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LEARNING TO LIVE IN THE KNOWLEDGE SOCIETY

IFIP – The International Federation for Information Processing

IFIP was founded in 1960 under the auspices of UNESCO, following the First World Computer Congress held in Paris the previous year. An umbrella organization for societies working in information processing, IFIP's aim is two-fold: to support information processing within its member countries and to encourage technology transfer to developing nations. As its mission statement clearly states,

> *IFIP's mission is to be the leading, truly international, apolitical organization which encourages and assists in the development, exploitation and application of information technology for the benefit of all people.*

IFIP is a non-profitmaking organization, run almost solely by 2500 volunteers. It operates through a number of technical committees, which organize events and publications. IFIP's events range from an international congress to local seminars, but the most important are:

- The IFIP World Computer Congress, held every second year;
- Open conferences;
- Working conferences.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is small and by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is less rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

Any national society whose primary activity is in information may apply to become a full member of IFIP, although full membership is restricted to one society per country. Full members are entitled to vote at the annual General Assembly, National societies preferring a less committed involvement may apply for associate or corresponding membership. Associate members enjoy the same benefits as full members, but without voting rights. Corresponding members are not represented in IFIP bodies. Affiliated membership is open to non-national societies, and individual and honorary membership schemes are also offered.

LEARNING TO LIVE IN THE KNOWLEDGE SOCIETY

IFIP 20th World Computer Congress,
IFIP TC 3 ED-L2L Conference
September 7-10, 2008, Milano, Italy

Edited by

Michael Kendall
East Midlands Broadband Community
United Kingdom

Brian Samways
Fellow of British Computer Society
United Kingdom

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IFIP 2008 World Computer Congress (WCC'08)

Message from the Chairs

Every two years, the International Federation for Information Processing hosts a major event which showcases the scientific endeavours of its over one hundred Technical Committees and Working Groups. 2008 sees the 20th World Computer Congress (WCC 2008) take place for the first time in Italy, in Milan from 7-10 September 2008, at the MIC - Milano Convention Centre. The Congress is hosted by the Italian Computer Society, AICA, under the chairmanship of Giulio Occhini.

The Congress runs as a federation of co-located conferences offered by the different IFIP bodies, under the chairmanship of the scientific chair, Judith Bishop. For this Congress, we have a larger than usual number of thirteen conferences, ranging from Theoretical Computer Science, to Open Source Systems, to Entertainment Computing. Some of these are established conferences that run each year and some represent new, breaking areas of computing. Each conference had a call for papers, an International Programme Committee of experts and a thorough peer reviewed process. The Congress received 661 papers for the thirteen conferences, and selected 375 from those representing an acceptance rate of 56% (averaged over all conferences).

An innovative feature of WCC 2008 is the setting aside of two hours each day for cross-sessions relating to the integration of business and research, featuring the use of IT in Italian industry, sport, fashion and so on. This part is organized by Ivo De Lotto. The Congress will be opened by representatives from government bodies and Societies associated with IT in Italy.

This volume is one of fourteen volumes associated with the scientific conferences and the industry sessions. Each covers a specific topic and separately or together they form a valuable record of the state of computing research in the world in 2008. Each volume was prepared for publication in the Springer IFIP Series by the conference's volume editors. The overall Chair for all the volumes published for the Congress is John Impagliazzo.

For full details on the Congress, refer to the webpage http://www.wcc2008.org.

Judith Bishop, South Africa, Co-Chair, International Program Committee
Ivo De Lotto, Italy, Co-Chair, International Program Committee
Giulio Occhini, Italy, Chair, Organizing Committee
John Impagliazzo, United States, Publications Chair

