IMS Learner Information Packaging Best Practice and Implementation Guide

Version 1.0 Final Specification

About This Document

Title	IMS Learner Information Package Best Practice & Implementation Guide
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Version	1.0
Version Date	9th March, 2001
Status	**Final Specification.**
Summary	This document provides additional information regarding IMS Learner Information Packaging best practices and implementation guidelines. It is meant to complement the IMS LIP XML Binding and IMS LIP Information Model documents.
Revision Information	9th March, 2001
Purpose	Defines the best practice usage of the XML binding for the LIP Information Model specification.
Document Location	http://www.imsproject.org/profiles/lipbpig01.html.

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Revision History

Version No.	Release Date	Comments
Public Draft Specification v1.0	21st December, 2000	This is the first publicly available version of the IMS LIP Best Practice & Implementation Guide.
Final Specification v1.0	9th March, 2001	This is the first final version of the IMS LIP Best Practice & Implementation Guide.

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1.   Introduction

1.1   IMS Learner Information Specifications Overview

IMS *Learner Information Package* is based on a data model that describes those characteristics of a learner needed for the general purposes of:

- Recording and managing learning-related history, goals, and accomplishments;
- Engaging a learner in a learning experience;
- Discovering learning opportunities for learners.

The specification supports the exchange of learner information among learning management systems, human resource systems, student information systems, enterprise e-learning systems, knowledge management systems, resume repositories, and other systems used in the learning process. In this document such systems will be called *learner information systems* regardless of any other functionality they possess or roles they fulfil. The IMS Learner Information Package specification does not address requests for learner information or the exchange transaction mechanism.

1.1.1   Requirements

IMS Learner Information specifications are designed to meet the following requirements:

- *Distributed information:* A learner information system may in fact consist of multiple distributed systems that share learner information or that store learner information in a distributed fashion. This necessitates the inclusion of adequate indexing and time stamping of learner information data as it is packaged;

- *Scalability:* To support large-scale systems it is necessary to exchange and reassemble chunks of arbitrary granularity as well as bulk transfer. Packaging of multiple LIPs will use the IMS Content &Packaging specification;

- *Privacy and Data Protection:* Learner information systems must be able to implement privacy and data protection policies and insure the integrity of data;

- *Flexibility and External references*: Learner information includes many constructs, such as learning objectives and learning history, which are in practice represented by different structures in different contexts. Learner information data models must be flexible enough to accommodate this need.

Privacy and Data Protection

The IMS project recognizes the need to:

- Maintain the privacy of learner information;
- Protect information from inappropriate access;
- Ensure the integrity of information;
- Accommodate the regulatory policies and requirements of different jurisdictions.

IMS Learner Information Package enables the inclusion of mechanisms for maintaining privacy and protecting the integrity of data with *all* data that comprises learner information. The specification cannot, however, specify the form, format, or type of these mechanisms or policies for their use. These must be determined by specific implementations in accordance with their requirements.

1.1.2   Learner Information Data and Meta-data

IMS Learner Information Package is a structured information model. An XML binding is included but is not meant to exclude other bindings. The information model contains both *data* and *meta-data* about that data. The model defines fields into which the data can be placed and the type of data that may be put into these fields. Typical data might be the name of a learner, a course or training completed, a learning objective, a preference for a particular type of technology, and so on. Meta-data about each field can include:

   i.   Time-related information;
  ii.   Identification and indexing information;
 iii.   Privacy and data protection information.

This meta-data is available for each and every field in the information model, either directly or via inheritance.

1.1.3   Learner Data Structure

The learner information model can be viewed in three different ways:

  i.   A tree;
 ii.   An object model;
iii.   A tabular representation.

All three ways are explained in the specification. The Learner information is separated into eleven main categories (as shown in Figure 1.1). These structures have been identified as the primary data structures that are required to support learner information. This composite approach means that only the required information needs to be packaged and stored.
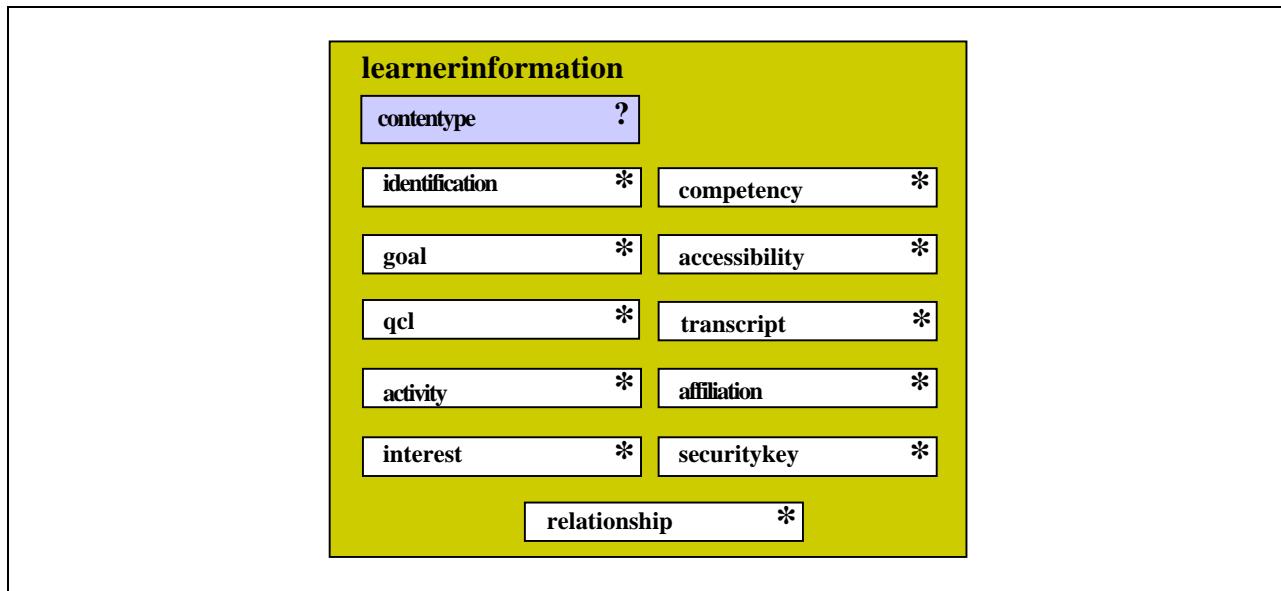
Figure 1.1 The IMS Learner Information Package (LIP) core data structures.

- *Identification:* Biographic and demographic data relevant to learning;

- *Goal:* Learning, career and other objectives and aspirations;

- *Qualifications, Certifications and Licenses (qcl):* Qualifications, certifications and licenses granted by recognized authorities;

- *Activity:* Any learning-related activity in any state of completion. Could be self-reported. Includes formal and informal education, training, work experience, and military or civic service;

- *Transcript:* A record that is used to provide an institutionally-based summary of academic achievement. The structure of this record can take many forms;

- *Interest:* Information describing hobbies and recreational activities;

- *Competency:* Skills, knowledge, and abilities acquired in the cognitive, affective, and/or psychomotor domains;

- *Affiliation*: Membership of professional organizations, etc. Membership of groups is covered by the IMS Enterprise specification;

- *Accessibility:* General accessibility to the learner information as defined through language capabilities, disabilities, eligibilities and learning preferences including cognitive preferences (e.g. issues of learning style), physical preferences (e.g. a preference for large print), and technological preferences (e.g. a preference for a particular computer platform);

- *Securityke*y: The set of passwords and security keys assigned to the learner for transactions with learner information systems and services;

- *Relationship:* The set of relationships between the core components. The core structures do not have within them identifiers that link to the core structures. Instead all of these relationships are captured in a single core structure thereby making the links simpler to identify and manage.

These categories were chosen to meet the requirements of a large variety of use cases and to facilitate mapping among IMS and other relevant specifications. Within each category several data elements and structures are defined. Some of these are specified explicitly as data types (language strings, for the most part) and others are defined as recursive hierarchical structures. In addition, data may be defined by referencing mechanisms. The referencing mechanisms supported are internal references, references to an external learner information system, and references via a URI.

1.1.4   Learner Information Meta-data

The learning information meta-data (contained within the 'contentype' structure shown in Figure 1.1) is broken into four categories:

- *Time Information:* Time of creation and time of expiration of a piece of data;

- *Index and Source:* Supports a pair consisting of a source and an ID assigned by that source, a local index that is used for cross-referencing, and a URI;

- *Privacy and data protection information:* Unstructured data to be determined by practice and implementation.

All learning information data elements have meta-data sub-elements with the exception of atomic elements that can always inherit their meta-data. For example, in the *Identification* category, meta-data is associated with the *Name* element but not with its constituent elements since it is felt that the meta-data for the constituent elements cannot change independently of the meta-data for the *Name* element itself.

1.2   Scope & Context

This document is the IMS Learning Information Package (LIP) Best Practice & Implementation Guide. As such it should be used in conjunction with the:

- IMS Learner Information Package Information Model specification v1.0;

- IMS Learner Information Package XML Binding v1.0;

1.3   Structure of this Document

The structure of this document is:

2.	RELATIONSHIP TO OTHER SPECIFICATIONS	The relationship of this specification to other IMS and external specification activities;
3.	OVERALL DATA MODEL	A brief summary of the IMS Learner Information Packaging information model;
4.	BASIC EXAMPLE LIP INSTANCES	Examples of the basic LIP instances (for each of the core structures) that are supported by this specification;
5.	ADVANCED EXAMPLE LIP INSTANCES	Advanced examples of LIP instances that are supported by this specification;
6.	IMS LIP AND OTHER RELEVANT SPECIFICATIONS	An explanation of how the IMS LIP can be used to capture some of the other relevant specifications;
7.	IMPLEMENTATION GUIDANCE	Tips on how distributed learning systems can make best usage of the LIP specification;
8.	V1.X DEVELOPMENTS	The areas of the specification that are for further development in later releases;

9.   EXTENSIBILITY   The extension facilities and their usage;

10.   CONFORMANCE   The expectations on systems that claim conformance
                                           to the IMS LIP specifications;

APPENDIX A – LIP AND ITS SCHEMAS   The range of available LIP XSDs and DTDs;

APPENDIX B – THE LIP XML INSTANCE   The set of LIP examples and their associated file
EXAMPLE FILES   names;

APPENDIX C – GLOSSARY OF TERMS   A glossary of the key terms and elements used within
                                          the specification.

1.4   Nomenclature

ADL   Advanced Distributed Learning
AICC   Aviation Industry CBT Committee
ANSI   American national Standards Institute
CBT   Computer Based Training
CEN   Centre for European Normalisation
CORBA   Common Object Repository Brokerage Architecture
DCOM   Distributed Common Object Management
DTD   Document Type Definition
EDI   Electronic Data Interchange
FEFC   Further Education Funding Council
GUID   Global User Identifier
IEEE   Institute of Electronic & Electrical Engineering
IETF   Internet Engineering Task Force
ISO   International Standards Organisation
ISR   Individualised Student Record
ISSS   Information Society Standardisation Service
JTC   Joint Technical Committee
LDAP   Lightweight Directory Access Protocol
LIP   Learner Information Packaging
LOM   Learner Object Meta-data
LTSC   Learning Technology Standards Committee
NATO   North Atlantic Treaty Organisation
PAPI   Public And Private Information
PDI   Personal Data Interchange
QTI   Question & Test Interoperability
SCORM   Shareable Courseware Object Reference Model
SEP   Staffing Exchange Protocol
SIF   Schools Interoperability Framework
URI   Universal Resource Identifier
W3C   World Wide Web Consortium
XDR   XML Data Reduced
XML   Extensible Mark-up Language
XSD   XML Schema

1.5   References

[ANSI, 98]   *Student Educational Record (Transcript)*, ANSI ASC X.12-TS130, <u>ANSI</u>, April 1998.

[CP, 00a]   *IMS Content Packaging Information Model*, T.Anderson, W.Young, C.Moffatt, Version 1.0, <u>IMS</u>,
                May 2000.

[CP, 00b]   *IMS Content Packaging XML Binding*, T.Anderson, W.Young, C.Moffatt, Version 1.0, <u>IMS</u>, May 2000.

[CP, 00c]   *IMS Content Packaging Best Practice and Implementation Guide*, T.Anderson, W.Young, C.Moffatt, Version 1.0, <u>IMS</u>, May 2000.

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[Gestalt, 99]   *Gestalt: WP5 - Object (Interfaces) Specification*, V.Wade, K.Riley, B.Banks, P.Foster, N.Evans-Mudie, Y.Nicol, P.Doherty, <u>Gestalt Doc No: A367/TCD/WP05/DS/L/008/b1</u>, October 1999.

[HR, 00a]   *Resume DTD*, <u>HR-XML Consortium</u>, June 2000, <u>http://www.hr-xml.org</u>.

[HR, 00b]   *Candidate DTD*, <u>HR-XML Consortium</u>, June 2000, <u>http://www.hr-xml.org</u>.

[LIP, 00a]   *Profiles Interchange Requirement Specification*, G.Collier, T.Probart and C.Smythe, Version 1.0, <u>IMS</u>, March 2000.

[LIP, 01a]   *IMS Learner Information Package Information Model Final Specification*, R.Robson, C.Smythe and F.Tansey, Version 1.0, <u>IMS</u>, March 2001.

[LIP, 01b]   *IMS Learner Information Package XML Binding Final Specification*, R.Robson, C.Smythe and F.Tansey, Version 1.0, <u>IMS</u>, March 2001.

[LIP, 01c]   *IMS Learner Information Package Best Practices & Implementation Guide Final Specification*, R.Robson, C.Smythe and F.Tansey, Version 1.0, <u>IMS</u>, March 2001.

[MD, 99a]   *IMS Meta-data Information Model*, T.Wason, Version 1.0, <u>IMS</u>, September 1999.

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[Messaging, 99] *Proposal for the Inclusion of a Run Time Messaging Service in the IMS 1.0 Specifications*, Ken Schweller, <u>IMS</u>, May 1999.

[PAPI, 98]   *IEEE PAPI Specification - Learning Technology: Public and Private Information*, Version 6.0, <u>IEEE LTSC P1484</u>, June 2000.

[QTI, 01]   *IMS Question & Test Interoperability Information Model*, C.Smythe and E.Shepherd, Version 1.1, <u>IMS</u>, March 2001.

[Saba, 00]   *Profile Format: Design Specification*, Daniel Lipkin, <u>Saba Inc</u>, May 2000.

[SIF, 99]   *Schools Interoperability Framework Preliminary Implementation Specifications*, Version 1.0, <u>SIF</u>, November 1999.

[vCard, 98]   *The vCard v3.0 XML DTD*, F.Dawson, <u>IETF Draft</u>, June 1998.

2.   Relationship to Other Specifications

2.1   IMS Specifications

Version 1.0 of the IMS Learner Information Package (LIP) specification is made up of three documents:

- *IMS Learner Information Package Information Model – Version 1.0.* This document describes the data structures that are used to provide interoperability of Internet-based learner information systems;

- *IMS Learner Information Package XML Binding – Version 1.0.* This document describes how to encode the learning information objects in XML and provides the corresponding XML schema;

- *IMS Learner Information Package Best Practice & Implementation Guide – Version 1.0.* This document (the one you are reading now) provides an overview and describes how the IMS LIP Information Model and XML Binding can be applied to specific types of interoperability scenarios.

The IMS LIP specification is related to several other IMS specifications, both complete and in-progress. This specification is intended to be consistent with these other initiatives wherever possible, in order to reduce redundancy and confusion between specifications. The related specifications are:

- IMS Meta-data Specification – the IMS LIP specification recommends the usage, where appropriate, of the IMS Meta-data definitions to support the meta-data entities to be used in the context of the LIP;

- IMS Enterprise Specification – the IMS LIP is not to be used for the exchange of information concerning education groups and the membership of such groups. This type of information exchange should be based on the IMS Enterprise specification;

- IMS Content Packaging Specification – multiple IMS LIP XML instances should be packaged using the IMS Content Packaging mechanisms;

- IMS Question & Test Interoperability – summary results interoperability is support by the IMS LIP. This will also be addressed by the IMS QTI working-group and when their work has been completed the two solutions will be formally harmonised (IMSP LIP method is more generic that that proposed for the QTI and as such is capable of supporting the QTI method).

2.2   Related Specifications

2.2.1   IEEE P1484

The IEEE Learning Technology Standardisation Committee P1484 is the only body engaged in the educational domain, which has a recognised formal standing. Given the diversity of the fora represented by the participants in the IEEE, there exist a large number of working groups focused on specific activities, as well as more horizontal activities (such as the Architecture and Reference Model and the Glossary working groups) that attempt to tie the wider ranging work together. The IEEE Public & Private Information (PAPI) Specification is an attempt to define a 'portable' learner [IEEE, 98]. The IMS LIP has, in part, been derived from the PAPI (versions 5.0 and 6.0).

