IMS Learning Design Frequently Asked Questions

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Background

- The IMS Global Learning Consortium (www.imsglobal.org) released the IMS Learning Design (IMS LD) specification on February the 13th, 2003;
- Like many specifications, IMS LD is quite voluminous (the three documents in the specification set run to around 300 pages) and fairly abstract (in that it describes a modelling language).
- As a result, it can be quite difficult to understand IMS Learning Design from the specification alone.
- This list of frequently asked questions complements the specification, collecting questions encountered to-date by the Educational Technology Expertise Centre of The Open University of The Netherlands (www.ou.nl) and providing answers;
- The FAQ will be maintained at www.learningnetworks.org, the site dedicated to the new development programme of Educational Technology Expertise Centre. The specific forum is http://learningnetworks.org/forums/forumdisplay.php?s=&forumid=45;
- The document tries to make few assumptions about readers' prior knowledge, although some reference to XML concepts is made (eg schemas);
- We anticipate that new questions will arise as more people are introduced to, and start to apply, the specification and we encourage feedback on this document. We'd like to receive new questions to be added to future versions of this document, and we'd like to know whether the answers we provide are helping. Please post your reactions in the forum . Thanks in advance.

Frequently Asked Questions

1 Where can I find the IMS Learning Design Specification?

- The IMS Learning Design 1.0 specification can be found at the following web address (URL):
    - http://www.imsglobal.org/learningdesign/index.cfm
- There you will find three documents:
    - IMS Learning Design Best Practice Guide
      … the most narrative of the three Specification documents whose primary is to describe how to implement an IMS Specification.
    - IMS Learning Design Information Binding
      … provides detailed descriptions of each of the elements in the Specification's (XML) binding
    - IMS Learning Design Information Model
      … describes the data structures of the Specification.
- There you will also find the various IMS LD XML Schemas

2 What is meant by the phrase "Learning Design"?

- The phrase 'learning design' is derived from the phrase 'instructional design' (defined, at http://www.coe.uh.edu/courses/cuin6373/whatisid.html as "*the systematic process of translating general principles of learning and instruction into plans for instructional materials*

and learning"). Rob Koper's article on pedagogical meta-modelling (see http://www.learningnetworks.org/downloads/ped-metamodel.pdf) describes learning design as "modelling units of study";

- The use of the word 'learning' helps emphasise the variety of approaches to learning above and beyond the "teaching, imparting knowledge" perhaps associated with "instructional design".

- Note also that the phrase is used to refer to the product of the design process, i.e. a learning design (defined, in the IMS Learning Design Specification as "*a description of a method enabling learners to attain certain learning objectives by performing certain learning activities in a certain order in the context of a certain learning environment"*)

3 What is the IMS LD Specification about, in a nutshell?

- IMS LD is a language for modelling units of study—"the smallest unit providing learning events for learners, satisfying one or more inter-related learning objectives";

- A learning design, modelled using the language described in the IMS LD specification, captures who does what, when and using which materials and services in order to achieve particular learning objectives.

- The specification describes the constructs of the language and gives a binding in XML. Using this binding, an XML document instance can be created to describe a learning process.

- The idea is that this XML document instance is 'loaded into' an IMS LD-aware application and 'played'. Playing an IMS LD instance means that once people are assigned into the various roles in the learning process (for example, learners, tutors and mentors), the various activities prescribed in the document instance can be performed.

- The relationship between the IMS LD language and an IMS LD player is analogous to the relationship between HTML and a browser—both languages need to be interpreted by an application to experience the results of the modelling process;

- An IMS LD player might be a separate application or could be functionality incorporated into a Virtual Learning Environment (VLE);

4 Why is the IMS LD Specification important?

- The learning objects movement has grown over the past few years, and is becoming increasingly mainstream (for an introduction to this area, see Stephen Downes' article Learning Objects: Resources for Distance Education Worldwide). Several specifications and a standard for learning objects exist, and there is much interest in meta-data and packaging.

- However, there is a growing feeling of uneasiness, a feeling that the primacy of reusable learning objects is leading to e-learning as page-turning, and to "static, fossilized, dead [content], low learner motivation & engagement, impersonal & isolating environments" (from Paul Stacy's article at http://www.bctechnology.com/statics/pstacey-feb1403.html).

