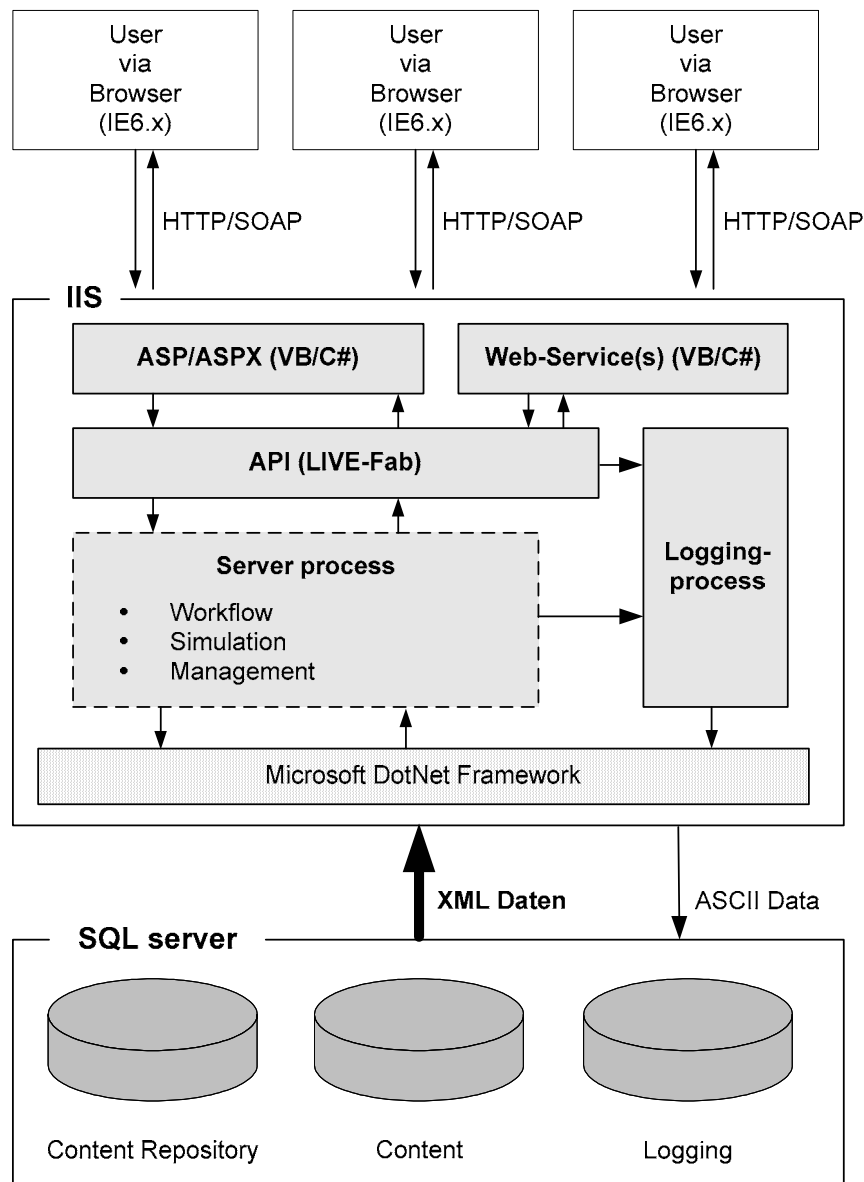


Fig.1: LIVE-Fab System design

We want to show implementation details (code, data structures, and database) and also the actual development state of the project itself.