2.2.2   Schools Interoperability Framework (SIF)

The Schools Interoperability Framework is an industry initiative to develop a technical blueprint for K-12 software that will enable diverse applications to interact and share data now and in the future. SIF has two deliverables: the SIF Message Specification and the Implementation Specification. While the SIF Message Specification defines the messages that each application can exchange with others, the Implementation Specification defines the software implementation guidelines for SIF. The Implementation Specification does not make any assumption of what hardware and software products need to be used to develop SIF-compliant applications. Instead, it only defines the requirements of architecture, communication, software components, and interfaces between them. The goal of SIF is to ensure that all the SIF-compliant applications can achieve interoperability, regardless of how they are implemented. SIF is truly an open industrial initiative. SIF is focused on supporting interoperability between schools-based educational administration systems whereas LIP is focussed on learner educational information.

2.2.3   ANSI TS 130 Student Educational Record

The ANSI TS130 contains the format and establishes the data contents of a Student Educational Record (Transcript) Transaction Set for use within the context of Electronic Data Interchange (EDI) environment. The student transcript is used by schools and school districts, and by post-secondary educational institutions to transmit current and historical records of educational accomplishment and other significant information for students enrolled at the sending schools and institutions. The transcript may be sent to other educational institutions, to other agencies, or to prospective or current employers. The student transcript contains personal history and identifying information about the student, the current academic status, dates of attendance, courses completed with grades earned, degrees and diplomas awarded, health information (Pre-Kindergarten through Grade 12 only), and testing information.[1]

2.2.4   Internet vCard Specification

The vCard specification allows the open exchange of Personal Data Interchange (PDI) information typically found on traditional paper business cards. The specification defines a format for an electronic business card, or vCard. The vCard specification is suitable as an interchange format between applications or systems. The format is defined independent of the particular method used to transport it. The transport for this exchange might be a file system, point-to-point public switched telephone networks, wired-network transport, or some form of unwired transport. The vCard has direct application to the way users utilize the Internet network. The vCard can be used to forward personal data in an electronic mail message. The numerous forms a user of the WWW fills out on a homepage can also be automated using the vCard. The Internet Mail Consortium is working with the Internet Engineering Task Force (IETF) to complete work on an extension to the Internet MIME-based electronic mail standard to allow for this capability. An XML binding of the vCard specification has produced a DTD [vCard, 98] and this has been used to inform the development of the IMS LIP.

2.2.5   Internet2 eduPerson

In February 2001the joint Internet2(R) and EDUCAUSE working group announced the release of the 'eduPerson' specification for services that provide seamless access to network-accessible information regardless of where or how the original information is stored. The eduPerson specification provides a set of standard higher-education attributes for an enterprise directory, which facilitate inter-institutional access to applications and resources across the higher education community. The EDUCAUSE/Internet2 eduPerson task force has the mission of defining a Lightweight Directory Access Protocol (LDAP) object class that includes widely-used person attributes in higher education. An example of how to use the IMS LIP to exchange the eduPerson information is shown in Section 6.

2.2.6   HR-XML Consortium Specifications

The HR-XML Consortium is an independent, non-profit association dedicated to the development and promotion of a standard suite of XML specifications to enable e-commerce and the automation of human resources-related data exchanges. The mission of the HR-XML Consortium is to develop and publish open data exchange standards based upon XML. Some of the Consortium's initial targets for standardization activities include recruiting, staffing, compensation and benefits. The Consortium's Recruiting and Staffing workgroup is working on a first version of Staffing Exchange Protocol (SEP), an XML-based messaging framework that supports dynamic, real-time staffing transactions over the Web. Transactions supported by SEP include the posting of job opportunities to job boards and other recruiting venues and the return of resumes matching those postings. The protocol also supports the up-dating and recall of job postings, the supplying of contact information for a job candidate where only partial information was initially supplied, employer feedback to job boards on positions that have been filled, and the update and recall of resumes by job seekers. The Consortium's Compensation and Benefits Workgroup has begun work on an XML framework for communicating employee benefit enrollment information between employers and insurance carriers, managed care organizations, and third party administrators. The workgroup also is working to deploy a demonstration of how standardized XML can streamline the transfer of Defined Contribution and Defined Benefit (DC/DB) data between a plan sponsor, such as an employer, and a plan provider.

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[1] The ANSI TS 130 definition of a transcript is more formal than that adopted as one of the core data structures in the IMS LIP. A TS 130 transcript is one of the possible documents that could be referenced by an IMS LIP instance.

2.3 Related Activities

2.3.1 ISO/IEC JTC1/SC36 Learning Technology

As of 10th November 1999, the ISO/IEC Joint Technical Committee 1 meeting in Seoul agreed resolution 6, which brought into existence Sub-Committee 36 - Learning Technology. The international secretariat for SC36 is provided by the US National Body, the American National Standards Institute (ANSI). ISO/IEC JTC1/SC36 is intended to address standardisation in the area of information technologies that support automation for learners, learning institutions, and learning resources. It is the intention that SC36 shall not create standards or technical reports that define educational standards, cultural conventions, learning objectives, or specific learning content. Their activity in the field of question and test has yet to be defined. The UK delegation to ISO has offered to undertake preliminary work on learning profiles on behalf of ISO.

2.3.2 Advanced Distributed Learning (ADL) Initiative

ADL is a US military programme started by the White House in 1997 that aims to advance the use of state-of-the-art on-line training amongst the countries defence forces. There is some collaboration with experts in military training applications from other NATO countries. ADL is very focused on content for particular areas of training. It also has the Shareable Courseware Object Reference Model (SCORM v1.0) as a working document to encourage discussion and input on the emerging standards. No separate Learner Information specification is underway.

2.3.3 Aviation Industry CBT Committee (AICC)

The Aviation Industry CBT Committee is a membership-based international forum that develops recommendations on interoperable learning technology, principally for the commercial aviation and related industries. As such its members include both plane and equipment manufacturers, carriers, software and multimedia vendors and a growing number of interested parties not directly engaged in the sector, but nevertheless interested in the work being done there. A sub-group of the AICC have been working with the ADL and other organisation from the IEEE LTSC.

2.3.4 EU ACTS Gestalt Project

The EU ACTS Project GESTALT (Getting Educational Systems Talking Across Leading-edge Technologies) addressed the issues of integrating a number of technologies able to support the planned integration. CORBA and DCOM were used to provide the distributed platform support required by this application. A meta-data format servicing the requirements of the application was specified, drawing on the work of bodies such as the IMS Project and the IEEE LTSC. In addition, W3C XML meta-data extensions, such as SMIL, were explored for providing object synchronisation. The Gestalt project was completed in March, 2000.

2.3.5 CEN/ISSS

CEN/ISSS, in co-operation with the European Commission's DG III & DG XIII has set up a working group to address European requirements for Educational Technology. This working group aims to achieve a consensus view in this area through the following actions:

- A requirements gathering stage to discover the precise needs of European developers and users;

- Consensus within a working group established under the TEISS (Telematics European Industry Standardisation Support) framework on the standardisation process for educational technology;

- Coherent developments within metadata under the CEN/ISSS workshop process after this stage;

- Coherent development of standards for interoperability which allow learning resources to work together and seamlessly with learning management systems;

- Publication and transmission of recommendations by the work group to publishers, suppliers of hardware and services, telecommunications operators, industry bodies generally, standardisation bodies, the European Commission and international standards bodies.

2.4   IMS Specification Development Process

The development life-cycle for an IMS specification has been established as:

- Month 1 – set-up of the team including identification of the team leads (for LIP this is Robby Robson, Saba, and Frank Tansy, IMS), editor (for LIP this is Colin Smythe, Dunelm Services Ltd) and key collaborating groups and organisations;

- Month 2 – Team and scope/requirements development;

- Month 3 – Initial internal team documents developed;

- Month 4 – Base document development and vote. Approval of the Base Documents by the Technical Board;

- Month 5 – Document improvement. Open issues are identified and solutions developed. Companies are encouraged to develop code against the base documents;

- Month 6 – Further document improvement and feedback from organisations involved in implementations;

- Month 7 – Completion of the Public Draft Specification and approval by the IMS Technical Board;

- Months 8 & 9 – Accept feedback from organisations working to the Public Draft Specification. Resolve any issues raised;

- Month 10 – Completion of the Final Specification and approval by the IMS Technical Board. This is the combination of the Public Draft Specification plus resolutions due to experience gained in working with it.

A draft specification is developed within the IMS developer and user community, which currently includes more than 200 organisations from around the world. In a number of cases, one of these organisations represents many other organisations, such as the Australian Government's DETYA organisation, which provides access to the IMS community for all institutions of learning in Australia.

The term 'Base Document' is used for draft specifications that have reached a relatively high level of stability based on input from the team and the Technical Board. Base documents represent the stage in the specification process of final development and refinement. It is base documents that are presented in their final forms to the IMS Technical Board for vote. If approved, the document becomes a 'Public Draft Specification' and is listed as such on the IMS public web site. If not approved, the team works through whatever adjustments and recommendations the Technical Board provides, and then resubmits the document. After three months the Public Draft Specification should be adopted as a 'Final Specification'.

After a final specification is released, the team develops the next scope document for the subsequent work. New requirements and features dropped from the previous specification constitute the scope of the next effort.

3.   Overall Data Model

3.1   Information Model

The data model for the LIP is shown in Figure 3.1 (this is the same as that described in the LIP Information Model, [LIP, 01b]).
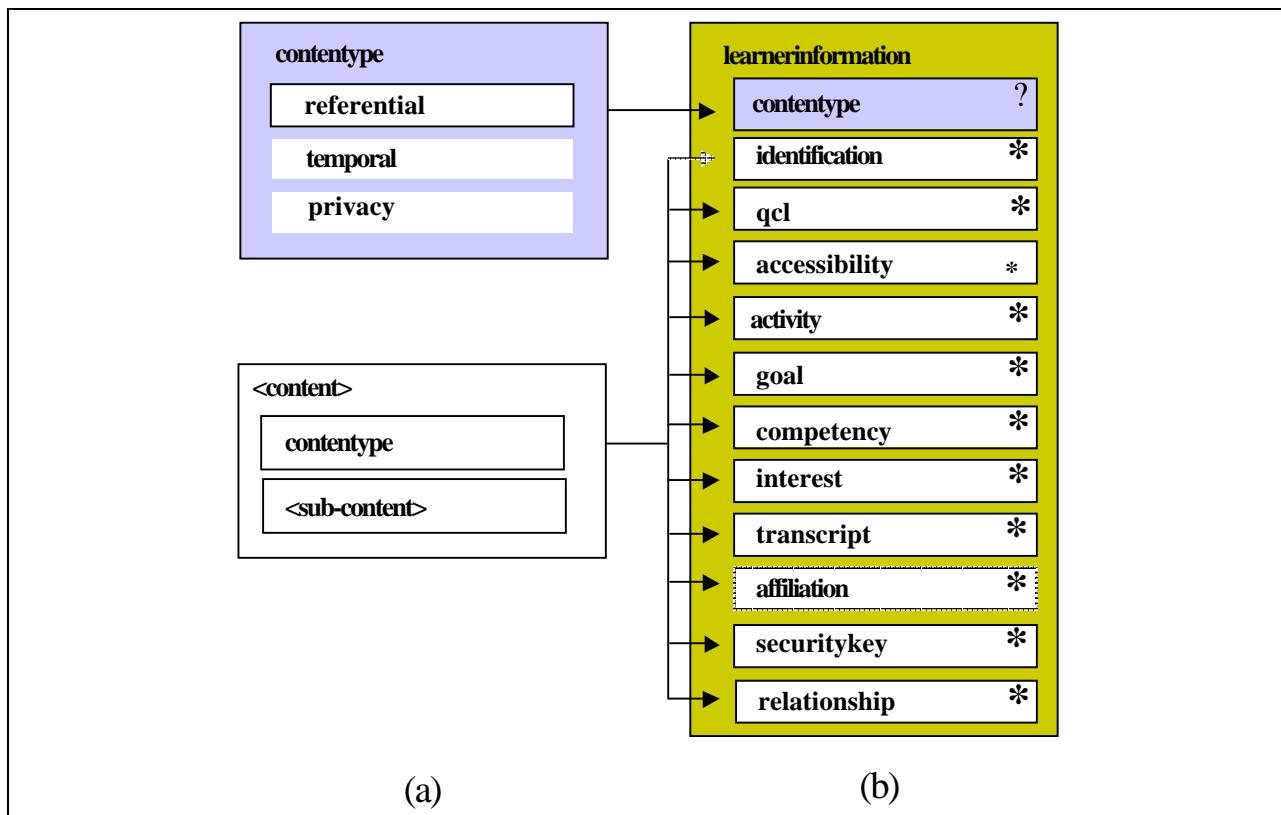
Figure 3.1 The IMS LIP data model.

The objects in this model and their key behaviours are:

learnerinformation   The data structure responsible for encapsulating the eleven core learner information classes. The control information describing the learner information as a whole is contained within the 'contentype' class;

identification   The learner information that contains all of the data for a specific individual or organisation. This includes data such as: names, addresses, contact information, demographics and agent;

accessibility   The learner information that consists of the cognitive, technical and physical preferences for the learner, their language capabilities, disability and eligibilities;

goal   This learner information consists of the description of the personal objectives and aspirations. These descriptions may also include information for monitoring the progress in achieving those goals. A goal can be defined in terms of sub-goals;

qcl   This learner information consists of the qualifications, certificationss and licenses awarded to the learner i.e. the formally recognised products of their learning and work history. This includes information on the awarding body and may also include electronic copies of the actual documents;

activity	The learner information that consists of the education/training, work and service (military, community, voluntary, etc.) record and products (excluding formal awards). This information may include the descriptions of the courses undertaken and the records of the corresponding evaluation;
transcript	The summary record of the academic performance of an individual with respect to a particular institution. The transcript is normally supplied by the body responsible for evaluating the performance of the individual;
competency	This learner information consists of the descriptions of the skills the learner has acquired. These skills may be associated with some formal or informal training or work history (described in the 'activity') and formal awards (described in the 'qcl'). The corresponding level of competency may also be defined;
interest	The learner information that consists of descriptions of the hobbies and other recreational activities. These activities may have formal awards (as described in the associated 'qcl'). Electronic versions of the products of these interests may also be contained;
affiliation	This learner information is used to store the descriptions of the affiliations associated with the learner e.g. professional affiliations. A learner's membership of the relevant class, cohorts, groups, etc. undertaken when being educated, trained, etc. should be supported using the IMS Enterprise specification;
securitykey	This learner information is used to store the descriptions of the passwords, certificates, PINs and authentication keys. These keys are used for transactions with the learner;
relationship	The container for the definition of the relations between the other core data structures e.g. 'qcl's and the awarding organisation. This enables the construction of complex relationships between the core data structures;
contentype	The container for the control information that is used to describe the learner information. This information consists of referential, temporal and privacy information and is applied to each of the 'atomic' parts of the learner information structure;
referential	The referential information is used to uniquely identify the learner information record as a whole and the individual data components within that record. These enable each piece of information to be identified. The actual identification system is outside the scope of this specification;
temporal	This information is used to describe any time-based dependencies of the data. This includes information such as the date of creation, time-stamp and expiry date of the learner information. The date/time descriptions are expected to conform to the ISO8601 standard;
privacy	All of the data relevant to the privacy, authenticity and integrity of the learner information is contained within this structure. The actual privacy etc. mechanism and architectures used to support the learner information are outside of the scope of the specification but they interact with the learner information through these structures.

