A Virtual Campus For Tethered And Untehered Scenarios [1]

Luca Mainetti,[2] *Mattia Monga*[3] *and Licia Sbattella*[4]

Abstract *— The paper focuses on the novel features of the architecture of the "Virtual Campus" infrastructure we are building at Politecnico di Milano. First, it illustrates the rich underlying conceptual model, which fosters reuse and evolution of learning objects by aggregation and modification. Complex learning objects can be defined and enacted as learning processes by a work-flow engine that manages and distributes learning and working data. Data can be analyzed to reason about users' behavior, audit their work and help them. Autonomous tutoring agents are provided for these tasks. The system provides virtual connection facilities to enable data sharing in untethered contexts.*

INTRODUCTION

I. A VIRTUAL CAMPUS PLATFORM

Convergence between telecommunication and computing is opening new opportunities and challenges for innovative, multimedia, network-wide educational services. In the "Virtual Campus" project at Politecnico di Milano, we envisage scenarios where instructors and students interact by using heterogeneous terminals such as PDAs, notebooks, or even just cellular WAP phones properly equipped to be connected to a wireless network. Users communicate and cooperate with each other in a personalized way, they can exploit multimedia services, such as classes with multimedia and hypertextual contents or distributed software development environments.

Teaching material is organized in Learning Objects [1], [2], [3] (LO). Our model is based on a three-levels approach (see Figure 1):

1. a *reusable-content* level in which authors declare relationships (IsRequiredBy, References, IsAlternativeTo, RequiresOnFail, IsPartOf, IsViewOf) among LOs,
2. a *teaching* level in which teachers describe the process of LOs fruition;
3. a *fruition* level in which users participate to the enactment of the process.

On the basis of the reusable-content level, arcs are automatically generated at the teaching level to describe all possible connections. Moreover, teachers can erase undesired paths and highlight particularly valuable ones. In order to enable the enactment, a third level is generated and teaching sessions are made "ready-for-processing" by augmenting them with information about actual students, teachers, etc.

The enactment engine (we used a general purpose work-flow engine, i.e., MS BizTalk [4], see Figure 2) proposes to learners the available work-flows and they choose the specific path they want to walk through. Data about fruition are stored in a repository and can be mined by evaluation agents, which appraise the efficacy of LOs and students efforts.

Besides traditional scenarios which assume users to be connected with the infrastructure through a reliable network, we support interaction through untethered devices. Special LOs can provide services like impromptu meetings, file sharing, cooperative processes with on-line and off-line work thanks to virtual connection facilities. A typical example is what we define as the "virtual software engineering laboratory" scenario, where students collaborate with a peer-to-peer configuration management tool [5].

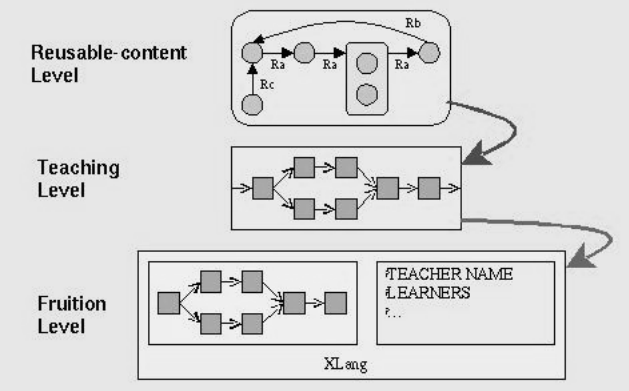

FIGURE. 1
THE THREE LEVELS ARCHITECTURE

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[2]Politecnico di Milano, `mainetti@mail2.elet.polimi.it`
[3]Politecnico di Milano, `monga@elet.polimi.it`
[4]Politecnico di Milano, `sbattell@elet.polimi.it`

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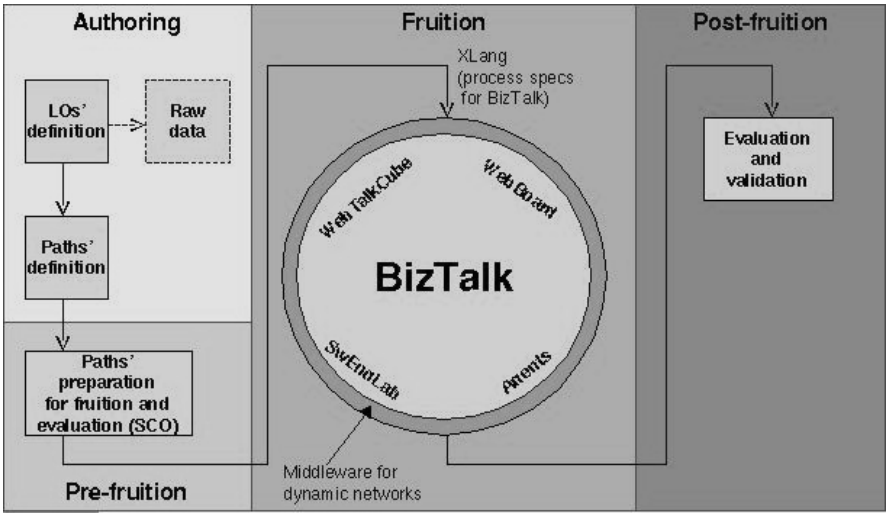

FIGURE. 2
THE ARCHITECTURE OF THE PLATFORM