

avalonlearning: WP4 Virtual Learning Platform:WP4-4 Comparative study of 3D environments



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Introduction

This deliverable is closely linked to the other deliverables in work-package 4 of the AVALON project by contributing to the architectural decisions made in this work package.

Audience

The special focus of this deliverable, different to other deliverables in this work-package, is to assess feasible options implementing the operational infrastructure of the AVALON project. Thus the intended **audience of this deliverables are IT system architects**.

Motivation

Even 3D environments exist since the 1990s, there is still a rapid development of available systems. The combination of available system components will determine the potential the AVALON project can utilize.

Methodology

The methodology used in this deliverable is based on the “Rational Unified Process” and the IBM Global Service Method. Similar methodologies but different namings are posted by different software engineering vendors, with similar results. As the “Rational Unified Process” is widely used in the academic and commercial software engineering domain, we will use the relevant naming and structuring without an additional reference.

Options

Overview about available 3D environments

In a “high-tech” information age, World Wide Web is serving the mankind in different fields of life. There is a huge knowledge

base available, for the users of internet. People not only exploit these resources for entertainment but for learning and education as well. Universities and educational institutions are exercising the e-learning solutions for distance and blended learning [8], [14]. These digital mediums such as educational games [5], [6], [15], Learning Management Systems (LMS) [2], [11] and Multi-User Virtual Environments (MUVE) [4] have given a new life to teaching and learning practices. Learner and instructors enjoy and prefer to exploit these tools for learning and teaching respectively. Especially educational games allow the learner to bridge their personal interest with skills and contents at schools [9], [12].

Even present era offers more innovative learning and teaching platforms in the form of 3D Multi-User Virtual Environments (MUVE) [1], [13] that offers much more than text-based MUVE and customized educational games. These virtual environments are being used for a variety of activities like playing games, doing business, formal and informal learning, distance learning, collaboration, e-commerce etc [10]. Numerous benefits of these virtual environments invite the educationist to exploit features of these environments to perk up the educational practices. But there is a need to properly exploit the features of these virtual environments for the educational needs. Moreover use of these environments without goals and objects unable to provide the optimal efficacy in educational milieu [7].

Numerous virtual environments [16] are available; each possesses varied strength and weaknesses, and serves needs of different age groups. Selection of a particular virtual environment is solely based on goals and requirements of educational institutions. "How to select virtual worlds and how best to design activities and experiences for learner?" is a challenge for both education and training sectors [3]. Research studies describes different parameters can help to categories or assess and evaluate a virtual world [3], [16]. For a comprehensive comparison we exploited these studies [3], [16] and summarized different virtual worlds in the Table 1.

Four important parameters considered while the selection of virtual worlds for the intended project, 1) Affordability, 2) interfacing with other applications, 3) proprietary rights and 4) education readiness. The virtual worlds *Forterra*, *There & Active Worlds* are unaffordable due to budget limitation of the project. Due to lack of possibilities to interface with other application, the virtual worlds *Google Lively*, *Habbo* and *papermint* is not considered. The virtual worlds *whyville* and *Entropia Universe* are proprietary governed and are not open for customized application. Finally three virtual worlds 1) *Second Life*, 2) *Wonderland* & 3) *OpenCroquet* are considered for the project AVALON keeping in view the selection parameters especially customizing features, education readiness and budget.

3D environments, excluded for AVALON

Systems we have excluded because they are not affordable within the AVALON budget:

- Forterra
- Active Worlds
- There

Others have been excluded because they lack the possibility to interface with other applications like

- Google Lively
- Habbo
- papermint

Others are inspiring but are proprietary governed and thus not open for customized applications

- whyville
- Entropia universe

Evaluated Options, already used in the education community

Component	Description	Reference
Second Life	Second Life is provided by Linden Labs Coop, San Franzisco as a service. The client software is provides proprietary as well as open source. The Second Life grid is proprietary serviced, but open source implementations and grids do exist and are actively supported by Linden Labs and IBM. The community using and supporting Second Life is strong and constantly growing. Interfaces	http://secondlife.com

	<p>are open and stable, tons of contents are already available.</p> <p>The is an open source version of Second Life is called open-sim and overcomes some of the limitations of Second Life, like control and governance over the physical ICT infrastructure. open-sim may however introduce disadvantages too like the limited community to collaborate online.</p>	
Wonderland	Java based, open source platform, formally SUN owned. Allows to operate independent sims, more powerful interfaces, easy er to integrate than Second Life. Small but vibrant community, not so much content and support.	http://openwonderland.org
OpenCroquet	Smalltalk based open source platform, allows P2P worlds wich may dynamic grow. Excellent technology, very small community near to no content.	http://www.opencroquet.org

Pro's and Con's

Component	Pro's	Con's
Second Life	<ul style="list-style-type: none"> • The community using and supporting Second Life is huge and constantly growing. • Interfaces are open and stable, a lot of open source code is available • Tons of contents are already available saving on development time. • Widely used by educational institutions (including Harvard law shool) 	<ul style="list-style-type: none"> • 3D browser has a very, very poor usability • Instable 3D browser (getting better) • Propriaty voice system (not open source) • Interfacing restrictions in protocol, volume, frequency • Payments for uploading some contents required • poor performance • simplified graphical model
Wonderland	<ul style="list-style-type: none"> • Java based, very stable and scalable • allows to run independent sims, • more powerful interfaces, easy er to integrate than Second Life. • Small but vibrant community, 	<ul style="list-style-type: none"> • not so much content and support, thus more expensive to use • still beta • requires expensive Java programming • recently discontinued by Oracle (after takeover of Sun), maintained as openwonderland with main contributor University of Zurich
OpenCroquet	<ul style="list-style-type: none"> • Smalltalk based open source, • easy to programm, • allows P2P worlds wich may dynamic grow. • Excellent, mature, stable technology, 	<ul style="list-style-type: none"> • very small community near to no content thus very expensive to use as learning environment • no digital rights management / no permission system

Conclusion and Architectural Decision for AVALON

The AVALON partners decided within the first meetings to use

- Second Life as 3D environment

- moodle as an LMS
- sloodle as 2D / 3D integration

Appendix: Literature an References

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