3.2   XML Schema Tree[2]

3.2.1   Core XML Schema Tree

The core XML schema tree is shown in Figure 3.2.
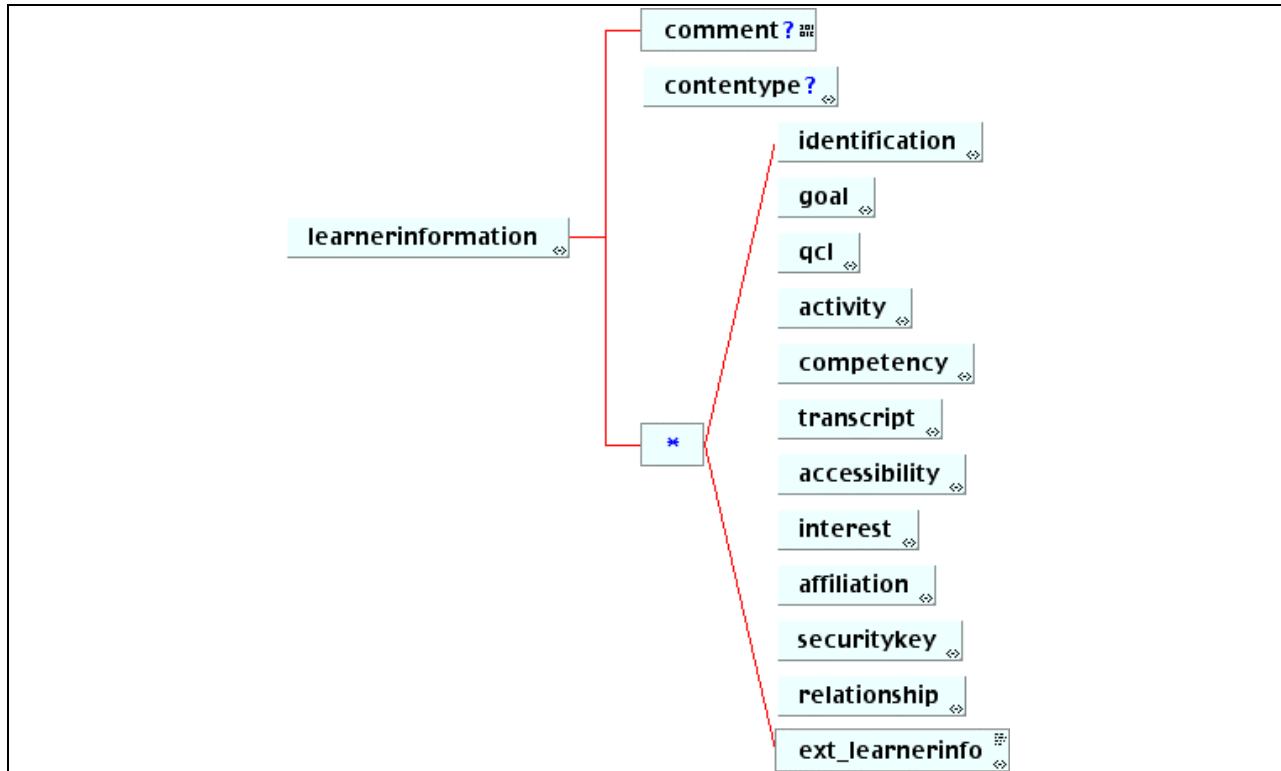
Figure 3.2 The core XML schema tree.

3.2.2   <identification> XML Schema Tree

The identification XML schema tree is shown in Figure 3.3.
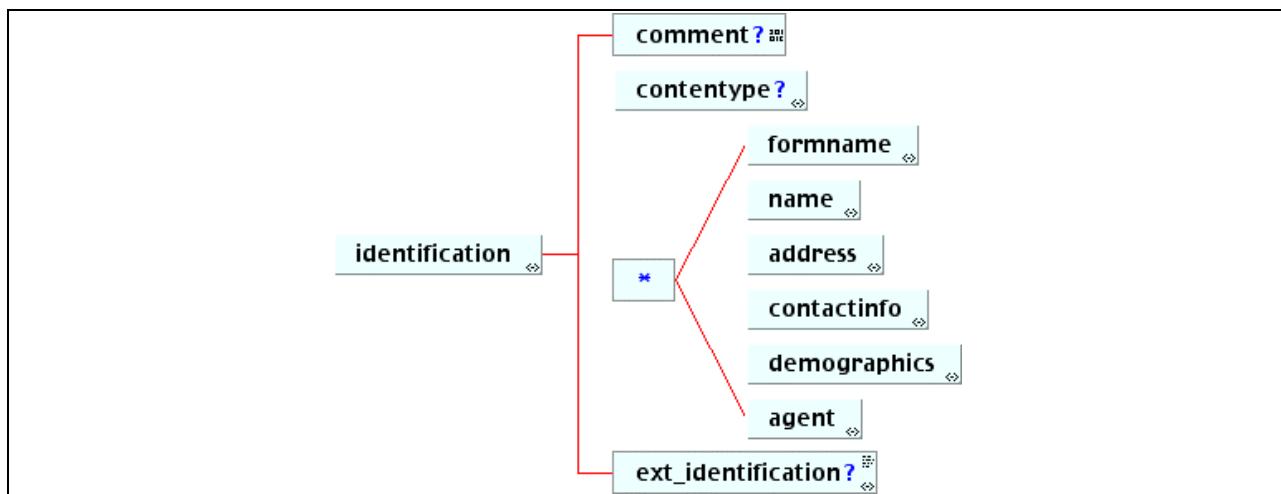
Figure 3.3 The <identification> XML schema tree.

---

[2] The XML schema trees shown in this document were generated by the XML Authority product from Extensibility Inc.

3.2.3 <goal> XML Schema Tree

The goal XML schema tree is shown in Figure 3.4.
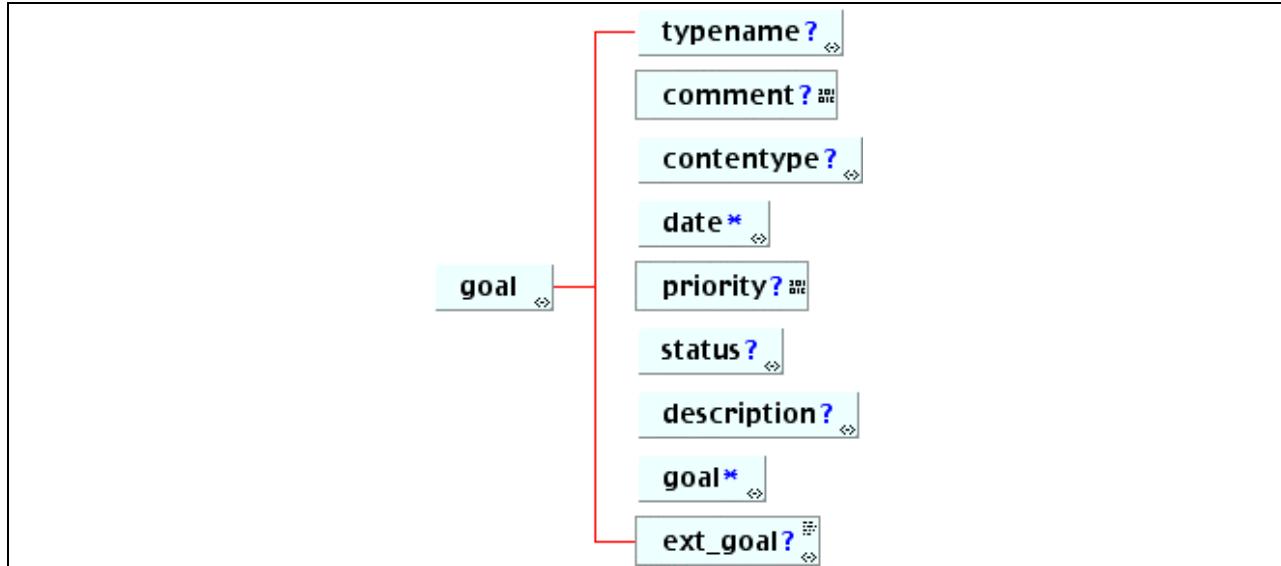
Figure 3.4 The <goal> XML schema tree.

3.2.4 <qcl> XML Schema Tree

The qcl XML schema tree is shown in Figure 3.5.
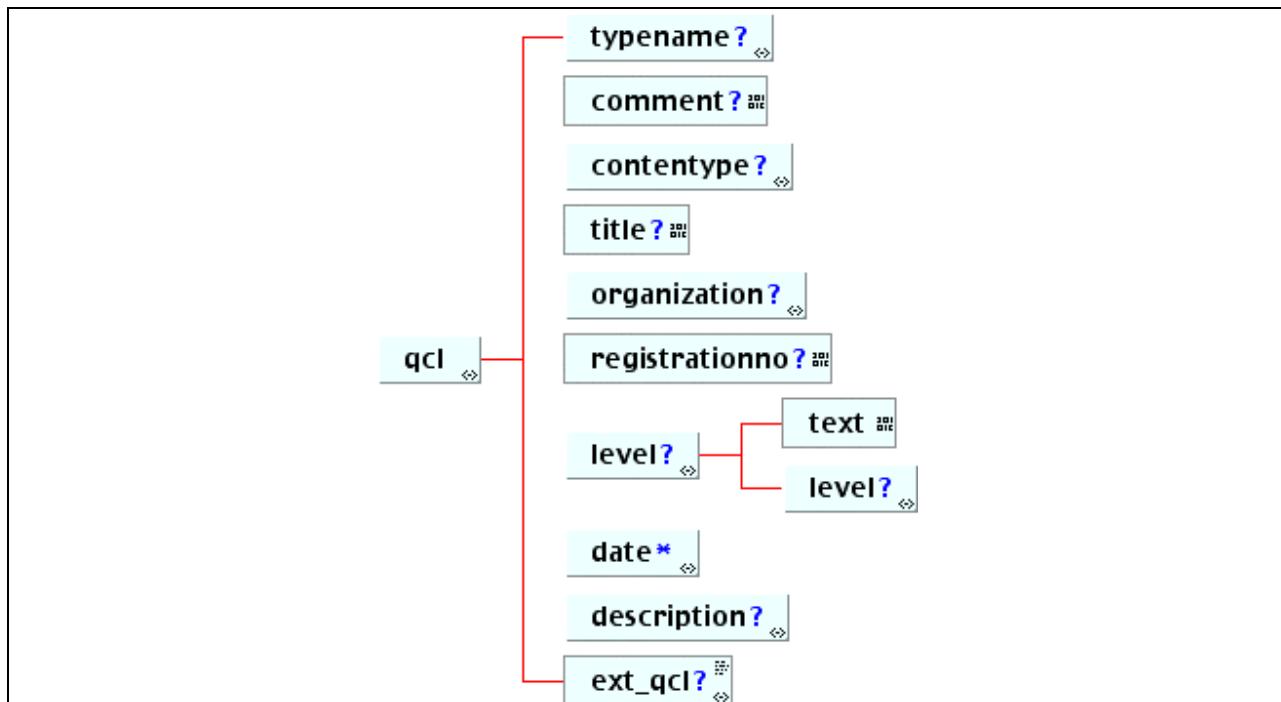
Figure 3.5 The <qcl> XML schema tree.

3.2.5 <accessibility> XML Schema Tree

The accessibility XML schema tree is shown in Figure 3.6.
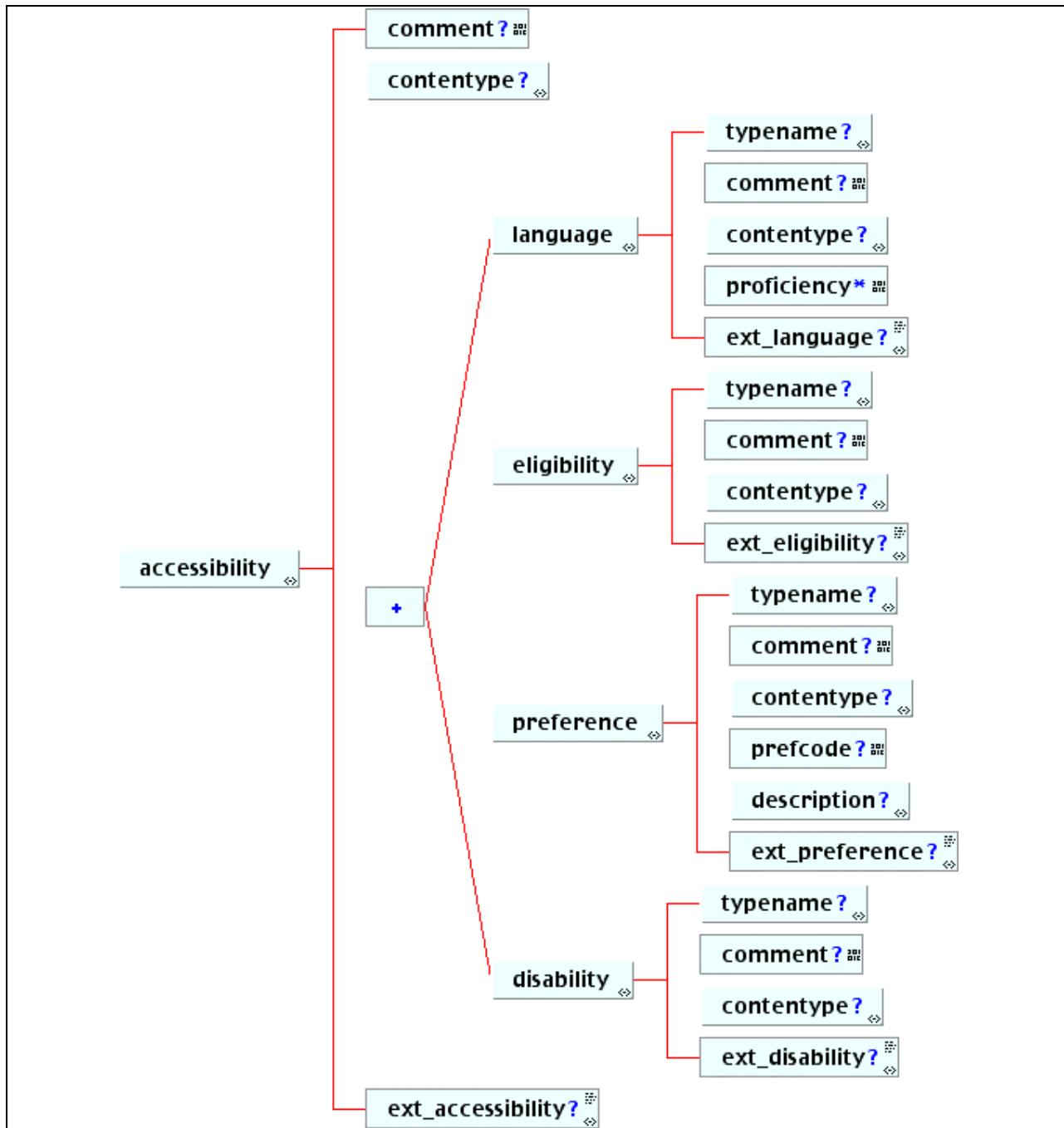
Figure 3.6 The <accessibility> XML schema tree.

3.2.6   <activity> XML Schema Tree

The activity XML schema tree is shown in Figure 3.7.
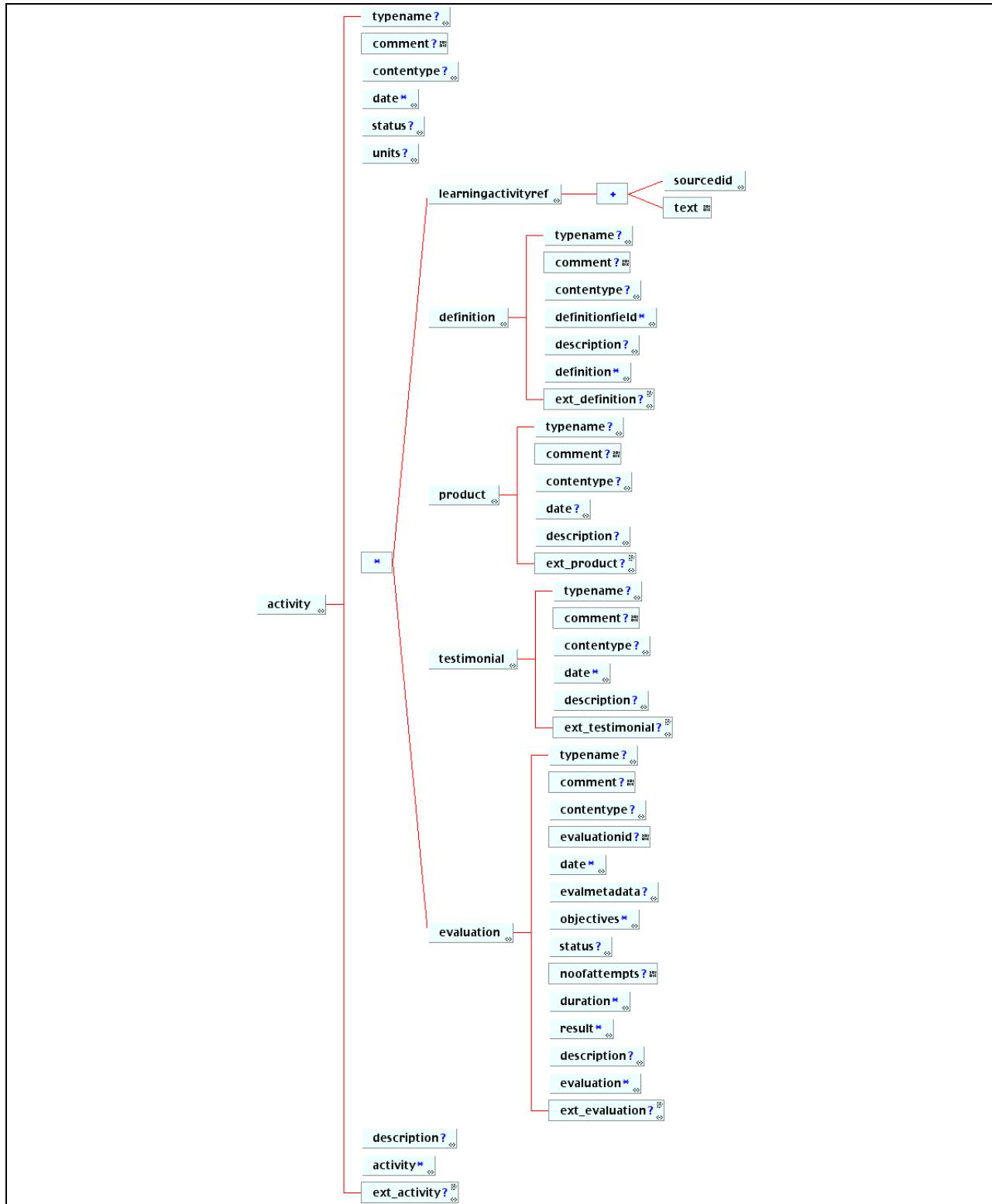
Figure 3.7 The <activity> XML schema tree.

