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## The Macro Design as an Own Task in WBT Production: Ideas, Concepts and a Tool

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**Abstract.** The conception and production of Web Based Training (WBT) is still too difficult for instructors. Semantic and didactic features are diluted during WBT development by teachers, due to the technical focus of the production task and the corresponding tools. Therefore, we claim a collaborative production as way to meet instructors' skills for an efficient WBT production. In addition to the content modeling and authoring, the proposed methodology points out so called "macro design" as an independent task to be supported. The macro design is innovative in two ways. First, it extends the existing way of content design by supporting instructors in explicating their intentions and instructional design. Second, it demonstrates the possibility to use the Rhetorical Structure Theory (RST) as a communicative mechanism for the instructional design in order to give an explicit perception of the expected content.

### 1 Motivation and Scenario of Use

As we move into the third millennium, instructors (at schools, universities or in companies as well) are increasingly self-engaging in Web Based Training (WBT) practices as a way to author and deliver their educational materials. So far, WBT production is still too difficult. It integrates many interrelated processes, paradigms and disciplines and needs different technical skills that must be acquired and continuously updated. The problem is that an instructor is a domain expert first [5]. In addition he has knowledge about methodology of education but in general he is not trained in technical skills needed for WBT authoring and media creation. Therefore, we motivate a collaborative production as way to meet instructors' skills where authoring and media creation are done in a team so that the technical efforts spent by the instructor are reduced to a minimum. If so, such collaborative production will provide a natural way of working and a better investment of the instructor energy for a better WBT delivery [3]. Figure 1 shows the process-map of our authoring approach. We distinguish three different tasks as part of the production process: the so called "macro design", content modeling, authoring and media creation cycles with feedback loops under instructors supervision. In addition we define vertical to these processes a production management process in order to harmonize the collaboration between actors during the whole collaborative production.

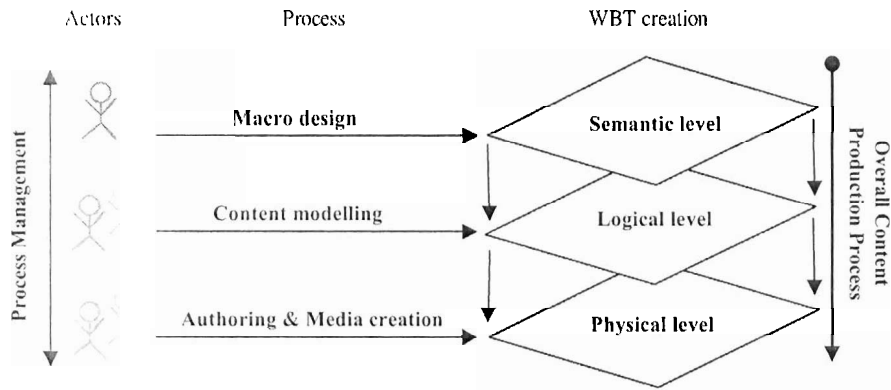


Fig. 1. The proposed approach for the overall content production process

The remainder of this paper is structured as follows: the following section will point out the “macro design” in detail. Section 3 will survey existing related work to discuss their shortcomings regarding our requirements. Then we will introduce in section 4 our approach and its components that we have implemented at the moment. Finally, the paper closes with the conclusion and gives an outlook on future work.

## 2 The Macro Design: Introduction and Requirements

In contrast to existing ways of WBT production, we postulate a phase in addition to content modelling, authoring and media creation which is often neglected or not fully taken into account. This phase, called temporary “the design thinking”, covers instructor’s ideas about what kind of WBT to produce, about a motif and reasons for a specific target group and about a list of themes that need to be taught. The instructor defines implicitly cognitive boundaries of main concepts of his WBT and semantic relations among these concepts according to both knowledge and learner domains. The “design thinking” is done in the mind of the instructor only. He could explain his ideas by speech or writing it down so far. Tool support starts in the content modelling phase nowadays. Most times WBT modelling is done using the table of content paradigm. Such a table of content records the main concepts which are used in content authoring only. The relationships between the main concepts as well as the instructional impact can not be expressed in such a simplified model. Being always only “in the instructor mind”, most of the “design thinking” and parts of the modelling implicit data evaporates as soon as another person is consigned with the authoring and if the WBT is produced.

We introduce, the “macro design” as an explicit modelling phase corresponding to the “design thinking” in order to record what instructors have in mind and to forward instructors’ ideas to all others involved in the WBT production, from the instructional level to the technical level (figure 2) in order to enhance their awareness and comprehension of the production context. As well, a possibility to express and to store the instructor intentions will increase consequently the chance to re-use parts of a

produced WBT. Stated most simply, the macro design could be summarized into answering explicitly the following questions:

1. Why to produce a WBT and for which audience?
2. What to produce (in term of knowledge)?
3. In which form to produce this WBT and why in this form?

