

## Digital textbooks

*– current status European and International formal standardisation  
& a proposed lifecycle model*

*Position statement to W3C Workshop on Publishing using the Open Web Platform*

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### Introduction

For obvious reasons, digital textbooks (hereafter etextbooks) have not been driving the development of the ebook market. With etextbooks we find the most challenging technical hurdles when moving from print to digital. Now, with the introduction of EPUB3 and the global focus on online learning this may change, and we may well find that etextbooks could drive market innovation and new publishing workflow developments.

Last year, the etextbook was put on the agenda of European and international formal standardisation. Chinese and South Korean communities launched a etextbook work item in ISO/IEC JTC 1/SC36, the subcommittee on ICT for Learning, Education and Training. South Korea, in understanding with IDPF, brought EPUB3 for «fast-tracking» and formal standardisation to ISO/IEC JTC 1/SC34, the Document description and processing languages subcommittee. And the CEN Workshop on Learning Technologies, established the etextbookseurope.eu project (under the name eTernity<sup>1</sup>) with the aim to establish a consensus based European position on etextbooks.

This position paper aims to give a short summary of where formal standardisation is at the moment, and to introduce a simple workflow model that has been used to structure the requirement discussion in the eTernity project.

### ISO e-Textbook

Standardisation is a multi-layered activity that may be discussed from a political, domain specific, technical, personal, a.o. perspectives. Politically, the SC36 e-Textbook project is interesting, as we see a strong rivalry between China and South Korea, with European national body representatives trying to mediate and to slow down the process, and with US interests completely absent<sup>2</sup>.

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<sup>1</sup> European Textbooks Reusability Networking & Interoperability

<sup>2</sup> US National Body is not participating at all in ISO/IEC JTC 1/SC36.

China had their own e-textbook / eSchoolBag framework they wanted to build on, while South Korea had planned that the combination of EPUB3 and IMS specifications should inform the new standard. Since the options were not that clear cut in mid 2012, SC36 chose to go for a Technical Report, which is a normative document of a more explorative nature than a technical standard.

A working draft of ISO/IEC TR 18120:2013(E) was circulated for comments in June this year. The draft will be discussed in the SC36 Moscow meeting in September, and the report will be further developed through the ISO ballot process and hopefully published early 2014. The gist of the report is the results of a survey mapping views of the etextbook standards landscape among the SC36 experts and their contacts (in total 119 respondents). The draft report also gives an overview of some stakeholder inputs contributing to requirements and a «conceptual model of e-Textbooks». The purpose of the report is to «provide a roadmap for further work to create an international standard for e-Textbook»; however, the way forward is less then clear as the draft reads, the main recommendation being to work «in consultation with IDPF».

The fact that the steward of EPUB is seen as the way forward for SC36 reflects the survey result that there is no viable alternatives; therefore «EPUB3 should be adopted as the primary base standards for any future e-Textbook standards to be produced by SC36». The report recommends that «SC36 should create a quality standard for e-Textbook readers, specifying appropriate functions which e-Readers should provide in respect of tagged e-Textbook content». The draft report also recommends that «SC36, in consultation with IDPF, should support the W3C community work on Open Annotations».

### **CEN eTernity project**

The ISO SC36 work has followed a somewhat «eclectic» path being led by survey answers to questions of the «usefulness» of a broad repertoire of Learning, Education and Training (LET) standards. In contrast, the CEN eTernity chose a more analytic approach. The state-of-the-art analysis of standards related to digital textbooks is still being drafted, and a very first version will be ready for the SC36 Moscow meeting. From the consultations so far, the following positions seem to emerge:

- EPUB3 is the base standard for digital textbooks.

This has a number of implications for further development to meet LET requirements. First, a number of issues of great importance, but not exclusive for learning will be developed by communities where educational interests have minor influence. Examples are display (e.g., rendering of graphical legacy formats), annotations, accessibility of content, and IPR policies or DRM. Second, EPUB3 builds on a range of web standards. Any proposed extension or solution to support LET requirements should acknowledge this architectural premise.