3.2.7   <competency> XML Schema Tree

The competency XML schema tree is shown in Figure 3.8.
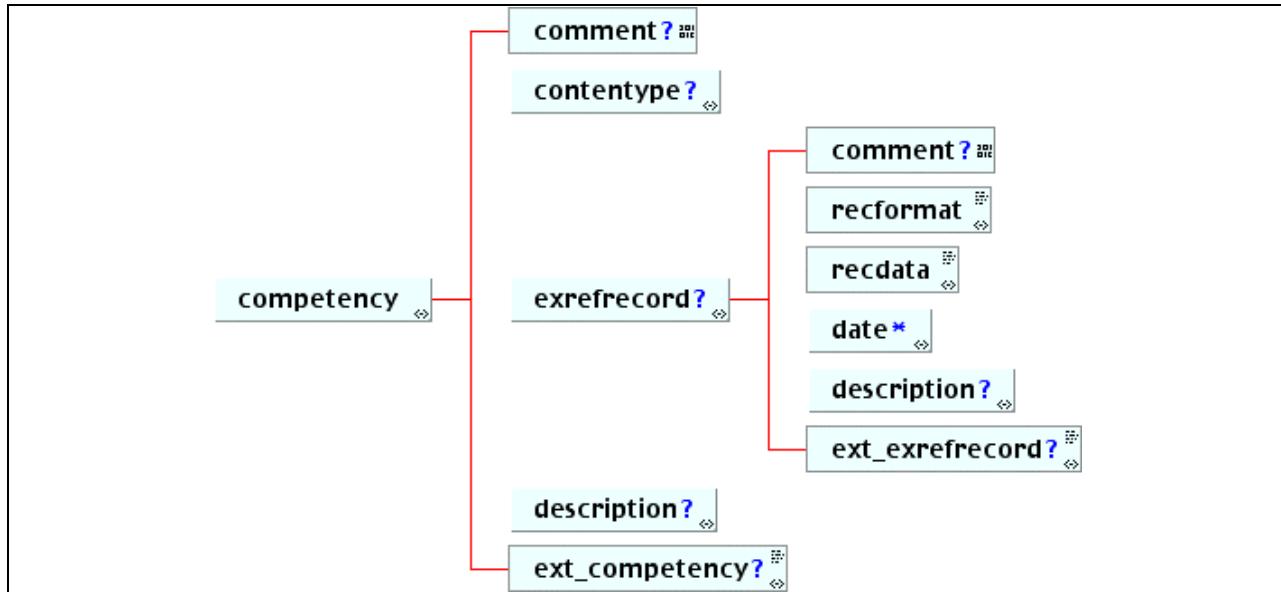
Figure 3.8 The <competency> XML schema tree.

3.2.8   <interest> XML Schema Tree

The interest XML schema tree is shown in Figure 3.9.
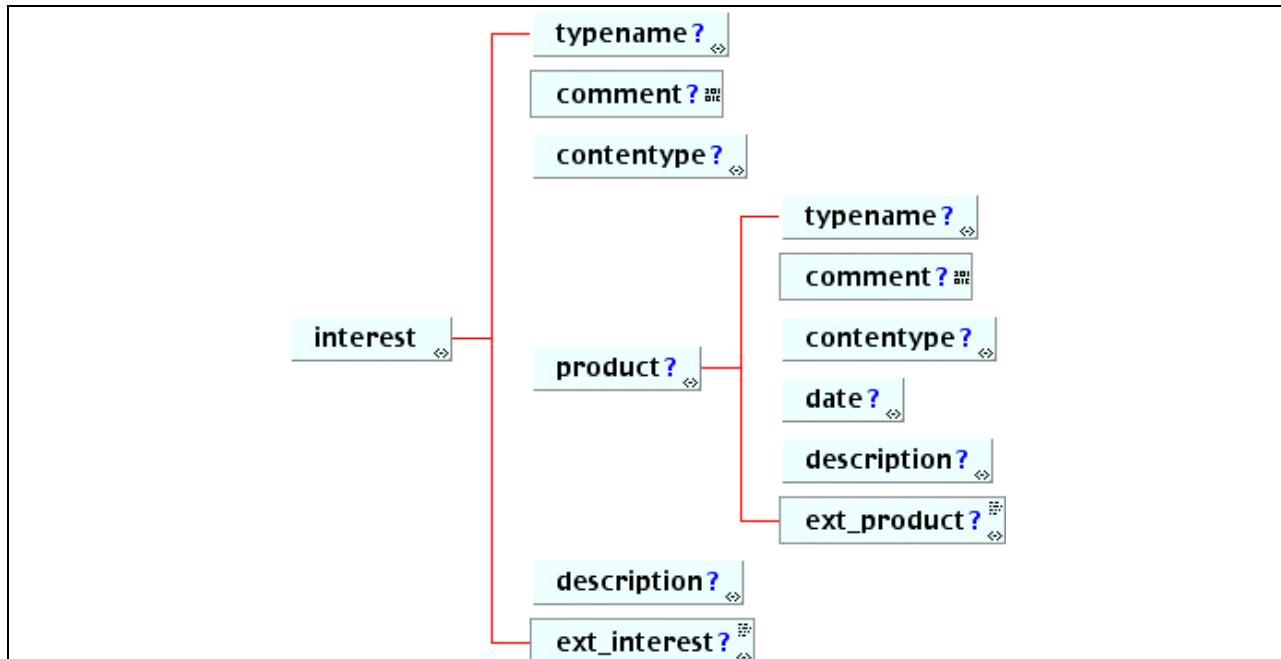
Figure 3.9 The <interest> XML schema tree.

3.2.9 <transcript> XML Schema Tree

The transcript XML schema tree is shown in Figure 3.10.
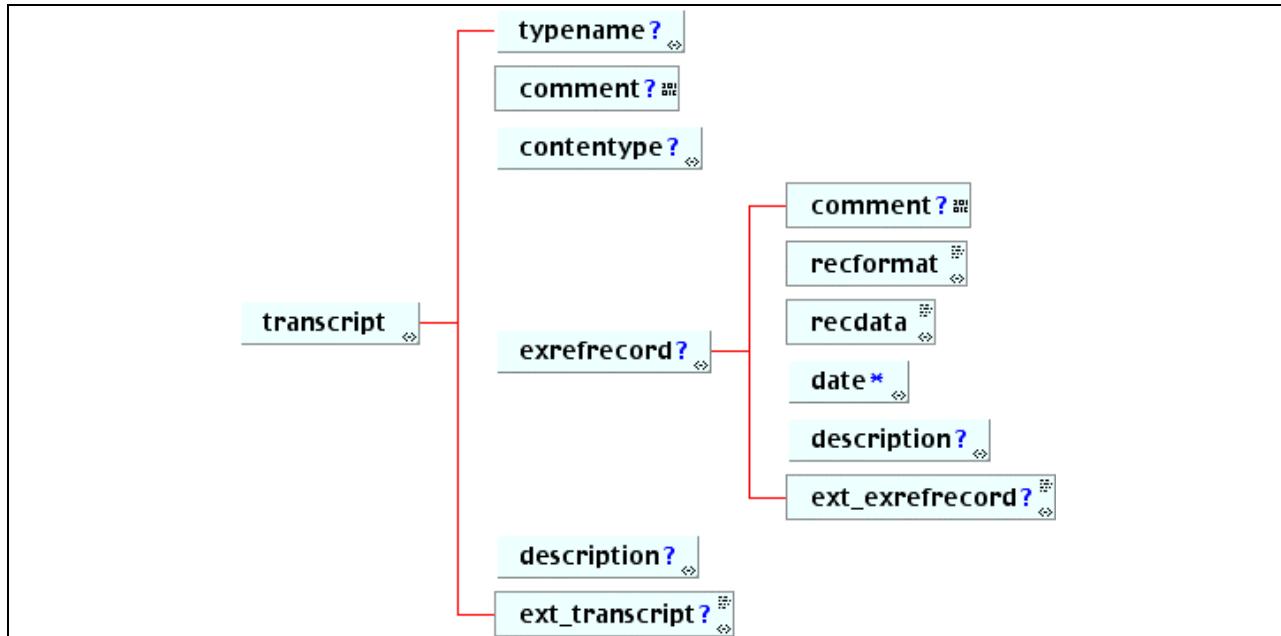
Figure 3.10 The <transcript> XML schema tree.

3.2.10   <affiliation> XML Schema Tree

The affiliation XML schema tree is shown in Figure 3.11.
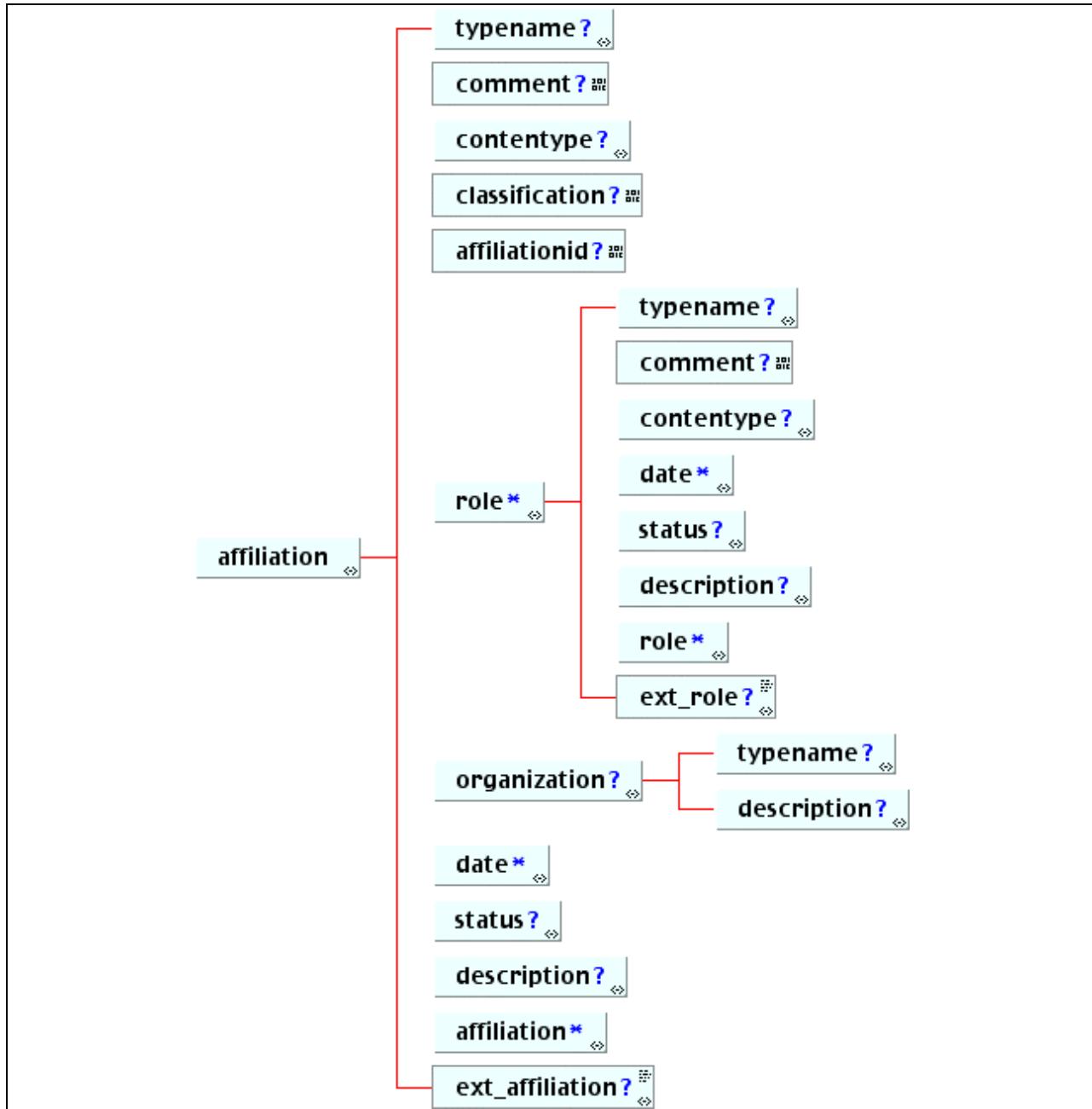
Figure 3.11 The <affiliation> XML schema tree.

3.2.11   <securitykey> XML Schema Tree

The securitykey XML schema tree is shown in Figure 3.12.
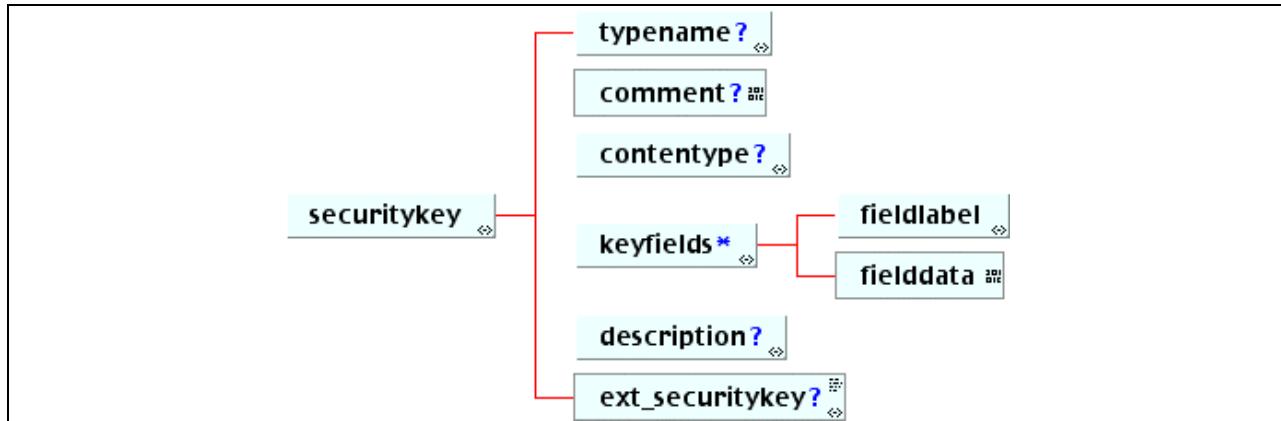
Figure 3.12 The <securitykey> XML schema tree.