- IMS LD moves beyond designing for lone-learners reading from screens. Its guides staff and educational developers to reflect on learning activities and the achievement of learning objectives. It recognises that learning can happen without learning objects, that learning is different from content consumption and that learning comes from being active. It recognises, too, that learning happens when learners cooperate to solve problems in social and work situations. In all this, it stresses that we must focus on the learning in e-learning, and it is this focus which makes it important for staff and educational developers.

- IMS LD is a language in which to describe learning processes. It helps educational developers model who does what, when and with which content and services in order to achieve learning objectives. It allows processes to be designed that include several roles, each of which can be played by several people. It enables their activities to be specified in coordinated “learning flows” that are analogous to groupware workflows. It supports group and collaborative learning of many different kinds, the importance of which is increasingly recognized in both the commercial training and educational spheres.

5 What problems is IMS LD designed to alleviate?

- In the absence of standardised way of describing learning processes, designers today often use HTML or proprietary scripting languages to code the sequences of activities to be performed by learners, to arrange for communication facilities to be incorporated into these situations, to store the results of interactions, and so on.

- Without agreed and compatible ways to describe teaching strategies, creators of teaching materials and their organizations continue to experience unnecessary difficulty in:

    - documenting the teaching strategies used in or with those materials.
    - establishing and adhering to prescribed procedures for assuring the consistency of that documentation.
    - ensuring that teaching quality targets are met across or between organizations.
    - re-using elements of existing teaching materials.

- IMS LD provides a level of abstraction in the process, offering constructs generic to different pedagogical approaches. Using the language, designers are able to talk in terms of pedagogy rather than technology, thereby making pedagogical choices explicit and subject to review, inspection, critique and comparison.

6 What about IMS LD and pedagogical neutrality?

- The IMS LD specification is sometimes discussed in terms of pedagogical neutrality, since no single pedagogy is inherent in, or implied by, the specification. However, it is important to emphasise that pedagogy is fundamental to the use of IMS LD. Using the specification requires a designer to think about pedagogy—to consider which objectives a learning process is designed to achieve and which pre-requisites are involved, to identify the activities learners and staff should undertake and which tools should be used in the process;

- IMS LD is a pedagogic meta-model, meaning that it provides constructs which allow pedagogic models (eg Problem Based Learning, Competency Based Learning) to be described;

- Since an IMS LD aware player is written at the meta-model level of abstraction, a player is able to interpret any pedagogical model written in terms of the meta-model; the same player can interpret and play a *Problem Based Learning* learning design, a *Programmed Instruction* learning design, and so on.

7 What are the different levels of IMS LD and why are they distinguished?

- To facilitate both the production of the specification and its subsequent implementation, Learning Design has been divided into three parts, known as Level A, Level B, and Level C. Separate XML schemas are provided for each level, with Levels B and C each integrating with and extending the previous Level.

- Level A contains the bulk of the IMS LD constructs, including activities, environments, plays, acts, roles, services etc;

- Level B adds Properties and Conditions to level A, which enable personalization and more elaborate sequencing and interactions based on learner portfolios. Properties can be used to direct learning activities as well as record outcomes.

- Level C adds notifications to Level B. A notification is triggered by an outcome and can make a new activity available for a role to perform.

8 How does IMS LD relate to the other IMS specifications?

- The IMS Learning Design specification can be considered as an integrative layer in that it makes use of, includes or is extendable with a number of existing specifications. The standard way to include specifications is through the mechanisms XML Namespaces. All IMS specifications have their own namespace.

- **IMS Content Packaging.** The IMS Learning Design is preferably integrated into an IMS Content Package to create a so called, 'Unit of Learning'.

- **IMS/LOM Metadata.** Placeholders for metadata are on various structures within the IMS Learning Design. IMS/LOM Metadata can be included at these places.

- **IMS Question and Test Interoperability.** The IMS QTI can be integrated in two ways. The first way is to integrate QTI elements into the element context environment/learning-object as a separate schema. Semantically, this is the correct place for tests. Tests can then be connected to learning-activities, which provide the instruction to complete the test that is present in the environment. Also, the currently used methods, integrating them into IMS Content Packaging as specific Resource types or as separate files are still supported.

    - IMS is currently (summer 2003) looking into best practices in the area of integration between IMS LD and IMS QTI;

- **IMS Reusable Competency Definition.** Learning Objectives and Prerequisites can refer to resources that are defined according to this specification. This is seen as a further refinement when needed. Also supported are simple resources (e.g. textual descriptions) of the learning objectives through the standard 'resource-ref' mechanism.