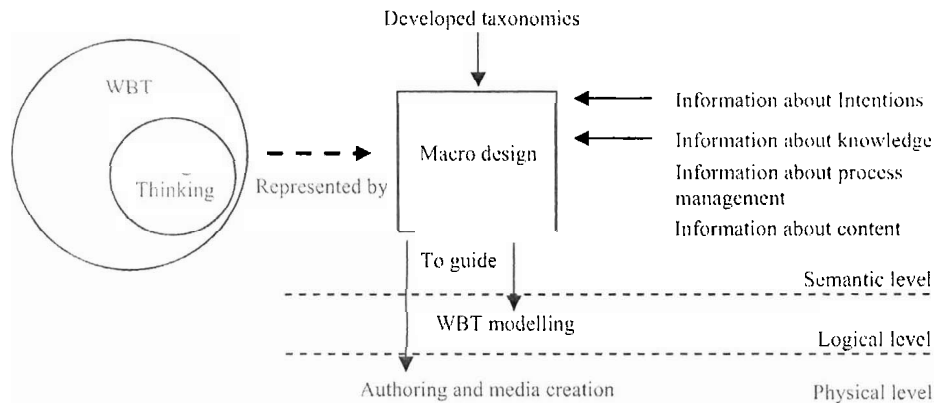


Fig. 2. Using the macro design to support the WBT production

Our goal is to build a tool to support the macro design without any overhead for the instructor. As requirements, first the proposed approach should not impose a certain pedagogical model for the instructor to avoid any semantic mismatch conflict between instructor intentions and the model mapping his intentions. Secondly, guidelines are needed to determine how the instructor should express his intentions, how to supervise and proceed the whole production process. This can be done by guiding him in a step-by-step manner. Taxonomies, as vocabulary for the representation of the WBT including "design thinking" data, are required to support such guidance.

### 3 Existing Support of CBT and WBT Production by Tools

Many approaches were purposed to support the WBT production by tools [7]. However, few suppose that the WBT production is done in a collaborative way supporting different roles and skills. Hence, using existing tools for a collaborative way of working will be quite fuzzy. In particular, these tools fail usually to support a macro design as stated in the previous section. For instance, web page editors (e.g. Macromedia Dreamweaver, FrontPage and Netscape Composer) and text editors (e.g. Microsoft Word, PowerPoint and Open Office) support the authoring phase only. Contrary, course composers (e.g. WebCT, TopClass or Blackboard) and some educational modelling languages (e.g. TeachML, LMML) support rather the content modelling phase [5]. WBT composers (e.g. Authorware, Toolbook, Mediator and Easy Prof) are professional WBT authoring tools and support both content modelling and authoring. Some academic approaches like GenDoc [1], ResourceCenter [4],

WB-Master [3] and SCENARI [1] could be listed in the same category too. But, generally, not all aspects of the macro design are considered in these approaches. Besides, the IMS-LD attempts to model the learning process in form of activities that contain content as black box or contain no content at all [5] [7]. IMS-LD by being so abstract, generic and constructivist oriented, it does not meet all the requirements of our projects.

## **4 Implementation and Work in Progress**

### **4.1 Developing a Taxonomy of WBT Units for the Macro Design**

In Macro Design both WBT domain and learner model have to be described by the instructor. So, he has to be supported to determine the elementary units of the WBT first. In addition, a general way to describe the relations among these units whether or not they are semantically interrelated have to be provided. Many related authoring approaches proposed hypotheses about what constitutes an elementary WBT unit. These hypotheses are based either on logical criteria (e.g. paragraph, section) or physical criteria (e.g. size, layout, image or page) [2]. For our scenario of use, we have developed an initial taxonomy where we distinguish 8 types of WBT Units and their instances to fit the macro design adequately. Our segmentation of WBT documents is rather grounded on semantic basis, where fragmentation and modularization of WBT units is determined by the existence of a certain meaning or didactic function in each unit. This unit, called “a semantic unit”, should be a stand alone and didactically well-recognized. For instance, an illustration composed of an image and its description in paragraph format will be not considered as two units but only as one. This way of modelling does fulfil our requirements. It leads to a separation between the different production’s levels (i.e. Semantic, Logical and Physical levels). The instructor has the ability to define the desired content in a complete abstract way in form of a set of semantic units.