3.2.12   <relationship> XML Schema Tree

The relationship XML schema tree is shown in Figure 3.13.
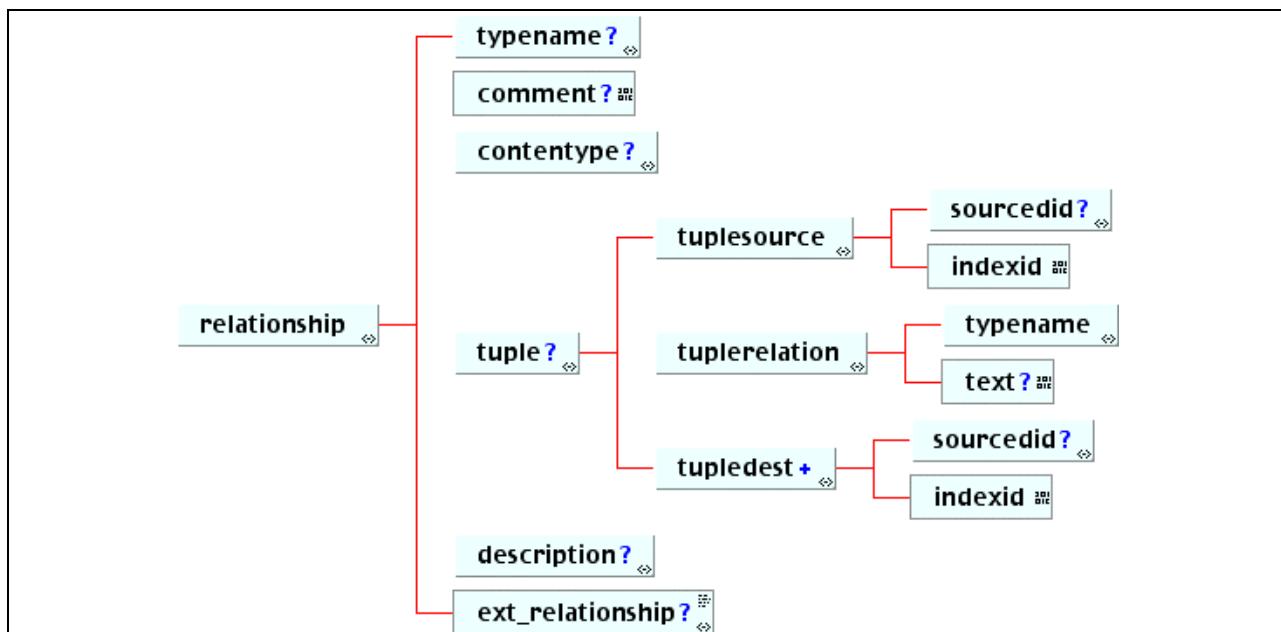
Figure 3.13 The <relationship> XML schema tree.

4. Basic Example LIP Instances

The basic examples are arranged according to the eleven core data structures. The examples supplied are:

- Accessibility
    – Language: the definition of the language proficiencies for a learner
    – Preference: the definition of a learner's cognitive, physical and technology preferences;

- Activity
    – Learning activity reference: an external reference mechanism to the learning materials
    – Definition: the definition of the materials studied
    – Product: the materials developed by the learner themselves
    – Testimonial: statements attesting to the capabilities of the learner
    – Evaluation: the results of the evaluations undertaken;

- Affiliation – the professional affiliations and associated roles of the learner;

- Competency the competencies of the learner;

- Goal – the goals and sub-goals of the learner

- Identification
    – Formatted Name: the formatted names for a learner
    – Name: the names for a learner
    – Address: the addresses for a learner
    – Contactinfo: the electronic-based contact information for the a learner
    – Demographics: the demographics information about the learner
    – Agent: the representatives permitted to act on behalf of the learner;

- Interest – the hobbies and recreational interests of the learner;

- Qcl – description of the qualification, certifications and licences for a learner;

- Relationship – the set of relationships that are to be defined between the learner and their identification, accessibility, qualifications, competencies, goals, activities, interests, transcripts, securitykeys and affiliations;

- Securitykey – the security-oriented information to be used with respect to the learner;

- Transcript – the transcripts that summarise the performance of the learner.

4.1   Accessibility Examples

4.1.1   Accessibility Language Examples

This example defines the 'German' language abilities of the learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>An example of LIP Accessibility information.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>basic_1001</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <accessibility>
12               <contentype>
13                   <referential>
14                       <indexid>accessibility_01</indexid>
15                   </referential>
16               </contentype>
17               <language>
18                   <typename>
19                       <tysource sourcetype="imsdefault"/>
20                       <tyvalue>German</tyvalue>
21                   </typename>
22                   <contentype>
23                       <referential>
24                           <indexid>language_01</indexid>
25                       </referential>
26                   </contentype>
27                   <proficiency profmode="OralSpeak">Excellent</proficiency>
28                   <proficiency profmode="OralComp">Excellent</proficiency>
29                   <proficiency profmode="Read">Good</proficiency>
30                   <proficiency profmode="Write">Poor</proficiency>
31               </language>
32           </accessibility>
33       </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/accs_lang_001/accs_lang_001.xml.

The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_1001' (lines 6 and 7). This must be used for all further references to this learner;

- The language is identified as 'German' in line 20;

- The language oral, reading and writing proficiencies are defined in lines 27-30 respectively.

The next stage is to create a second set of language proficiencies for the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>An example of LIP Accessibility information.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>basic_1001</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
```

```
11          <accessibility>
12              <contentype>
13                  <referential>
14                      <indexid>accessibility_01</indexid>
15                  </referential>
16              </contentype>
17              <language>
18                  <typename>
19                      <tysource sourcetype="imsdefault"/>
20                      <tyvalue>Spanish</tyvalue>
21                  </typename>
22                  <contentype>
23                      <referential>
24                          <indexid>language_02</indexid>
25                      </referential>
26                  </contentype>
27                  <proficiency profmode="OralSpeak">Poor</proficiency>
28                  <proficiency profmode="OralComp">Poor</proficiency>
29                  <proficiency profmode="Read">Good</proficiency>
30                  <proficiency profmode="Write">Good</proficiency>
31              </language>
32          </accessibility>
33      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/accs_lang_002/accs_lang_002.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_1001' (lines 6 and 7) – as per the previous language example;

- The same accessibility record is denoted by the usage of the same indexid i.e. 'accessibility_01' (line 14 in both examples). The fact that a new language is being supplied is denoted by the fact that a new language indexid is used i.e. 'language_02' (cf. line 21 in both examples);

- The language oral, reading and writing proficiencies are defined in lines 27-30 respectively.

4.1.2   Accessibility Preference Examples

This example creates the input technology preferences of the learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Accessibility information.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>basic_1001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <accessibility>
12              <contentype>
13                  <referential>
14                      <indexid>accessibility_01</indexid>
15                  </referential>
16              </contentype>
17              <preference>
18                  <typename>
19                      <tysource sourcetype="imsdefault"/>
20                      <tyvalue>InputTech</tyvalue>
21                  </typename>
22                  <contentype>
23                      <referential>
24                          <indexid>preference_01</indexid>
25                      </referential>
26                  </contentype>
```

```
27              <prefcode>Large Font Display Devices</prefcode>
28            </preference>
29          </accessibility>
30      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/accs_pref_001/accs_pref_001.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_1001' (lines 6 and 7). This must be used for all further references to this learner;

- The preference is defined as 'Input Technology' in line 20;

- The actual preference entry is given in line 27.

The next stage is to create a second preference for the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>An example of LIP Accessibility information.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>basic_1001</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <accessibility>
12               <contentype>
13                   <referential>
14                       <indexid>accessibility_01</indexid>
15                   </referential>
16               </contentype>
17               <preference>
18                   <typename>
19                       <tysource sourcetype="imsdefault"/>
20                       <tyvalue>Cognitive</tyvalue>
21                   </typename>
22                   <contentype>
23                       <referential>
24                           <indexid>preference_02</indexid>
25                       </referential>
26                   </contentype>
27                   <prefcode>Exploratory</prefcode>
28               </preference>
29           </accessibility>
30       </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/accs_pref_001/accs_pref_002.xml.

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_1001' (lines 6 and 7) – as per the previous language example;

- The same accessibility record is denoted by the usage of the same indexid i.e. 'accessibility_01' (line 14 in both examples). The fact that a new preference is being supplied is denoted by the fact that a new preference indexid is used i.e. 'preference_02' (cf. line 21 in both examples);

- The new preference (a cognitive type) is stored in line 27.

4.2   Activity Examples

4.2.1   Activity Learningactivetyref Examples

This example creates an activity containing a learninactivityref record for the learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>An example of LIP Activity information.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>2001</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <activity>
12               <typename>
13                   <tysource sourcetype="imsdefault"/>
14                   <tyvalue>Education</tyvalue>
15               </typename>
16               <contentype>
17                   <referential>
18                       <indexid>activity_1</indexid>
19                   </referential>
20               </contentype>
21               <date>
22                   <typename>
23                       <tysource sourcetype="imsdefault"/>
24                       <tyvalue>Award</tyvalue>
25                   </typename>
26                   <datetime>1980:7</datetime>
27               </date>
28               <units>
29                   <unitsfield>
30                       <fieldlabel>
31                           <typename>
32                               <tyvalue>CreditNumber</tyvalue>
33                           </typename>
34                       </fieldlabel>
35                       <fielddata>10</fielddata>
36                   </unitsfield>
37               </units>
38               <learningactivityref>
39                   <text>HNC in Mathematics</text>
40               </learningactivityref>
41           </activity>
42       </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/actv_lref_001/actv_lref_001.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_2001' (lines 6 and 7). This must be used for all further references to this learner;

- The type of activity is defined in line 14;

- The content of the record is based upon the date of the activity (lines 21-27), the credits assigned to the activity (lines 28-37) and the external reference to the learning activity (lines 38-40).

The next stage is to create a second learningactivityref record for the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Activity information.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>2001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <activity>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Education</tyvalue>
15              </typename>
16              <contentype>
17                  <referential>
18                      <indexid>activity_2</indexid>
19                  </referential>
20              </contentype>
21              <date>
22                  <typename>
23                      <tysource sourcetype="imsdefault"/>
24                      <tyvalue>Award</tyvalue>
25                  </typename>
26                  <datetime>1988:7</datetime>
27              </date>
28              <learningactivityref>
29                  <text>HND in Electronics</text>
30              </learningactivityref>
31          </activity>
32      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/actv_lref_002/actv_lref_002.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_2001' (lines 6 and 7) – as per the previous learningactiviyref example;

- The type of activity is defined in line 14;

- The content of the record is based upon the date of the activity (lines 21-27) and the external reference to the learning activity (lines 28-30).

4.2.2   Activity Definition Examples

This example creates an activity containing a course definition record for the learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Activity information.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>2001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <activity>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
```

```
14                    <tyvalue>Education</tyvalue>
15                </typename>
16                <contenttype>
17                    <referential>
18                        <indexid>activity_1</indexid>
19                    </referential>
20                </contenttype>
21                <definition>
22                    <typename>
23                        <tysource sourcetype="imsdefault"/>
24                        <tyvalue>Course</tyvalue>
25                    </typename>
26                    <contenttype>
27                        <referential>
28                            <indexid>DegreeCourse</indexid>
29                        </referential>
30                    </contenttype>
31                    <definition>
32                        <typename>
33                            <tysource sourcetype="imsdefault"/>
34                            <tyvalue>Curriculum</tyvalue>
35                        </typename>
36                        <contenttype>
37                            <referential>
38                                <indexid>Year1</indexid>
39                            </referential>
40                        </contenttype>
41                        <definition>
42                            <typename>
43                                <tysource sourcetype="imsdefault"/>
44                                <tyvalue>Module</tyvalue>
45                            </typename>
46                            <contenttype>
47                                <referential>
48                                    <indexid>Electronics_101</indexid>
49                                </referential>
50                            </contenttype>
51                            <definitionfield>
52                                <fieldlabel>
53                                    <typename>
54                                        <tyvalue>Lecture1</tyvalue>
55                                    </typename>
56                                </fieldlabel>
57                                <fielddata>BooleanLogic</fielddata>
58                            </definitionfield>
59                            <definitionfield>
60                                <fieldlabel>
61                                    <typename>
62                                        <tyvalue>Lecture2</tyvalue>
63                                    </typename>
64                                </fieldlabel>
65                                <fielddata>Transistors</fielddata>
66                            </definitionfield>
67                        </definition>
68                        <definition>
69                            <typename>
70                                <tysource sourcetype="imsdefault"/>
71                                <tyvalue>Module</tyvalue>
72                            </typename>
73                            <contenttype>
74                                <referential>
75                                    <indexid>Maths_101</indexid>
76                                </referential>
77                            </contenttype>
78                            <definitionfield>
79                                <fieldlabel>
80                                    <typename>
81                                        <tyvalue>Lecture1</tyvalue>
82                                    </typename>
83                                </fieldlabel>
84                                <fielddata>BooleanLogic1</fielddata>
```

```
85                          </definitionfield>
86                          <definitionfield>
87                              <fieldlabel>
88                                  <typename>
89                                      <tyvalue>Lecture2</tyvalue>
90                                  </typename>
91                              </fieldlabel>
92                              <fielddata>BooleanLogic2</fielddata>
93                          </definitionfield>
94                      </definition>
95                  </definition>
96              </definition>
97          </activity>
98      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/actv_defn_001/actv_defn_001.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_2001' (lines 6 and 7). This must be used for all further references to this learner;

- The type of activity is defined in line 14;

- The full definition is given in lines 21-96. This is a hierarchical structure for two modules being taught in the first year of a course. The course identification is given in lines 26-30. The year one curriculum is given in lines 31-95 and consists of two modules – electronics 101 (lines 41-67) and maths 101 (lines 68-94). For the elctronics module there a two lectures – Lecture 1 in Boolean Logic (lines 51-58) and Lecture 2 in Transistors (lines 59-66). Similarly for maths 101 there are two modules – Lecture 1 in Boolean Logic (lines 78-85) and Lecture 2 in Boolean Logic (lines 86-93).

The next stage is to create a second course definition for the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Activity information.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>2001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <activity>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Education</tyvalue>
15              </typename>
16              <contentype>
17                  <referential>
18                      <indexid>activity_1</indexid>
19                  </referential>
20              </contentype>
21              <definition>
22                  <typename>
23                      <tysource sourcetype="imsdefault"/>
24                      <tyvalue>Course</tyvalue>
25                  </typename>
26                  <contentype>
27                      <referential>
28                          <indexid>DegreeCourse</indexid>
29                      </referential>
30                  </contentype>
31                  <definition>
32                      <typename>
33                          <tysource sourcetype="imsdefault"/>
```

```
34                <tyvalue>Curriculum</tyvalue>
35              </typename>
36              <contenttype>
37                  <referential>
38                      <indexid>Year2</indexid>
39                  </referential>
40              </contenttype>
41              <definition>
42                  <typename>
43                      <tysource sourcetype="imsdefault"/>
44                      <tyvalue>Module</tyvalue>
45                  </typename>
46                  <contenttype>
47                      <referential>
48                          <indexid>Maths_201</indexid>
49                      </referential>
50                  </contenttype>
51                  <definitionfield>
52                      <fieldlabel>
53                          <typename>
54                              <tyvalue>Lecture1</tyvalue>
55                          </typename>
56                      </fieldlabel>
57                      <fielddata>FourierTransform1</fielddata>
58                  </definitionfield>
59                  <definitionfield>
60                      <fieldlabel>
61                          <typename>
62                              <tyvalue>Lecture2</tyvalue>
63                          </typename>
64                      </fieldlabel>
65                      <fielddata>FourierTransform2</fielddata>
66                  </definitionfield>
67              </definition>
68          </definition>
69        </definition>
70      </activity>
71    </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/actv_defn_002/actv_defn_002.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_2001' (lines 6 and 7) – as per the previius definition example;

- The type of activity is defined in line 14;

- The year 2 curriculum information is being added to the previous year 1 information. This material is defined in lines 31-69. This consists of a single module (lines 41-68) which itself consists of two lectures (lines 51-58 and 59-66).

4.2.3   Activity Product Examples

This example creates an activity containing a product record for the learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Activity information.</comment>
3           <contenttype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>2001</id>
8                   </sourcedid>
9               </referential>
10          </contenttype>
11          <activity>
```

```
12                  <typename>
13                      <tysource sourcetype="imsdefault"/>
14                      <tyvalue>Education</tyvalue>
15                  </typename>
16                  <contentype>
17                      <referential>
18                          <indexid>activity_1</indexid>
19                      </referential>
20                  </contentype>
21                  <date>
22                      <typename>
23                          <tysource sourcetype="imsdefault"/>
24                          <tyvalue>Create</tyvalue>
25                      </typename>
26                      <datetime>1980:7</datetime>
27                  </date>
28                  <product>
29                      <typename>
30                          <tysource sourcetype="imsdefault"/>
31                          <tyvalue>Coursework</tyvalue>
32                      </typename>
33                      <contentype>
34                          <referential>
35                              <indexid>activity_product_01</indexid>
36                          </referential>
37                      </contentype>
38                      <description>
39                          <short>Thesis</short>
40                          <full>
41                              <media mediamode="Text" mimetype="text/word" contentreftype="uri">
42                                  myfile/thesis.doc
43                              </media>
44                          </full>
45                      </description>
46                  </product>
47              </activity>
48      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/actv_prod_001/actv_prod_001.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_2001' (lines 6 and 7). This should be used for other related transactions;

- The type of activity is defined in line 14;

- The product record date of creation is recorded (lines 21-27). The product record itself is given in lines 28-46. The type of product is defined (line 31) and it is given an index identifier (lines 33-37). The product itself, a copy of the learner's thesis is given in lines 38-45.