WCC 2008 Scientific Conferences

TC12	**AI**	Artificial Intelligence 2008
TC10	**BICC**	Biologically Inspired Cooperative Computing
WG 5.4	**CAI**	Computer-Aided Innovation (Topical Session)
WG 10.2	**DIPES**	Distributed and Parallel Embedded Systems
TC14	**ECS**	Entertainment Computing Symposium
TC3	**ED_L2L**	Learning to Live in the Knowledge Society
WG 9.7 TC3	**HCE3**	History of Computing and Education 3
TC13	**HCI**	Human Computer Interaction
TC8	**ISREP**	Information Systems Research, Education and Practice
WG 12.6	**KMIA**	Knowledge Management in Action
TC2	**OSS**	Open Source Systems
WG 2.13 TC11	**IFIP SEC**	Information Security Conference
TC1	**TCS**	Theoretical Computer Science

IFIP

- is the leading multinational, apolitical organization in Information and Communications Technologies and Sciences
- is recognized by United Nations and other world bodies
- represents IT Societies from 56 countries or regions, covering all 5 continents with a total membership of over half a million
- links more than 3500 scientists from Academia and Industry, organized in more than 101 Working Groups reporting to 13 Technical Committees
- sponsors 100 conferences yearly providing unparalleled coverage from theoretical informatics to the relationship between informatics and society including hardware and software technologies, and networked information systems

Details of the IFIP Technical Committees and Working Groups can be found on the website at http://www.ifip.org.

IFIP and TC3

IFIP is a non-governmental, non-profit umbrella organisation for national societies in the field of information processing. It was established in 1960 under the auspices of UNESCO as the aftermath of the first World Computer Congress held in Paris in 1959. IFIP's mission is to be the leading, truly international, a political organisation which encourages and assists in the development, exploitation and application of information technology (IT) for the benefit of all people.

TC3 is the Technical Committee for ICT and Education, and its aims are:

1. To provide an international forum for educators to discuss research and practice in
    a. teaching informatics
    b. educational uses of communication and information technologies (ICT)
2. To establish models for informatics curricula, training programs, and teaching methodologies
3. To consider the relationship of informatics in other curriculum areas
4. To promote the ongoing education of ICT professionals and those in the workforce whose employment involves the use of information and communication technologies
5. To examine the impact of information and communication technologies on the whole educational environment
    a. teaching and learning
    b. administration and management of the educational enterprise
    c. local, national and regional policy-making and collaboration.

The work of TC3 is carried out through its Working Groups (WG) and Special Interest Groups (SIG).

WG 3.1 Informatics and ICT in Secondary Education
WG 3.2 Informatics and ICT in Higher Education
WG 3.3 Research on Education Applications of Information Technologies
WG 3.4 IT Professional and Vocational Education in Information Technology
WG 3.5 Informatics in Elementary Education
WG 3.6 Distance Learning
WG 3.7 Information Technology in Educational Management
SIG 3.8 Lifelong Learning
SIG 3.9 Digital Literacy

To find out more about the work and people of the TC3 community you find information and links on the web site at http://www.ifip-tc3.net/

Jan Wibe
Chair
Technical Committee 3

Foreword

ED-L2L, Learning to Live in the Knowledge Society, is one of the co-located conferences of the 20th World Computer Congress (WCC2008). The event is organized under the auspices of IFIP (International Federation for Information Processing) and is to be held in Milan from 7th to 10th September 2008.

ED-L2L is devoted to themes related to ICT for education in the knowledge society. It provides an international forum for professionals from all continents to discuss research and practice in ICT and education. The event brings together educators, researchers, policy makers, curriculum designers, teacher educators, members of academia, teachers and content producers.

ED-L2L is organised by the IFIP Technical Committee 3, Education, with the support of the Institute for Educational Technology, part of the National Research Council of Italy. The Institute is devoted to the study of educational innovation brought about through the use of ICT.

Submissions to **ED-L2L** are published in this conference book. The published papers are devoted to the published conference themes:

- Developing digital literacy for the knowledge society: information problem solving, creating, capturing and transferring knowledge, commitment to lifelong learning
- Teaching and learning in the knowledge society, playful and fun learning at home and in the school
- New models, processes and systems for formal and informal learning environments and organisations
- Developing a collective intelligence, learning together and sharing knowledge
- ICT issues in education - ethics, equality, inclusion and parental role
- Educating ICT professionals for the global knowledge society
- Managing the transition to the knowledge society

The published papers clearly show the major interests of our community and conference are related to innovative learning environments for teaching and learning in the knowledge society and related issues with the majority of papers refer to these themes. Digital literacy and themes related to digital inclusion are included as strong conference themes.