- **IMS Learner Information Package.** The structure of IMS Learning Design properties can be mapped fully to the IMS LIP.

- **IMS Enterprise** can be used for mapping learners and support staff to roles when instantiating some learning designs. Use of this specification is also recommended for the transfer of user enrollments in cases where they are created in a system other than the LD set up system. This may be a hybrid, where they are transferred at the class level; the more detailed assigning of users to LD roles may then be accomplished in the LD set up system.

- With the IMS Learning Design specification it is possible to include **SCORM content** within a learning design. It would be necessary to have its type set and the runtime system would have to be able to deliver and manage SCORM content.

- **IMS Simple Sequencing**. There are two ways in which LD makes room for the integration of SS.
    - First there is the generally available mechanism of sub-manifests in a content package that Simple Sequencing could latch on to. So one may have a content package with LD for its organization element, that contains a sub-manifest which has SS for its organization element. Etc. SS thus is positioned next to LD. Clearly, this requires a runtime engine that is capable of both running LD and SS instance

documents. Providing an appropriate engine is available in the runtime time environment, it should also be possible to include SCORM content.

- Alternatively, SS may be included in an LD instance document. There are two positions at which SS may be slotted in: inside the environments elements, at the level of the environment element, and within the learning object element at the level of the item element. In the latter case, SS is used to sequence items (and items within it, etc.) that are contained within a learning object. This is very much in the spirit of the SS specification (although we feel the term 'activity' for what really is a piece of static content is a misnomer). In the former case, SS is used to sequence learning objects and items contained in the learning objects. In both cases, the runtime engine has of course to be able to process both LD and SS instance documents.

9 IMS LD and IMS Simple Sequencing seem to be similar. Which one should I use?

- The IMS Simple Sequencing (IMS SS) and Learning Design Specifications both contain sequencing constructs:

    - IMS SS specifies a set of pre-defined conditions and actions, chosen in the light of a body of experience to support the most common conditions and actions found in practice.

    - Within IMS LD there are three sequencing mechanisms. The first mechanism lies in IMS LD's use of one or more concurrent plays, each consisting of a fixed sequence of acts. Each act embraces a number of concurrent role-parts. The second mechanism involves the role-part elements. Role-parts are used to couple roles to (structures of) activities. These activity structures may be of two kinds: a fixed sequence of activities or a selection of (all or some) of the activities. The third mechanism, positioned at Level B, uses properties and conditions to modify the flow of events for both single users and for all users in any role

- The main difference between IMS SS and IMS LD is that IMS SS is based on a single learner model, whereas IMS LD, while also able to model single learner situations, allows multi-learner situations such as group and collaborative learning processes to be modelled.

- As a result, the decision to use one specification over the other is dominated by considerations of the approach to learning being modelled. If multiple roles are involved, or group or collaborative processes, IMS LD offers the appropriate constructs. In the single learner situation, the decision will likely be influenced by a number of factors, including possible customer mandate, existing experience with the specifications in the development team and availability of a player.

10 Will IMS LD be incorporated into a future version of SCORM?

- Although there have been a number of discussions on this issue (see, for example, http://www.cetis.ac.uk/content/20030415235439) there are, as yet, no concrete plans known to us to incorporate IMS LD into a future version of SCORM.

11 How was IMS LD developed?

- EML, the Educational Modelling Language, was developed by The Open University of The Netherlands. Version 1.0 was made available to the e-learning community in December 2000.

- In order to gain a wider acceptance for the ideas contained in EML, the Open University of The Netherlands began to participate in the IMS Global Learning Consortium, in the new workgroup known as IMS Learning Design.

- Rob Koper's article on the pedagogical meta-model behind EML (see http://www.learningnetworks.org/downloads/ped-metamodel.pdf) was produced as input to the

workgroup and an IMS scope document was written (approved in August 2001). A number of use cases were modelled in EML and it was chosen as the foundation for the IMS LD specification.

- A number of modifications to EML were made, some of which were substantial, and the final version of the IMS LD specification was approved on February the 13th 2003.

- EML is now no longer updated or otherwise maintained, although the EML 1.0 DTD is still available through www.learningnetworks.org.