ICT for LET standardisation should focus on the issues the educational community is able to influence, and where no other community is developing specifications. The eTernity project sees three main areas where development and integration work are needed:

- **Assessment.** This is a core LET activity, which is not addressed by the base specification(s). Simple quizzes, however, are part of many eBooks on the market using

the interactive functionalities of EPUB3/HTML5. Educational stakeholders want more extensive assessment being built into their etextbooks, allowing the ebook to use external questions and tests, and to be able to report assessment result to external services, e.g., a Student Record System or a Learning Management System.

- **Navigation.** This area covers what traditionally is discussed as metadata. IEEE LOM, Dublin Core, ISO MLR and LRMI are all learning resources metadata specifications, which are relevant for etextbooks. A future e-textbook framework should allow for a multitude of metadata specifications depending on the particular market. Further work is needed to specify how this will be handled together with EPUB3. Furthermore, European standardisation has pioneered solutions for how learning content could be aligned with curricula, learning outcome descriptions and competency frameworks. These capabilities are very important for adaptive etextbook scenarios and should be integrated in future etextbook formats.
- **Learning Activity descriptions.** Exchange of information related to educational activities are key to relate learning resources to activity and content sequences, learning designs and other aspects of learning, education and training. Even if there are some specifications in this area, there is no particular candidate with the necessary market support. The Experience API recently released by Advanced Distributed Learning (ADL) could offer some solution.

How the LET community should come up with proposals for further development of etextbook standards is, as far as this author is concerned, an open question. It is clear that substantial pre-standardisation work is needed, where stakeholder involvement, especially from tool vendors, is essential to deliver proof of concepts. SC36 does not seem to be able to deliver technical specifications, unless other organisations do the main development. The CEN Workshop on Learning Technologies has recently experienced setbacks in their till now open work process. This is due to restrictions imposed by CEN management focussing on a business model in stark opposition to the open processes being at the heart of the educational community. In this situation, there may be scope for new and intensified work by W3C or other consortia that is more central to the further development of ebooks standards as a whole.

### **A simple publishing lifecycle model for etextbooks**

The August Paris W3C workshop will focus on the complete publishing workflow and on issues particular to producing printed products. Long before the Digital Age, textbooks have had a complex production workflow, now being disrupted by several disintegrating factors. For example, the author role is now more complex, as self-publishing brings more educators to the market; and the learners themselves now take authoring roles as publishing becomes part of the learning process. Curricula and reading lists are not any longer authoritative sources of content for learning, as the Internet has changed the way textbooks are brought to the market. The use of content for learning is also changed, as the social aspects of learning have become more important. These, and a host of other factors needs to be discussed when requirements for the

future etextbooks are solicited and analysed. This author has proposed a etextbook lifecycle model (Figure 1) to the eTernity project to support the discussion on requirements.

In order to stimulate discourse a non-conclusive list of issues related to each process is presented as detailed below.

### Authoring & publishing

- Authoring tools
- Pedagogical design, e.g. pathways, adaptivity, input from learner analytics (informing use of eTextbooks)
- Maps / Navigation / Semantic metadata inclusion
- Rich media / interactivity
- Packaging (what is optimal unit?)
- Licencing / Digital Rights Management (DRM) / Intellectual Property Rights (IPR)
- Tools interoperability / relationship to external services
- Technical formats (EPUB, HTML5, etc.)
- Publication channels

### Aggregation & Searching

- Sharing of metadata on the eTextbook
- Aggregation of eTextbooks according to curricula, reading lists
- “Visibility issues” - eTextbook vs. OER
- IPR, eg. orphaned works, works with unclear digital use IPR
- Preview options / Subscription / Sales