The next stage is to create a second product record for the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Activity information.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>2001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <activity>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Education</tyvalue>
```

```
15              </typename>
16              <contenttype>
17                  <referential>
18                      <indexid>activity_1</indexid>
19                  </referential>
20              </contenttype>
21              <date>
22                  <typename>
23                      <tysource sourcetype="imsdefault"/>
24                      <tyvalue>Create</tyvalue>
25                  </typename>
26                  <datetime>1980:7</datetime>
27              </date>
28              <product>
29                  <typename>
30                      <tysource sourcetype="imsdefault"/>
31                      <tyvalue>Exam</tyvalue>
32                  </typename>
33                  <contenttype>
34                      <referential>
35                          <indexid>activity_product_02</indexid>
36                      </referential>
37                  </contenttype>
38                  <description>
39                      <short>Archived CBT Exam Paper</short>
40                      <full>
41                          <media mediamode="Text" mimetype="text/word" contentreftype="uri">
42                              assess/exam1.cbt
43                          </media>
44                      </full>
45                  </description>
46              </product>
47          </activity>
48      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/actv_prod_002/actv_prod_002.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_2001' (lines 6 and 7) – as per the previous definition example;

- The type of activity is defined in line 14;

- The product record date of creation is recorded (lines 21-27). The product record itself is given in lines 28-46. The type of product is defined (line 31) and it is given an index identifier (lines 33-37). The product itself, a copy of the larchived CBT exam is given in lines 38-45.

4.2.4   Activity Testimonial Examples

This example creates an activity containing a testimonial record for the learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Activity information.</comment>
3           <contenttype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>2001</id>
8                   </sourcedid>
9               </referential>
10          </contenttype>
11          <activity>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Education</tyvalue>
15              </typename>
```

```
16              <contenttype>
17                  <referential>
18                      <indexid>activity_1</indexid>
19                  </referential>
20              </contenttype>
21              <date>
22                  <typename>
23                      <tysource sourcetype="imsdefault"/>
24                      <tyvalue>Award</tyvalue>
25                  </typename>
26                  <datetime>1980:7</datetime>
27              </date>
28              <testimonial>
29                  <typename>
30                      <tysource sourcetype="imsdefault"/>
31                      <tyvalue>Academic</tyvalue>
32                  </typename>
33                  <contenttype>
34                      <referential>
35                          <indexid>activity_testimonial_01</indexid>
36                      </referential>
37                  </contenttype>
38                  <description>
39                      <short>Tutors reference</short>
40                      <full>
41                          <media mediamode="Text" mimetype="text/word" contentreftype="uri">
42                              tutor/ref.doc
43                          </media>
44                      </full>
45                  </description>
46              </testimonial>
47          </activity>
48      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/actv_test_001/actv_test_001.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_2001' (lines 6 and 7). This should be used for other related transactions;

- The type of activity is defined in line 14;

- The testimonial record date of creation is recorded (lines 21-27). The testimonial record itself is given in lines 28-46. The type of testimonial is defined (line 31) and it is given an index identifier (lines 33-37). The testimonial itself, a copy of the tutor's reference is given in lines 38-45.

The next stage is to create a second testimonial record for the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Activity information.</comment>
3           <contenttype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>2001</id>
8                   </sourcedid>
9               </referential>
10          </contenttype>
11          <activity>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Education</tyvalue>
15              </typename>
16              <contenttype>
17                  <referential>
18                      <indexid>activity_1</indexid>
```

```
19                      </referential>
20                  </contentype>
21                  <date>
22                      <typename>
23                          <tysource sourcetype="imsdefault"/>
24                          <tyvalue>Create</tyvalue>
25                      </typename>
26                      <datetime>1980:7</datetime>
27                  </date>
28                  <testimonial>
29                      <typename>
30                          <tysource sourcetype="imsdefault"/>
31                          <tyvalue>Academic</tyvalue>
32                      </typename>
33                      <contentype>
34                          <referential>
35                              <indexid>activity_testimonial_02</indexid>
36                          </referential>
37                      </contentype>
38                      <description>
39                          <short>Head of Departments reference</short>
40                          <full>
41                              <media mediamode="Text" mimetype="text/word" contentreftype="Base-64">
42                                  This is an outstanding student.
43                              </media>
44                          </full>
45                      </description>
46                  </testimonial>
47              </activity>
48          </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/actv_test_002/actv_test_002.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_2001' (lines 6 and 7) – this is the same as for the previous testimonial example;

- The type of activity is defined in line 14;

- The testimonial record date of creation is recorded (lines 21-27). The testimonial record itself is given in lines 28-46. The type of testimonial is defined (line 31) and it is given an index identifier (lines 33-37). The testimonial itself, a copy of the Head of Department's reference is given in lines 38-46 (this is embedded in the XML instance itself).

4.2.5   Activity Evaluation Examples

This example creates an activity containing an evaluation record for the learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Activity information.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>2001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <activity>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Education</tyvalue>
15              </typename>
16              <contentype>
17                  <referential>
18                      <indexid>activity_1</indexid>
```

```
19                      </referential>
20                  </contentype>
21              <units>
22                  <unitsfield>
23                      <fieldlabel>
24                          <typename>
25                              <tyvalue>CreditNumber</tyvalue>
26                          </typename>
27                      </fieldlabel>
28                      <fielddata>20</fielddata>
29                  </unitsfield>
30              </units>
31              <evaluation>
32                  <contentype>
33                      <referential>
34                          <sourcedid>
35                              <source>ExamBoard</source>
36                              <id>12345</id>
37                          </sourcedid>
38                      </referential>
39                  </contentype>
40                  <result>
41                      <interpretscore>
42                          <fieldlabel>
43                              <typename>
44                                  <tyvalue>MinimumScore</tyvalue>
45                              </typename>
46                          </fieldlabel>
47                          <fielddata>0</fielddata>
48                      </interpretscore>
49                      <interpretscore>
50                          <fieldlabel>
51                              <typename>
52                                  <tyvalue>MaximumScore</tyvalue>
53                              </typename>
54                          </fieldlabel>
55                          <fielddata>100</fielddata>
56                      </interpretscore>
57                      <score>
58                          <fieldlabel>
59                              <typename>
60                                  <tyvalue>Score</tyvalue>
61                              </typename>
62                          </fieldlabel>
63                          <fielddata>30</fielddata>
64                      </score>
65                  </result>
66              </evaluation>
67          </activity>
68      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1Examples/Valid/Basic/actv_eval_001/actv_eval_001.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_2001' (lines 6 and 7). This should be used for other related transactions;

- The type of activity is defined in line 14;

- The evaluation record includes the number of units assigned to the activity (lines 21-30), the evaluation identifier (lines 32-39), and the actual results (lines 40-65). The results consist of two sets of interpretive information (lines 41-48 and 49-56) and the actual score itself (lines 57-64).

The next stage is to create a second evaluation record for the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
```

```
2           <comment>An example of LIP Activity information.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>2001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <activity>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Education</tyvalue>
15              </typename>
16              <contentype>
17                  <referential>
18                      <indexid>activity_1</indexid>
19                  </referential>
20              </contentype>
21              <evaluation>
22                  <contentype>
23                      <referential>
24                          <sourcedid>
25                              <source>ExamBoard</source>
26                              <id>12346</id>
27                          </sourcedid>
28                      </referential>
29                  </contentype>
30                  <result>
31                      <score>
32                          <fieldlabel>
33                              <typename>
34                                  <tyvalue>Score</tyvalue>
35                              </typename>
36                          </fieldlabel>
37                          <fielddata>65</fielddata>
38                      </score>
39                  </result>
40              </evaluation>
41          </activity>
42      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/actv_eval_002/actv_eval_002.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_2001' (lines 6 and 7) – the same as for the previous evaluation example;

- The type of activity is defined in line 14;

- The evaluation record (lines 21-40) includes the evaluation identifier (lines 22-29), and the actual results (lines 30-39). The results consist of the actual score itself (lines 31-38).

4.3   Affiliation Examples

This example creates the professional affiliation for a learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Affiliation information.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>3001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <affiliation>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Professional</tyvalue>
15              </typename>
16              <contentype>
17                  <referential>
18                      <indexid>affiliation_01</indexid>
19                  </referential>
20              </contentype>
21              <classification>Member</classification>
22              <affiliationid>2457923A</affiliationid>
23              <organization>
24                  <typename>
25                      <tysource sourcetype="imsdefault"/>
26                      <tyvalue>Professional</tyvalue>
27                  </typename>
28                  <description>
29                      <short>Institute of Electronic and Electrical Engineers</short>
30                  </description>
31              </organization>
32              <date>
33                  <typename>
34                      <tysource sourcetype="imsdefault"/>
35                      <tyvalue>Join</tyvalue>
36                  </typename>
37                  <datetime>1992</datetime>
38              </date>
39              <status>
40                  <typename>
41                      <tysource sourcetype="imsdefault"/>
42                      <tyvalue>Active</tyvalue>
43                  </typename>
44              </status>
45              <description>
46                  <short>All fees paid</short>
47              </description>
48          </affiliation>
49      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/affl_002/affl_002.xml.

The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_3001' (lines 6 and 7). This must be used for all further references to this learner;

- The type of affiliation is defined as professional (line 14);

- The membership classification, membership number and the name of organisation is given in lines 21, 22 and 23-31 respectively;

- The date of initial membership and current status is given in lines 32-38 and 39-44 respectively.

The next stage is to to add the learners role in the affiliation for the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Affiliation information.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>3001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <affiliation>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Professional</tyvalue>
15              </typename>
16              <contentype>
17                  <referential>
18                      <indexid>affiliation_01</indexid>
19                  </referential>
20              </contentype>
21              <role>
22                  <typename>
23                      <tysource sourcetype="imsdefault"/>
24                      <tyvalue>Officer</tyvalue>
25                  </typename>
26                  <contentype>
27                      <referential>
28                          <indexid>affiliation_role_01</indexid>
29                      </referential>
30                  </contentype>
31                  <date>
32                      <typename>
33                          <tysource sourcetype="imsdefault"/>
34                          <tyvalue>Start</tyvalue>
35                      </typename>
36                      <datetime>1994:04:01</datetime>
37                  </date>
38                  <date>
39                      <typename>
40                          <tysource sourcetype="imsdefault"/>
41                          <tyvalue>Finish</tyvalue>
42                      </typename>
43                      <datetime>1995:03:31</datetime>
44                  </date>
45                  <description>
46                      <short>IEEE Local Chapter Treasurer</short>
47                  </description>
48              </role>
49          </affiliation>
50      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/affl_003/affl_003.xml.

The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0Example:basic_3001' (lines 6 and 7) – as per the previous affiliation eample;

- The same affiliation identifier is used (line 18) and so this implies this transaction would be an update transaction;

- The role information is given in lines 21-48. The role itself is identified in line 24 and the associated start and finish dates in lines 31-44 and 38-44 respectively. A short description is given in lines 45-47.

4.4   Competency Examples

This example creates a new competency record for a learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>An example of LIP Competency information.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>4001</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <competency>
12               <contentype>
13                   <referential>
14                       <indexid>competency_01</indexid>
15                   </referential>
16               </contentype>
17               <exrefrecord>
18                   <recformat uri="compformats/vocabulary.doc"/>
19                   <recdata uri="learner1/competency.doc"/>
20                   <date>
21                       <typename>
22                           <tysource sourcetype="imsdefault"/>
23                           <tyvalue>Award</tyvalue>
24                       </typename>
25                       <datetime>1998</datetime>
26                   </date>
27               </exrefrecord>
28               <description>
29                   <short>IT Competencies</short>
30               </description>
31           </competency>
32       </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/comp_002/comp_002.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0_Example:basic_4001' (lines 6 and 7). This must be used for all further references to this learner;

- The actual competency is defined in terms of its format (line 18) and the external reference to the material itself (line 19). The date of award is also stored (lines 20-26).

This next stage is to create a competency record for a different learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>An example of LIP Competency information.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>4002</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <competency>
12               <contentype>
13                   <referential>
14                       <indexid>competency_01</indexid>
15                   </referential>
```

```
16              </contenttype>
17              <exrefrecord>
18                  <recformat uri="compformats/vocabulary.doc"/>
19                  <recdata uri="learner2/competency.doc"/>
20                  <date>
21                      <typename>
22                          <tysource sourcetype="imsdefault"/>
23                          <tyvalue>Award</tyvalue>
24                      </typename>
25                      <datetime>1998</datetime>
26                  </date>
27              </exrefrecord>
28              <description>
29                  <short>IT Competencies</short>
30              </description>
31          </competency>
32      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/comp_003/comp_003.xml. The key features of this example are:

• The core record for this new learner is identified by the <sourcedid> of 'IMS_LIP_V1p0_Example:basic_4002' (lines 6 and 7). This must be used for all further references to this learner;

• The actual competency is defined in terms of its format (line 18) and the external reference to the material itself (line 19). The date of award is also stored (lines 20-26).

4.5   Goal Examples

This example creates the record of a goal for a learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>A basic example of a Goal.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>basic_5001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <goal>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Work</tyvalue>
15              </typename>
16              <contentype>
17                  <referential>
18                      <indexid>goal_01</indexid>
19                  </referential>
20              </contentype>
21              <date>
22                  <typename>
23                      <tysource sourcetype="imsdefault"/>
24                      <tyvalue>Start</tyvalue>
25                  </typename>
26                  <datetime>2000:11:06</datetime>
27              </date>
28              <priority>Primary Objective</priority>
29              <status>
30                  <typename>
31                      <tysource sourcetype="imsdefault"/>
32                      <tyvalue>Active</tyvalue>
33                  </typename>
34                  <date>
35                      <typename>
36                          <tysource sourcetype="imsdefault"/>
37                          <tyvalue>Effective</tyvalue>
38                      </typename>
39                      <datetime>2000:11:06</datetime>
40                  </date>
41              </status>
42              <description>
43                  <short>Career Plan</short>
44                  <full>
45                      <media mediamode="Text" mimetype="text/word" contentreftype="uri">
46                          learner1/careerplan.doc
47                      </media>
48                  </full>
49              </description>
50          </goal>
51      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/goal_002/goal_002.xml.

The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0_Example:basic_5001' (lines 6 and 7). This must be used for all further references to this learner;

- The type of goal is defined in line 14 and the index for the goal is given in line 18;

- The priority of the goal is defined in line 28 and the status by lines 29 to 41. The status is defined as 'Active' and the date of entry of the status is given in line 32;

- The actual goal is described in lines 42 to 49 with the actual reference to the text file containing the description given in line 46. The file name includes the directory ('learner1') - this approach is used to ensure that packaging of multiple instances using the IMS Content Packaging specification can be achieved.

The next stage is to add a sub-goal to the goal created in the previous example. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>A basic example of adding a sub-goal.</comment>
3           <contenttype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>basic_5001</id>
8                   </sourcedid>
9               </referential>
10          </contenttype>
11          <goal>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Work</tyvalue>
16              </typename>
17              <contenttype>
18                  <referential>
19                      <indexid>goal_01</indexid>
20                  </referential>
21              </contenttype>
22              <date>
23                  <typename>
24                      <tysource sourcetype="imsdefault"/>
25                      <tyvalue>Update</tyvalue>
26                  </typename>
27                  <datetime>2000:11:07</datetime>
28              </date>
29              <goal>
30                  <typename>
31                      <tysource sourcetype="imsdefault"/>
32                      <tyvalue>Work</tyvalue>
33                  </typename>
34                  <contenttype>
35                      <referential>
36                          <indexid>goal_01_subgoal_01</indexid>
37                      </referential>
38                  </contenttype>
39                  <date>
40                      <typename>
41                          <tysource sourcetype="imsdefault"/>
42                          <tyvalue>Start</tyvalue>
43                      </typename>
44                      <datetime>2000:11:07</datetime>
45                  </date>
46                  <description>
47                      <short>Sub-goal for the goal that is the primary objective</short>
48                      <full>
49                          <media mediamode="Text" mimetype="text/word" contentreftype="uri">
50                              learner1/subgoal1.doc
51                          </media>
52                      </full>
53                  </description>
54              </goal>
55          </goal>
56      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/goal_003/goal_003.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0_Example:basic_5001' (lines 6 and 7) - this is as per the previous 'goal' example. The same goal identifier is used as per line 19;

- The sub-goal itself is defined in lines 29 to 54. This sub-goal has its own index number as shown in line 36. The actual sub-goal text is stored in an external file as defined in line 49 i.e. the file "learner1/subgoal1.doc";

- The transaction instructions are not contained in the XML instance - this is outside the scope of the IMS LIP specification.