To ensure contributions are of the highest quality, all conference presentations have been selected following a refereeing process carried out by an international panel of 32 members, the International Programme Committee and Editors, all of whom belong to IFIP TC3 working groups. All papers have been peer reviewed by at least 3 international experts in Education and ICT.

The International Programme Committee selected four different formats for the proceedings: eight-page papers, four-page papers, four page workshop proposals and poster summaries. The high quality of the contributions, along with the importance of the themes addressed, ensures that the conference will further understanding of the nature of education processes and systems required for the transition to the knowledge society.

Vittorio Midoro
Chair
International Programme Committee

International Programme Committee ED-L2L

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Innovative Learning Environments 1

Design and implementation of a user friendly environment for Learning Objects creation

Giovanni Adorni, Diego Brondo and Mauro Coccoli
University of Genoa, Department of Communication,
Computer, and Systems Science
E-Learning & Knowledge Management Laboratory
Viale Causa, 13 - 16145 Genova, Italy
{adorni, diego.brondo, mauro.coccoli}@unige.it
WWW home page: http://elkm.unige.it

Abstract. The aim of this paper is describing the SCOMaker, a user friendly authoring tool for the automated production of SCOs, mainly oriented to distance learning and learning object design. It is a freely available open source application to assist teachers and academics in the publishing of web content without the need to become proficient in HTML, XML markup or any other language. SCOMaker can export content as self-contained web pages or as SCORM 2004 packages usable on a LMS server or designed for a database SCO repository. This project has been developed by ELKM (E-Learning & Knowledge Management) and led by the University of Genoa.

1 Introduction

The progress of Information and Communication Technologies (ICT) is changing in depth production, management, and exchange of knowledge: methodologies and tools for communication, investigation, and information research are rapidly changing too [1]. Several years of experience in developing e-learning projects at the University of Genoa [2], have pointed out a scenario of increasing managerial complexity, due to the existence of heterogeneous technologies. In an open and heterogeneous environment, the interaction among different tools and platforms, and legacy systems can only be obtained by means of seamless integration and communication, and the use of standards. Another key point is the usability: researchers, teachers, and anyone else having to develop learning objects, has to cope with complex technologies, programming language and elaborate software. Hence the objective of the project is to develop an easy-to-use [3] tool enabling authors of educational materials to produce and deliver sharable objects and documents

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(compliant to international standards, ADL SCORM [4] in primis) in a short time and with a little effort. In this respect, a specific tool has been designed, which we called "the SCOMaker". Furthermore the SCOMaker is thought as a part of a comprehensive pipeline of software tools that cover the whole process of course design, from concept map indexing to publication or storage passing through the creation of learning objects [5]. SCOMaker can be adapted to several application scenarios and learning backgrounds (school, university, primary school, business). On account of this and on the different skill proficiency of potential users, it was of primary relevance to develop a system respecting two main concepts: being accessible and easy-to-use.

2 Software architecture

The first step, in building educational materials, is to create a concept map, a logical and well-formed diagram showing the relationships between concepts of the topics of the lesson. This diagram is a good way for encoding knowledge and