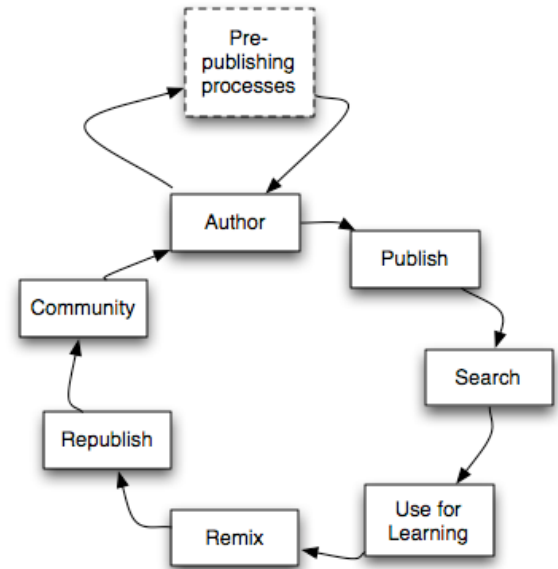


Figure 1 eTextbook lifecycle model

### Learning with eTextbooks (Use of eTextbooks)

- What are basic learning activities (use patterns) of an eTextbook?
- Navigation
- Annotation, sharing annotations
- Tagging
- Saving excerpts
- Sharing (what are sharable units?)
- What are educational (e.g., teacher directed) use of an eTextbook?
- How to interact with the eTextbook (content) from outside (by whom?)
- How to interact with services from inside the eTextbook (guided by use of the content)?
- Simple Quiz (given by the eTextbook author / publisher)
- Questions and tests directed by teacher / schools (bidirectional); Exams / complex assessment based in curricula / registered courses
- Progress report to LMS or other support services

- Interaction with ePortfolio and systems for “self representation”
- Disaggregation and reassembling
- Scaffolding by teachers (learners contact teacher about issues in the ebook. Or teachers to provide more information about a given subject/ task / annotation in the ebook based on the learner’s progression)
- Personalisation of the eTextbook?
- Active learning style buy in, eg. active annotation
- Sharing
- Maintenance of participation in community of learners
- IPR and DRM
- Quality issues: The remix may lead to a new resource of higher quality, or to quite the contrary

### **Remixing**

- Remixing is closely related to learning and teaching activities.
- Teacher: Curation of optimal mix of learning material for the class.
- Mixing eTextbooks, OER and own material
- Pedagogical, economic and licencing issues influencing the mix
- Learners’ motives for remixing may be more ambivalent

### **Republishing**

- Channels for republishing
- Local, e.g., school or school district
- Regional or National, e.g., behind a SSO wall (in Norway FEIDE)
- International, e.g., indexed by search engines
- IPR and remuneration
- Lifecycle issues: when is a remixed and republished resource “expired”?

The lifecycle model was validated in the initial meeting of the eTernity project and the following observations were made:

Publishers are inclined to start analysis with the Authoring process, whilst educational stakeholders tend to start the analysis by examining the Search and Learn processes, with the most digitally literate focussing on the ability to disaggregate, remix and republish content.

Without the facilitator foregrounding the lifecycle model discussion on requirements, a single process, e.g. Authoring, may be the container of most issues related to an etextbook ecology. This may result in the distortion of perspectives on transversal issues like navigation, digital rights management and licencing, definition of granularity, marketing and distribution, etc.

Limiting the discourse to the processes where a stakeholder has vested interests may constrain development of innovative ideas. E.g., Publishers focussing on Authoring, Publishing and Search may overlook the marketing potential in the Community process.

From a publisher’s perspective the etextbook is a single coherent unit and monetization happens through sale of “books”. From a learner’s perspective the focus of discourse is the learning unit, which may not necessarily be the book, but the curriculum or subject and its instantiation in a learning resource (text, video, game, quiz, visualization, etc.). When mobile and open learning,

open educational resources and other e-learning trends and initiatives challenge the traditional textbook model all the processes in the proposed lifecycle model need be analysed. Innovative publishers are beginning to explore the potential of changing from a “push” to a “pull” model for digital textbooks. If this is indeed a precondition to thrive in the new etextbook ecology publishers will be required to understand the entire Learning processes with Remix and Republish, as well as the Community process, where alternative relationships are established between the learner, content and its granularity, and the publisher.

## **Conclusions**

This position statement has given a update on the current state-of-affairs related to (formal) standardisation of digital textbooks formats. This is volatile field at the moment with many actors wanting to influence this substantial market. There is a convergence towards using EPUB3 as the base standard. However, requirements for Learning, Education and Training are not yet described in a way that could inform further standardisation. Both the educational community, the publishers and the tool developers need to provide demonstrators of new etextbook capabilities before consensus could be reached through standardisation.

As a contribution to the necessary discourse on requirements a high level workflow model was presented. The model introduced educational processes (e.g., Remix, Republish, and Community) that need to be better understood by stakeholders that still cling to pre-digital publishing models.