4.6   Identification Examples

4.6.1   Identification Formatted Name Examples

This example creates the formatted name record for: Frederick Williams. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>A basic example of creating a formatted name.</comment>
3           <contenttype>
4               <referential>
5                   <sourcedid>
6                       <source>ims_lipexample_v1p0</source>
7                       <id>basic_6001</id>
8                   </sourcedid>
9               </referential>
10          </contenttype>
11          <identification>
12              <contenttype>
13                  <referential>
14                      <indexid>identification_01</indexid>
15                  </referential>
16              </contenttype>
17              <formname>
18                  <typename>
19                      <tysource sourcetype="imsdefault"/>
20                      <tyvalue>Preferred</tyvalue>
21                  </typename>
22                  <contenttype>
23                      <referential>
24                          <indexid>formname_01</indexid>
25                      </referential>
26                  </contenttype>
27                  <text>Frederick Williams</text>
28              </formname>
29          </identification>
30      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/iden_fnme_001/iden_fnme_001.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'ims_lipexample_v1p0:basic_6001' (lines 6 and 7). This must be used for all further references to this learner;

- The formatted name is defined as the 'Preferred name" (line 20);

- The formatted name itself is given in line 27.

The next stage is to create a second formatted name record for 'Frederick Williams that will be used as his contact name. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>A basic example of creating a formatted name.</comment>
3           <contenttype>
4               <referential>
5                   <sourcedid>
6                       <source>ims_lipexample_v1p0</source>
7                       <id>basic_6001</id>
8                   </sourcedid>
9               </referential>
10          </contenttype>
11          <identification>
12              <contenttype>
13                  <referential>
14                      <indexid>identification_01</indexid>
```

```
15                    </referential>
16                </contentype>
17                <formname>
18                    <typename>
19                        <tysource sourcetype="imsdefault"/>
20                        <tyvalue>Contact</tyvalue>
21                    </typename>
22                    <contentype>
23                        <referential>
24                            <indexid>formname_02</indexid>
25                        </referential>
26                    </contentype>
27                    <text>Professor Frederick Calland Williams</text>
28                </formname>
29            </identification>
30        </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/iden_fnme_002/iden_fnme_002.xml. The key features of this example are:

- The same <sourcedid> must be used as per the previous formatted name example (lines 6 and 7). It is an implementation dependent issue whether the <identification> identifiers have to be the same in the two examples as given herein (line 14);

- The new formatted name entry is identified by the fact that it has a new <indexid>. In this example the identifier is 'formname_02' (line 24) whereas for the previous example it was 'formname_01' (line 24);

- The formatted name is given in line 27 and the nature of the formatted name i.e. it is the 'Contact' name, is defined in line 20.

4.6.2   Identification Name Examples

This example creates the name record for: Alan Turing. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>A basic example of creating a compound name.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>ims_lipexample_v1p0</source>
7                        <id>basic_6002</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <identification>
12               <contentype>
13                   <referential>
14                       <indexid>identification_01</indexid>
15                   </referential>
16               </contentype>
17               <name>
18                   <typename>
19                       <tysource sourcetype="imsdefault"/>
20                       <tyvalue>Preferred</tyvalue>
21                   </typename>
22                   <contentype>
23                       <referential>
24                           <indexid>name_01</indexid>
25                       </referential>
26                   </contentype>
27                   <partname>
28                       <typename>
29                           <tysource sourcetype="imsdefault"/>
30                           <tyvalue>First</tyvalue>
31                       </typename>
32                       <text>Alan</text>
```

```
33              </partname>
34              <partname>
35                  <typename>
36                      <tysource sourcetype="imsdefault"/>
37                      <tyvalue>Last</tyvalue>
38                  </typename>
39                  <text>Turing</text>
40              </partname>
41          </name>
42      </identification>
43   </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/iden_name_001/iden_name_001.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'ims_lipexample_v1p0:basic_6002' (lines 6 and 7). This must be used for all further references to this learner;

- The name is defined as the 'Preferred name" (line 20);

- The name parts themselves are given in lines 32 and 39. The corresponding part types are defined in lines 30 and 37 respectively.

The next stage is to add a name part, middle name, to this learner's name. The example contains all of the IMS LIP information required to construct the instance record.

```
1    <learnerinformation>
2        <comment>A basic example of creating a compound name.</comment>
3        <contentype>
4            <referential>
5                <sourcedid>
6                    <source>ims_lipexample_v1p0</source>
7                    <id>basic_1002</id>
8                </sourcedid>
9            </referential>
10       </contentype>
11       <identification>
12           <contentype>
13               <referential>
14                   <indexid>identification_01</indexid>
15               </referential>
16           </contentype>
17           <name>
18               <typename>
19                   <tysource sourcetype="imsdefault"/>
20                   <tyvalue>Preferred</tyvalue>
21               </typename>
22               <contentype>
23                   <referential>
24                       <indexid>name_01</indexid>
25                   </referential>
26               </contentype>
27               <partname>
28                   <typename>
29                       <tysource sourcetype="imsdefault"/>
30                       <tyvalue>Middle</tyvalue>
31                   </typename>
32                   <text>Mathison</text>
33               </partname>
34           </name>
35       </identification>
36   </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/iden_name_002/iden_name_002.xml. The key features of this example are:

- The same <sourcedid> must be used as per the previous formatted name example (lines 6 and 7). It is an implementation dependent issue whether the <identification> identifiers have to be the same in the two examples as given herein (line 14);

- The same name entry is identified by the fact that it has the same <indexid> i.e. 'name_01'. The mechanism by which the nature of the transaction is passed between the systems i.e. stating the new information is an update to current data, is outside the scope of this specification;

- The new name part is given in line 32 and the nature of the formatted name i.e. it is the 'Middle' name, is defined in line 30.

4.6.3   Identification Address Examples

This example creates the address for a learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>A basic example of an address in an Identification.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>basic_6003</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <identification>
12               <contentype>
13                   <referential>
14                       <indexid>identification_01</indexid>
15                   </referential>
16               </contentype>
17               <address>
18                   <typename>
19                       <tysource sourcetype="imsdefault"/>
20                       <tyvalue>Private</tyvalue>
21                   </typename>
22                   <contentype>
23                       <referential>
24                           <indexid>address_01</indexid>
25                       </referential>
26                   </contentype>
27                   <street>
28                       <nonfieldedstreetaddress>Towerview Apartment 3A, 34 Oxford St
29                       </nonfieldedstreetaddress>
30                       <complex>Towerview</complex>
31                       <streetnumber>34</streetnumber>
32                       <streetname>Oxford</streetname>
33                       <streetype>Street</streetype>
34                       <aptnumber>3</aptnumber>
35                       <aptnumsuffix>A</aptnumsuffix>
36                   </street>
37                   <locality>West-end</locality>
38                   <city>London</city>
39                   <country>UK</country>
40                   <postcode>SE23 2RR</postcode>
41                   <timezone>GMT</timezone>
42                   <geo>
43                       <lat>57.01.49N</lat>
44                       <lon>00.00.00E</lon>
45                   </geo>
46               </address>
47           </identification>
48       </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/iden_addr_001/iden_addr_001.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'ims_lipexample_v1p0:basic_6003' (lines 6 and 7). This must be used for all further references to this learner;

- The type of the address is given in line 20 i.e. a 'Private' address;

- The address is given in lines 27 to 45 based upon the street information (lines 27 to 36), the locality (line 37), the city (line 38), the country (line 39), the postcode (line 40), the time-zone (line 41) and the geographic location (lines 42 to 45);

- The detailed street address is shown in two forms, the non-fielded form (lines 28 and 29) and the compound form (lines 30 to 35).

This next stage is to add a second address to the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>A basic example of an address in an Identification.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>basic_6003</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <identification>
12              <contentype>
13                  <referential>
14                      <indexid>identification_01</indexid>
15                  </referential>
16              </contentype>
17              <address>
18                  <typename>
19                      <tysource sourcetype="imsdefault"/>
20                      <tyvalue>Work</tyvalue>
21                  </typename>
22                  <contentype>
23                      <referential>
24                          <indexid>address_02</indexid>
25                      </referential>
26                  </contentype>
27                  <pobox>PO236</pobox>
28                  <city>London</city>
29                  <country>UK</country>
30                  <postcode>SW3 4RQQ</postcode>
31              </address>
32          </identification>
33      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/iden_addr_002/iden_addr_002.xml. The key features of this example are:

- The same <sourcedid> must be used as per the previous formatted name example (lines 6 and 7). It is an implementation dependent issue whether the <identification> identifiers have to be the same in the two examples as given herein (line 14);

- The new address is identified by the index shown in line 24 i.e. this address identifier must not have been used previously;

- The address itself is given in lines 27-30.

4.6.4   Identification Contactinfo Examples

This example creates the contact information for a learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>A basic example of contact information in an Identification.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>basic_6004</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <identification>
12               <contentype>
13                   <referential>
14                       <indexid>identification_01</indexid>
15                   </referential>
16               </contentype>
17               <contactinfo>
18                   <typename>
19                       <tysource sourcetype="imsdefault"/>
20                       <tyvalue>Work</tyvalue>
21                   </typename>
22                   <contentype>
23                       <referential>
24                           <indexid>contactinfo_01</indexid>
25                       </referential>
26                   </contentype>
27                   <telephone>
28                       <countrycode>44</countrycode>
29                       <areacode>020</areacode>
30                       <indnumber>6472239</indnumber>
31                   </telephone>
32               </contactinfo>
33               <contactinfo>
34                   <typename>
35                       <tysource sourcetype="imsdefault"/>
36                       <tyvalue>Work</tyvalue>
37                   </typename>
38                   <contentype>
39                       <referential>
40                           <indexid>contactinfo_02</indexid>
41                       </referential>
42                   </contentype>
43                   <facsimile>
44                       <countrycode>44</countrycode>
45                       <areacode>020</areacode>
46                       <indnumber>6472238</indnumber>
47                   </facsimile>
48               </contactinfo>
49           </identification>
50       </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/iden_cinf_001/iden_cinf_001.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0_Example:basic_6004' (lines 6 and 7). This must be used for all further references to this learner;

- Two types of contact information have been supplied i.e. telephone (lines 27 to 31) and facsimile (lines 43 to 47). The types of contact information are identified in lines 20 and 36 respectively ('Work') and the identifiers are given in lines 24 and 40 respectively;

- In each case the telephone and facsimile numbers consist of country code, area code and individual number.

This next stage is to add more contact information to the same learner i.e. an email address. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>A basic example of contact information in an Identification.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>basic_6004</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <identification>
12               <contentype>
13                   <referential>
14                       <indexid>identification_01</indexid>
15                   </referential>
16               </contentype>
17               <contactinfo>
18                   <typename>
19                       <tysource sourcetype="imsdefault"/>
20                       <tyvalue>Work</tyvalue>
21                   </typename>
22                   <contentype>
23                       <referential>
24                           <indexid>contactinfo_03</indexid>
25                       </referential>
26                   </contentype>
27                   <email>enquiries@work.com</email>
28               </contactinfo>
29           </identification>
30       </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/iden_cinf_002/iden_cinf_002.xml. The key features of this example are:

- The same <sourcedid> must be used as per the previous contact information name example (lines 6 and 7). It is an implementation dependent issue whether the <identification> identifiers have to be the same in the two examples as given herein (line 14);

- The new email address is given in line 27. This new information has its own identifier, as shown in line 24.

4.6.5   Identification Demographics Examples

This example creates the demographics information for a learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>A basic example of demographics in an Identification.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>basic_6005</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <identification>
12               <contentype>
13                   <referential>
14                       <indexid>identification_01</indexid>
15                   </referential>
16               </contentype>
```

```
17              <demographics>
18                  <typename>
19                      <tysource sourcetype="imsdefault"/>
20                      <tyvalue>Adult</tyvalue>
21                  </typename>
22                  <contentype>
23                      <referential>
24                          <indexid>demographics_01</indexid>
25                      </referential>
26                  </contentype>
27                  <gender gender="M"/>
28                  <date>
29                      <typename>
30                          <tysource sourcetype="imsdefault"/>
31                          <tyvalue>Birth</tyvalue>
32                      </typename>
33                      <datetime>1901:04:01</datetime>
34                  </date>
35                  <placeofbirth>Boston, Massacheusettes</placeofbirth>
36                  <uid>09234789A</uid>
37              </demographics>
38          </identification>
39      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/iden_demg_001/iden_demo_001.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0_Example:basic_6005' (lines 6 and 7). This must be used for all further references to this learner;

- The type of demographic record is define in line 20. The structure identifier is given in line 24;

- The actual demographics information includes the gender (line 27), date of birth (lines 28-34), place of birth (line 35) a a user identifier (line 36).

This next stage is to add more demographics information for the same learner i.e. a photograph. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>A basic example of demographics in an Identification.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>basic_6005</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <identification>
12              <contentype>
13                  <referential>
14                      <indexid>identification_01</indexid>
15                  </referential>
16              </contentype>
17              <demographics>
18                  <typename>
19                      <tysource sourcetype="imsdefault"/>
20                      <tyvalue>Adult</tyvalue>
21                  </typename>
22                  <contentype>
23                      <referential>
24                          <indexid>demographics_01</indexid>
25                      </referential>
26                  </contentype>
27                  <representation>
28                      <typename>
29                          <tysource sourcetype="imsdefault"/>
30                          <tyvalue>Photo</tyvalue>
```

```
31                         </typename>
32                         <date>
33                             <typename>
34                                 <tysource sourcetype="imsdefault"/>
35                                 <tyvalue>Create</tyvalue>
36                             </typename>
37                             <datetime>1940</datetime>
38                         </date>
39                         <description>
40                             <full>
41                                 <media mediamode="Image" mimetype="image/gif" contentreftype="uri">
42                                     photo/photo.gif
43                                 </media>
44                             </full>
45                         </description>
46                     </representation>
47                 </demographics>
48             </identification>
49     </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/iden_demg_002/iden_demo_002.xml. The key features of this example are:

- The same <sourcedid> must be used as per the previous contact information name example (lines 6 and 7). It is an implementation dependent issue whether the <identification> identifiers have to be the same in the two examples as given herein (line 14);

- The new demographics information is added, a photograph. The type of representation is defined (line 30), the date of creation (lines 32-38) and the external reference to the actual photograph (lines 28-31). The actual media reference is given in lines 39-45.

4.6.6   Identification Agent Examples

This example creates the agent information for a learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>A basic example of agent in an Identification.</comment>
3           <contenttype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>basic_6006</id>
8                   </sourcedid>
9               </referential>
10          </contenttype>
11          <identification>
12              <contenttype>
13                  <referential>
14                      <indexid>identification_01</indexid>
15                  </referential>
16              </contenttype>
17              <agent>
18                  <typename>
19                      <tysource sourcetype="imsdefault"/>
20                      <tyvalue>Sponsor</tyvalue>
21                  </typename>
22                  <contenttype>
23                      <referential>
24                          <indexid>agent_01</indexid>
25                      </referential>
26                  </contenttype>
27                  <agentid>SYLEA98_01137</agentid>
28                  <agentdomain>
29                      <typename>
30                          <tysource sourcetype="imsdefault"/>
31                          <tyvalue>Financial</tyvalue>
```

```
32                    </typename>
33                </agentdomain>
34                <description>
35                    <short>Local Government Grant</short>
365               </description>
37            </agent>
38        </identification>
39    </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/iden_agnt_001/iden_agnt_001.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0_Example:basic_6006' (lines 6 and 7). This must be used for all further references to this learner;

- The type of agent and their domain is defined in lines 18 and 26 respectively. The structure identifier is given in line 14;

- The agent is the learner's sponsor and the agent's formal external identifier is given in line 24 – the nature of this identifier is determined by the actual agent.

This next stage is to add a new agent's information for the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>A basic example of agent in an Identification.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>basic_6006</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <identification>
12              <contentype>
13                  <referential>
14                      <indexid>identification_01</indexid>
15                  </referential>
16              </contentype>
17              <agent>
18                  <typename>
19                      <tysource sourcetype="imsdefault"/>
20                      <tyvalue>Tutor</tyvalue>
21                  </typename>
22                  <contentype>
23                      <referential>
24                          <indexid>agent_02</indexid>
25                      </referential>
26                  </contentype>
27                  <agentid>UniversityStaffNumber</agentid>
28                  <agentdomain>
29                      <typename>
30                          <tysource sourcetype="imsdefault"/>
31                          <tyvalue>Educational</tyvalue>
32                      </typename>
33                  </agentdomain>
34                  <description>
35                      <short>University Academic Tutor</short>
36                  </description>
37              </agent>
38          </identification>
39      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/iden_agnt_002/iden_agnt_002.xml. The key features of this example are:

- The same <sourcedid> must be used as per the previous contact information name example (lines 6 and 7). It is an implementation dependent issue whether the <identification> identifiers have to be the same in the two examples as given herein (line 14);

- The type of agent and their domain is defined in lines 20 and 31 respectively;

- The agent is the learner's sponsor and the agent's formal external identifier is given in line 24 – once again the nature of this identifier is determined by the actual agent.

4.7   Interest Examples

This example creates a record containing the interests for a learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Interest information.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>7001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <interest>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Recreational</tyvalue>
15              </typename>
17              <contentype>
18                  <referential>
19                      <indexid>interest_02</indexid>
20                  </referential>
21              </contentype>
22              <product>
23                  <typename>
24                      <tysource sourcetype="imsdefault"/>
25                      <tyvalue>Portfolio</tyvalue>
26                  </typename>
27                  <contentype>
28                      <referential>
29                          <indexid>product_01</indexid>
30                      </referential>
31                  </contentype>
32                  <date>
33                      <typename>
34                          <tysource sourcetype="imsdefault"/>
35                          <tyvalue>Create</tyvalue>
36                      </typename>
37                      <datetime>2000</datetime>
38                  </date>
39                  <description>
40                      <short>A picture of the garden</short>
41                      <full>
42                          <media mediamode="Image" mimetype="image/gif" contentreftype="uri">
43                              myfile/garden.gif
44                          </media>
45                      </full>
46                  </description>
47              </product>
48          </interest>
49      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/intt_002/intt_002.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0_Example:basic_7001' (lines 6 and 7). This must be used for all further references to this learner;

- The type of interest record is defined in line 14. The identifier is given in line 19;

- The actual products of the interest, in this case a photograph of the garden, is given in lines 39-46. The date that the photograph was taken is also recorded (lines 32-38).

This next stage is to add further material to the interest record of the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>An example of LIP Interest information.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>7001</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <interest>
12               <typename>
13                   <tysource sourcetype="imsdefault"/>
14                   <tyvalue>Recreational</tyvalue>
16               </typename>
17               <contentype>
18                   <referential>
19                       <indexid>interest_02</indexid>
20                   </referential>
21               </contentype>
22               <product>
23                   <typename>
24                       <tysource sourcetype="imsdefault"/>
25                       <tyvalue>Portfolio</tyvalue>
26                   </typename>
27                   <contentype>
28                       <referential>
29                           <indexid>product_02</indexid>
30                       </referential>
31                   </contentype>
32                   <date>
33                       <typename>
34                           <tysource sourcetype="imsdefault"/>
35                           <tyvalue>Create</tyvalue>
36                       </typename>
37                       <datetime>1999</datetime>
38                   </date>
39                   <description>
40                       <short>Another picture of the garden</short>
41                       <full>
42                           <media mediamode="Image" mimetype="image/gif" contentreftype="uri">
43                               myfile/garden1.gif
44                           </media>
45                       </full>
46                   </description>
47               </product>
48           </interest>
49       </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/intt_003/intt_003.xml. The key features of this example are:

- The same <sourcedid> must be used as per the previous contact information name example (lines 6 and 7). The same identifer for the interest is used (line 19) but a different identifer is used to denote a new product to be added to the interest activity (line 29);

- The new interest material is added (lines 39-46) and consists of another photograph. The associated creation date of the photograph is also recorded (lines 32-38).

4.8   Qcl Examples

This example creates a new taxi licence record for a learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment> A basic example of a QCL.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>basic_8001</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <qcl>
12               <typename>
13                   <tysource sourcetype="imsdefault"/>
14                   <tyvalue>Licence</tyvalue>
15               </typename>
16               <contentype>
17                   <referential>
18                       <indexid>qcl_01</indexid>
19                   </referential>
20               </contentype>
21               <title>Taxi Driver Licence</title>
22               <organization>
23                   <typename>
24                       <tysource sourcetype="imsdefault"/>
25                       <tyvalue>Government</tyvalue>
26                   </typename>
27                   <description>
28                       <short>New York State</short>
29                   </description>
30               </organization>
31               <registrationno>24785NY</registrationno>
32               <date>
33                   <typename>
34                       <tysource sourcetype="imsdefault"/>
35                       <tyvalue>Start</tyvalue>
36                   </typename>
37                   <datetime>1996:09:01</datetime>
38               </date>
39               <date>
40                   <typename>
41                       <tysource sourcetype="imsdefault"/>
42                       <tyvalue>Expiry</tyvalue>
43                   </typename>
44                   <datetime>2001:08:31</datetime>
45               </date>
46           </qcl>
47       </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/qcln_002/qcln_002.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0_Example:basic_8001' (lines 6 and 7). This must be used for all further references to this learner;

- The nature of the QCL is denoted as a licence (line 14);

- The core information concerning the licence includes its title (line 21), awarding organisation (lines 22-30), registration number (line 31) and start (lines 32-38) and expiry (lines 39-44) dates.

This next stage is to create a new certification for the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment> A basic example of a QCL.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>basic_8001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <qcl>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Certification</tyvalue>
15              </typename>
16              <contentype>
17                  <referential>
18                      <indexid>qcl_02</indexid>
19                  </referential>
20              </contentype>
21              <title>Taxi Maintenance</title>
22              <organization>
23                  <typename>
24                      <tysource sourcetype="imsdefault"/>
25                      <tyvalue>Training</tyvalue>
26                  </typename>
27                  <description>
28                      <short>Taxi Training Institute</short>
29                  </description>
30              </organization>
31              <registrationno>TTI_23498</registrationno>
32              <date>
33                  <typename>
34                      <tysource sourcetype="imsdefault"/>
35                      <tyvalue>Award</tyvalue>
36                  </typename>
37                  <datetime>1998:011</datetime>
38              </date>
39          </qcl>
40      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/qcln_003/qcln_003.xml. The key features of this example are:

- The same <sourcedid> must be used as per the previous qcl example (lines 6 and 7).

- The new qcl is identified by the index shown in line 18 i.e. this qcl identifier must not have been used previously;

- The training certification (denoted in line 14) information is described as title (line 21), accrediting organisation (lines 22-30), registration number of the award (line 31) and the date of the award (lines 32-38).

4.9   Relationship Examples

This example creates the relationships between a qcl and activities for a learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>A basic example of a Relationship.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>basic_9001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <relationship>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Qcl</tyvalue>
16              </typename>
17              <contentype>
18                  <referential>
19                      <indexid>relationship_01</indexid>
20                  </referential>
21              </contentype>
22              <tuple>
23                  <tuplesource>
24                      <indexid>qcl_213</indexid>
25                  </tuplesource>
26                  <tuplerelation>
27                      <typename>
28                          <tyvalue>resultsfrom</tyvalue>
29                      </typename>
30                  </tuplerelation>
31                  <tupledest>
32                      <indexid>activity_21</indexid>
33                  </tupledest>
34                  <tupledest>
35                      <indexid>activity_22</indexid>
36                  </tupledest>
37              </tuple>
38              <description>
39                  <short>The qualification results from the two activities</short>
40              </description>
41          </relationship>
42      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/rltp_002/rltp_002.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0_Example:basic_9001' (lines 6 and 7). This must be used for all further references to this learner;

- The type of relationship is defined as a qcl (line 14). The unique data structure is assigned in line 19;

- The source of the relationship is defined as a qcl (lines 23-25), the type of relationship (lines 26-30) and the two destination structures (lines 31-33). A brief explanation of the structure is given in lines 34-36.

This next stage is to create a new relationship for the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>A basic example of a Relationship.</comment>
3           <contentype>
4               <referential>
```

```
5              <sourcedid>
6                  <source>IMS_LIP_V1p0_Example</source>
7                  <id>basic_9001</id>
8              </sourcedid>
9          </referential>
10     </contentype>
11     <relationship>
12         <contentype>
13             <referential>
14                 <indexid>relationship_02</indexid>
16             </referential>
17         </contentype>
18         <tuple>
19             <tuplesource>
20                 <sourcedid>
21                     <source>SOURCE1</source>
22                     <id>6294UoD</id>
23                 </sourcedid>
24                 <indexid/>
25             </tuplesource>
26             <tuplerelation>
27                 <typename>
28                     <tyvalue>equivalent</tyvalue>
29                 </typename>
30             </tuplerelation>
31             <tupledest>
32                 <sourcedid>
33                     <source>SOURCE2</source>
34                     <id>UserOrg22</id>
35                 </sourcedid>
36                 <indexid/>
37             </tupledest>
38         </tuple>
39         <description>
40             <short>These two sourcedids refer to the same learner</short>
41         </description>
42     </relationship>
43 </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/rltp_002/rltp_003.xml. The key features of this example are:

- The same <sourcedid> must be used as per the previous relationship example (lines 6 and 7).

- The new relationship is identified by the index shown in line 14. Its type is given in line 28;

- The core of the relationship shows how different sourcedids can be shown to be equivalent (lines 18-38).

4.10 Securitykey Examples

This example creates a new security key record for a learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>An example of LIP Securitykey information.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>10001</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <securitykey>
12               <typename>
13                   <tysource sourcetype="imsdefault"/>
14                   <tyvalue>Password</tyvalue>
16               </typename>
17               <contentype>
18                   <referential>
19                       <indexid>securitykey_1</indexid>
20                   </referential>
22               </contentype>
23               <keyfields>
24                   <fieldlabel>
25                       <typename>
26                           <tyvalue>Password</tyvalue>
27                       </typename>
28                   </fieldlabel>
29                   <fielddata>1fotcn</fielddata>
30               </keyfields>
31           </securitykey>
32       </learnerinformation>
```