12 What's the difference between IMS LD and EML?

- The major differences between the EML and IMS LD are:

    - EML was created and owned by The Open University of The Netherlands whereas IMS LD is an IMS specification;

    - EML covered all aspects of modelling a learning process in a single language, whereas IMS LD integrates (and therefore does not include constructs contained in) several other specifications, including IMS Content Packaging, IMS/LOM Meta-data, IMS Question and Test Interoperability, etc

    - Following on from the previous difference, but worthy of separate mention, is the fact that EML offers constructs to model the content used in learning processes, but IMS LD does address the modelling of content. The IMS LD specification recommends the use of XHTML for modelling content.

    - IMS LD has the notion of three levels, whereas EML is not split into levels.

13 What kind of process is the creation of a learning design?

- Creating a Learning Design often starts from ideas sketched on paper of a whiteboard and ends with the production of a well-formed, valid XML instance document, which is also correct (in that 'executing the document' creates the envisaged learning experience);

- In our experience at The Open University of The Netherlands, we have found it useful to separate the following phases in this process:

    - In the analysis phase a concrete educational problem is analysed, usually by talking to the various stakeholders. The analysis results in a didactic scenario that is captured in a narrative, often on the basis of a checklist.

    - The narrative then is cast in the form of a UML activity diagram in order to add more rigor to the analysis. The UML activity diagram then forms the basis for an XML document instance that conforms to the IMS LD spec.

    - This document instance subsequently forms the basis for the development of the actual content (resources) in the development phase.

    - The content package with both the resources and the learning design will then be evaluated, including testing in a run-time system;

- It is important to stress that iteration is a natural characteristic of this process;

14 What kind of support is available today for learning designers?

- Given that the Learning Design Specification is new, there is still much work to be done in tool support—today, there are no IMS LD-aware tools which support the creation of Learning

Designs, neither is there an IMS LD player;

- Beyond the NotePad-level, a designers only choice is to turn to XML-aware editors such as XML Spy. Although these tools help to ensure that XML is well-formed and valid against the Learning Design schemas, there are a number of other levels of support needed:
    - help in ensuring that the various references included in an IMS LD document instance are to the correct types of construct (eg does the `property-ref` used in a `change-property-value` construct actually refer to a property?);
    - help in ensuring that deadlock situations are avoided, such as when the setting of property means that all further activities are disabled;
- Today's rather barren situation is changing and we maintain a list of initiatives in the area of IMS LD tooling at:
    - http://learningnetworks.org/forums/showthread.php?s=&threadid=137

15 What kind of support is envisaged for learning designers?

- The ideal environment for learning designers would include:
    - Tools to aid the discovery (and re-use) of learning design templates and learning resources created elsewhere;
    - Parsers, validators and checkers to ensure that the document instance created is valid, correct (references are correct, no deadlock);
    - Editors, capable of handling combinations of IMS CP, IMS LD, IMS QTI, IMS LIP;
    - Previews and simulators, so that designers can see how the design will be experienced by learners and staff;

16 How are learning designs transformed to 'something that runs'?

- Once a learning design has been created, it must be populated with actual users. We have found it useful to use the concept of a *run*—the combination of a particular learning design with a community of users assigned to that learning design. The reasons for assigning a certain number of runs to a learning design are often based on organizational and administrative considerations, such as:
    - The educational organization is based on a classroom system. Here it makes sense to create a run for each classroom;
    - Enrolment of users is open all year, but the learning design requires that users work in groups which are synchronized in time. A run is then created as soon as a sufficient numbers of users have enrolled for the learning design.
- Note that the constraints formulated in the learning design must be respected. For example, if some of the roles require a minimum number of users, at least that number should be assigned to the run before the actual live interpretation may start.