### **4.2 Application of Rhetorical Structure Theory to Support the Macro Design**

Our proposed mechanism to support the macro design is inspired from the Rhetorical Structure Theory (RST) [6]. RST is a framework for analyzing discourse structure and statements by positing hierarchical relations between spans of text in terms of what their intended effect on the reader is. RST has been chosen because it has many features which meet our requirements. First, RST is a natural and neutral mechanism for the semantic modelling that specifies a rigorous set of annotation guidelines without imposing any prior model for the conception. Secondly, RST respect perfectly our developed semantic taxonomy. A work to implement an RST based guidance in a tool is in progress. This tool will allow the instructor to express his macro design as well as to provide information to the technical team (authors) for the ongoing production process. To understand, we simplify briefly in the figure 3 an example of a passage via RST from a given learner and WBT modeling to a simple WBT semantic modeling as a part of the macro design.

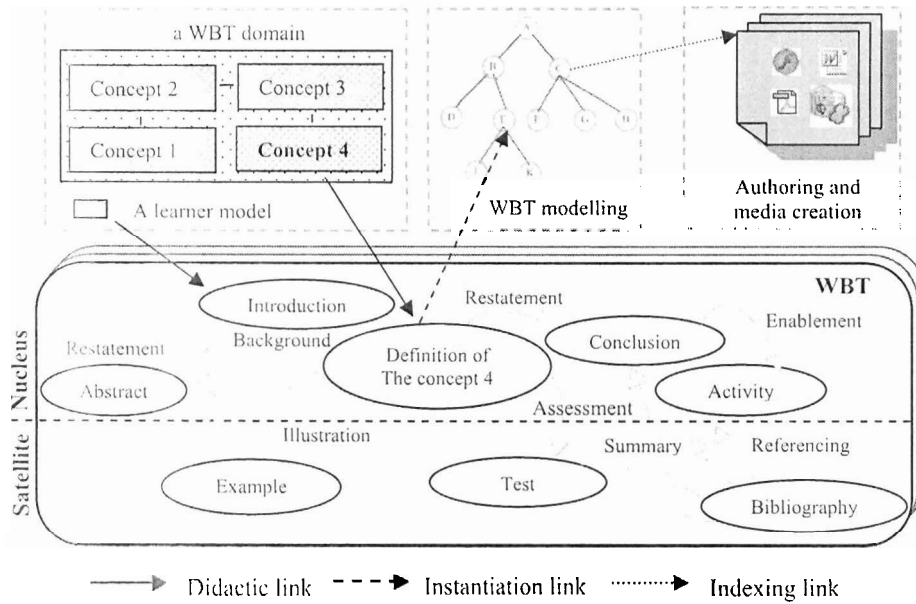


Fig. 3. Using RST and taxonomies to support the Macro Design

In this example, the WBT semantic modelling shows only WBT segmenting into semantic units and rhetorical relations among them to express some of the instructor's intentions. First, the instructor starts by the specification of concepts that the WBT domain of knowledge should include as well as the concepts known already by the learner. The second step is to map those concepts to certain semantic units which serve as abstracted containers of knowledge. All information which are needed about each semantic unit has to be defined explicitly such its mapping to given concepts, its semantic features, its intentional relations with other units and authoring properties if required. This specification is based on the RST framework and on our developed taxonomies. The resulting representation of the WBT when it is completed should be instantiated into a specific WBT model so that the last step to do is to enable this model by authoring and creating needed media. The modelling and authoring of the WBT must fulfil the representation and the requirements given by the instructor and should be done through an iteration controlled by the process management.

### 4.3 Building Blocks and Tool Concept

As proof of concept, we plan to implement an extension of ResourceCenter [4] to support the macro design by addition of a layer up on this tool and to support the processes management. ResourceCenter was chosen because it constitutes a browser based and instructor-friendly tool. Moreover, it supports separately the content modelling and authoring and implements already some required functionalities that we need for the collaborative production. The extension of ResourceCenter is currently in work.

## 5 Conclusion and Future Work

The conception and production of WBT is still technically complex for instructors. Consequently, the development of required technical skills became one of the top instructors' priorities for their professional policies. As a result today, technical concerns over WBT production have dominated teaching and pedagogical aspects. In order to develop a balanced management between the technical and pedagogical skills while producing WBTs, we motivated a collaborative production as way to meet instructors' skills for an efficient WBT production. The proposed methodology points out so called "macro design" as an independent task which has to be supported by a tool. The macro design is innovative in two ways. First, it extends the existing way of content design by supporting instructors in expliciting their intentions and instructional design. Second, it demonstrates the possibility to use the Rhetorical Structure Theory as a communicative mechanism for the instructional design in order to give an explicit perception of the expected content.

As future work, we will continue our semantic modelling and taxonomies development to adapt and to extend the RST framework in order to support completely all macro design requirements. The technical implementation of the macro design up on ResourceCenter will provide a "semantic enrichment" of this tool and evaluate, by the way, capabilities of our approach as compare as existing approaches.

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