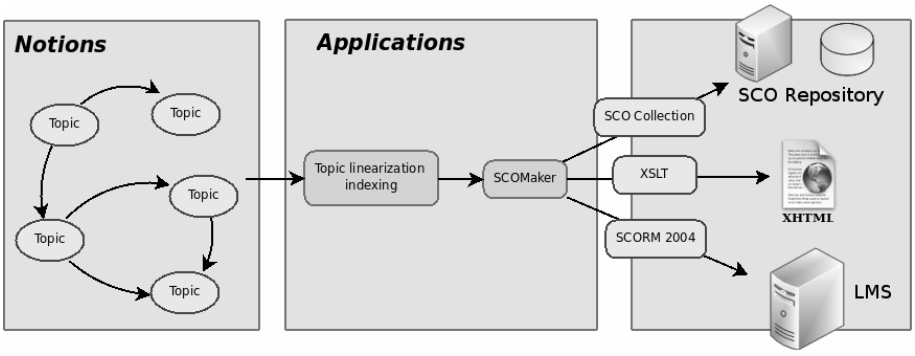

Fig. 1. Learning object production line

connecting this encoded knowledge to relevant information resources. In the notions schema, shown in Figure 1, topics represent the subjects of discourse and arrows are the associations, representing relationships between the subjects.

Following topics association it is possible to glean a linear sequence of topic obtaining a well ordered index (chapters, sections, subsection, etc.). The concept map represents in all respects the index of the e-learning course and, due to its intrinsically hierarchical nature, it can be easily turned into a XML tree following the priority rules. The XML file index can be imported into the SCOMaker creating the framework of the project. The second step is the creation of the content based on the above logical structure and this can be obtained in two different ways. First way writing from the scratch and importing documents and multimedia contents. Second way importing and adding content to an empty framework solution obtained with the topic linearization. Any topic can be linked by author to one or more occurrences, which connect the subjects to pertinent information resources (i.e. PDF documents,

images, multimedia files, etc). Such contents are organized in the XML file and from this point on it can be re-edited or rendered in different shapes. Moreover users can modify the framework freely.

3 Implementation

We developed a web application written in PHP, a reflective programming language, and used XHTML, a markup language that has the same depth of expression as HTML but with a syntax that conforms to XML syntax, for the web interface [6]. This guarantees documents to be well-formed and a better accessibility.

A significant advantage of building web applications to support standard browser features is that they should perform as specified regardless of the operating system or OS version installed on a given client. Additionally, the ability of users to customize many of the display settings of their browser (such as selecting different font sizes, colors, and typefaces) can give an advance to the web application accessibility [7]. SCOMaker was developed taking into account an user-centered design [8], with its intended users in mind at all times. The web interface was designed to be as easy as possible, just like an internet page and all the complex operation for contents and outputs manipulation are completely transparent. So that teachers, instructors or business managers have to focus their attention only on the contents of the lesson .

3.1 Content management

Contents could be of different type: text, images, HTML pages, WiKi, multimedia files imported into SCOMaker with the use of an URI to the remote resource, or embedded ones written directly with the SCOMaker editor.

Each asset (text field, image, multimedia content, etc.) is handled by a specific PHP class. These classes handle both the module interface providing a suitable editor for each content type and the object manipulation methods (PHP functions). This way of project makes possible to developers to easily add new features, fulfilling new educational purposes, just making new modules for handling different type of contents. This modular approach guarantees flexibility and adaptiveness to different pedagogical methodologies and a further extension of SCOMaker features or new standards to come.

Once obtained a structure complying to own intents, the only thing left is the users to save the entire project. Thanks to a set of plugins the customers can choose among different output formats. Using a module rather than another, the learning structure will be converted into different formats for different purposes.

3.2 SCOMaker outputs

Users can create XML output of the course they are creating for a later time modification; or trough a SCORM 2004 standard converter can create a Sharable Content Object portable on any LMS platform SCORM compliant. Moreover they

can send the output to a database with the purpose of adding their work into a learning objects repository. Finally they can create a web version of the lesson in XHTML pages readable on-line through suited XML/XSL-Transformations. This modular approach gives robustness to the standard changes, or database repository changes.

4 Conclusion

Much web publishing applications for authoring such as Frontpage and Dreamweaver provides a set of powerful and complex tools whose use implies a somewhat computer knowledge and a fairly steep learning curve. Moreover too generic software doesn't give appropriate e-learning solutions [9]. With SCOMaker we tried to identify the elements of a learning resource and offer them in an easy and user friendly way. Users in out-and-out learning building, can use SCOMaker features with extreme ease and often without the need for data conversion, thus saving on potential data losses and incompatibilities.

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