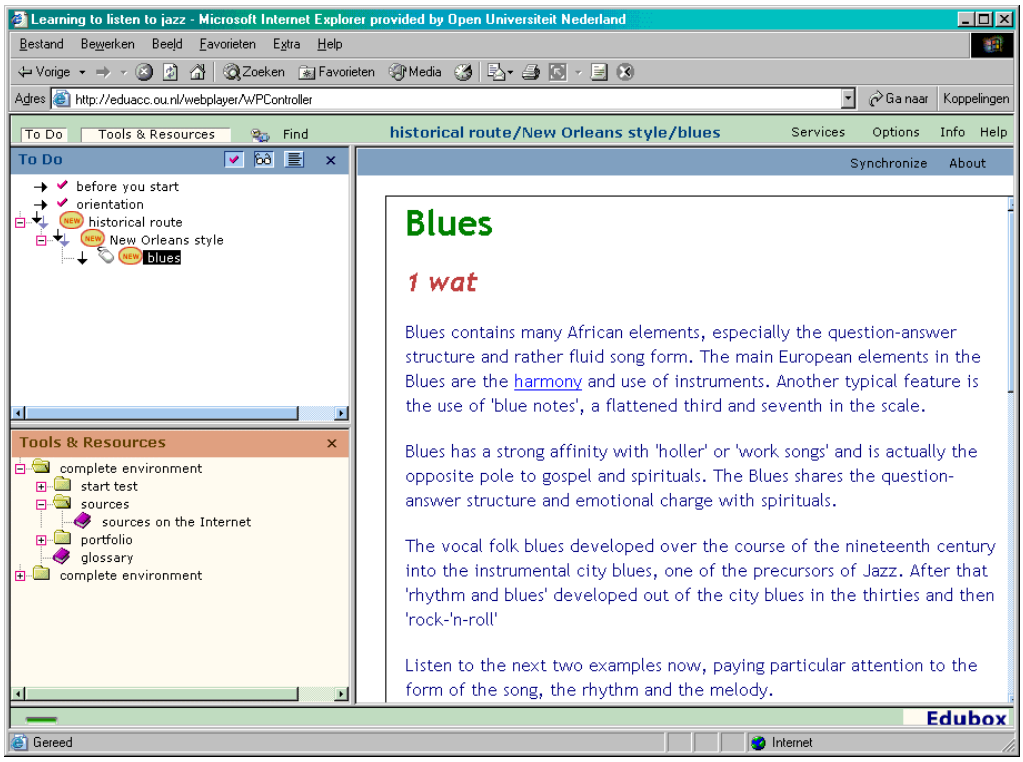
17 What happens at run-time?

- The actual run-time playing of a learning design run can be relatively straightforward (if appropriate pre-processing activities have been carried out prior to interpretation).
- Personalisation of the learning design is handled, so that the view on the learning design is adapted to individual users on the basis of learner information. This includes adaptation of the

activity list, environments, etc.

- The main mechanism for personalizing the content uses the global elements Levels B and C, which provide property manipulation (viewing and setting of properties). Furthermore standard HTML and XHTML can be manipulated (made visible or hidden) via their class attribute.

- An example player user interface, as it might be experienced by a learner, is shown in the following figure:



18 Is there an IMS LD developer's community?

- The Open University of The Netherlands runs www.learningnetworks.org, a site which contains a number of forums, including one dedicated to IMS LD (see http://learningnetworks.org/forums/forumdisplay.php?s=&forumid=20);

- Furthermore, we were the initiators of the Valkenburg Group, a group of organisations working on EML and IMS Learning Design tools and applications. See http://learningnetworks.org/forums/forumdisplay.php?s=&forumid=33 for further information.

19 The Best Practice Guide examples have incorrect schema locations. What's wrong?

- There's a discrepancy between the schema location used in the examples and the actual schema location of the published schemas. This is a rather unfortunate consequence of the publishing process ....

- The examples use:

```
xsi:schemaLocation=http://www.imsglobal.org/xsd/imsld_v1p0
http://www.imsglobal.org/xsd/imsld_level_a_v1p0.xsd
```

- but in reality, the schema location naming convention is different, and the `schemaLocation` should be:

```
xsi:schemaLocation=http://www.imsglobal.org/xsd/imsld_v1p0
http://www.imsglobal.org/xsd/IMS_LD_Level_A.xsd
```

- Also, one of the examples (Problem Based Learning) uses a reference to a local copy of the schema instead of referencing the IMS site, which was the intention for all examples;

- These issues will likely be corrected in a future version of the specification;

20 I'm still getting schema errors with the examples. What's wrong?

- Not all current XML tools support some of the more sophisticated schema constructs used in the IMS Learning Design schemas and this can give rise to errors;

- The Open University of The Netherlands has developed so-called author's schemas which are equivalent to the official IMS Learning Design schemas but avoid certain constructs.

- We are making these schemas available to the community 'as is' (i.e. without warranty of any kind, and we are not in a position to provide support) as a temporary measure to ease validation of IMS Learning Design files while XML tooling matures.

- The author's schemas can be found at http://learningnetworks.org/downloads/IMSLD/AuthorSchemas.zip. Following this link will download a ZIP file containing a memo describing the need for the author's schemas together with two toy LD examples which help to illustrate the issue, in addition to the schemas themselves.

- We would like to stress that the official IMS Learning Design schemas are to be found at www.imsglobal.org and this tooling should not be seen as a replacement.