This example is stored in the file: IMS_LIPv1Examples/Valid/Basic/skey_002/skey_002.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0_Example:basic_10001' (lines 6 and 7). This must be used for all further references to this learner;

- The type of security key information (line 14) and the associated identifier (line 19) is defined;

- The actual password is defined (line 29) and the associated field name is identified in lines 24-28.

This next stage is to store a PIN number for the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1        <learnerinformation>
2            <comment>An example of LIP Securitykey information.</comment>
3            <contentype>
4                <referential>
5                    <sourcedid>
6                        <source>IMS_LIP_V1p0_Example</source>
7                        <id>10001</id>
8                    </sourcedid>
9                </referential>
10           </contentype>
11           <securitykey>
12               <typename>
13                   <tysource sourcetype="imsdefault"/>
14                   <tyvalue>PIN</tyvalue>
16               </typename>
17               <contentype>
```

```
18                     <referential>
19                         <indexid>securitykey_2</indexid>
20                     </referential>
21                 </contentype>
22                 <keyfields>
23                     <fieldlabel>
24                         <typename>
25                             <tyvalue>PhotoCopyCard</tyvalue>
26                         </typename>
27                     </fieldlabel>
28                     <fielddata>5760</fielddata>
29                 </keyfields>
30             </securitykey>
31     </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/skey_003/skey_003.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0_Example:basic_10001' (lines 6 and 7). This is the same as for the previous securitykeys example;

- The type of security key information (line 14) and the associated identifier (line 19) is defined. This identifier is different from the previous example;

- The actual code is defined (line 28) and the associated field name is identified in lines 23-27.

4.11 Transcript Examples

This example creates a transcript for a learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Transcript information.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>11001</id>
8                   </sourcedid>
9               </referential>
10          </contentype>
11          <transcript>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Vocational</tyvalue>
16              </typename>
17              <contentype>
18                  <referential>
19                      <indexid>transcript_01</indexid>
20                  </referential>
21              </contentype>
22              <exrefrecord>
23                  <recformat>MSWord98</recformat>
24                  <recdata uri="employee1/reference.doc"/>
25                  <date>
26                      <typename>
27                          <tysource sourcetype="imsdefault"/>
28                          <tyvalue>Create</tyvalue>
29                      </typename>
30                      <datetime>1999:10:31</datetime>
31                  </date>
32              </exrefrecord>
33              <description>
34                  <short>Line manager employment transcript on the learner</short>
35              </description>
36          </transcript>
37      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/trns_002/trns_002.xml. The key features of this example are:

- The core record for this learner is identified by the <sourcedid> of 'IMS_LIP_V1p0_Example:basic_11001' (lines 6 and 7). This must be used for all further references to this learner;

- The type of transcript is defined in line 14. The identifier is given in line 19;

- The actual transcript is defined in terms of its format (line 23) and the external reference to the material itself (line 24). The date of creation is also stored (lines 25-31).

This next stage is to add another transcript for the same learner. The example contains all of the IMS LIP information required to construct the instance record.

```
1       <learnerinformation>
2           <comment>An example of LIP Transcript information.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>11001</id>
8                   </sourcedid>
9               </referential>
```

```
10          </contentype>
11          <transcript>
12              <typename>
13                  <tysource sourcetype="imsdefault"/>
14                  <tyvalue>Vocational</tyvalue>
16              </typename>
17              <contentype>
18                  <referential>
19                      <indexid>transcript_02</indexid>
20                  </referential>
21              </contentype>
22              <exrefrecord>
23                  <recformat>PDF</recformat>
24                  <recdata uri="employee1/reference1.pdf"/>
25                  <date>
26                      <typename>
27                          <tysource sourcetype="imsdefault"/>
28                          <tyvalue>Create</tyvalue>
29                      </typename>
30                      <datetime>2000:10:31</datetime>
31                  </date>
32              </exrefrecord>
33          </transcript>
34      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Basic/trns_003/trns_003.xml. The key features of this example are:

- The same <sourcedid> must be used as per the previous transcript (lines 6 and 7). A new identifer for the transcript is used (line 19) and the type of transcript is defined (line 14);

- The actual transcript is defined in terms of its format (line 23) and the external reference to the material itself (line 24). The date of creation is also stored (lines 25-31).

5.   Advanced Example LIP Instances

5.1   Engineering Resume

The following is an example of using the LIP-XML to represent an Engineering-oriented resume.

5.1.1   The Example

1	# Colin Smythe (BSc, PhD, FBCS, C.Eng) Resume

1
2

PERSONAL DETAILS
3

4 **Contact Address:**   34 Acorn Hill, Stannington, Sheffield, S6 6AW
5   Tel/Fax: +(44)-114-2334009
                                           E-mail: colin@dunelm.com
6
        Date of Birth: 18th February, 1958;
7
        Nationality: British
8
9   **Education:**   1982–1985, PhD in Communications (University of Durham)
                                           1976–1979, BSc (Hons) in Applied Physics (University of Durham)
10 **Affiliations:**   Fellow of British Computer Society (1998)
11   Member IEEE and Member ACM, Chartered Engineer (1998)

12 **Experience in IT:**   20 years

13
PRIMARY SKILLS
14

16 - Networks consultancy (Data networking and internetworking)   Ten years
        - Standards and specification development   Five years
17 - Project management (inc. European projects)   Ten years
        - Proposal tendering and writing (inc. European projects)   Fifteen years
18 - Computer systems implementation (inc. C)   Twenty years
19 - IT training (Data networking and software engineering)   Ten years

20
DETAILED JOB HISTORY
21

22
June 1989 – Present   Dunelm Services Limited
23

24 Co-founder and Director of Dunelm Systems Ltd. Dunelm specialises in providing: consultancy and
        implementation skills in Information & Communications Technology (ICT); and IT training in Data
25 Networking and Software Engineering.

26 **Responsibilities and achievements**

27 - DISTRIBUTED LEARNING SPECIFICATIONS (1999, 24 months): Responsible for the editing and
        authoring of the IMS Question and Test Interoperability, and the Learner Information Packaging
28 Specifications.

29 - RENAISSANCE Project (ACTS AC100) (1995-1998, 30 months): Responsible for the development of
30 CBT materials (inc. HTML) used on a Pan-European demonstrator.

31

32

33
34
August 1992 – Oct 1999   University of Sheffield

35
A member of the Department of Computer Science which consists of 26 full-time academics, 2 EPSRC
Advanced Research Fellows, 7 technical staff, 7 secretaries, 35 research assistants, 55 PhD/MPhil research
36
students, 350 undergraduates and 60 MRes/MSc postgraduates.

37
Responsibilities and achievements

38
- Full Professor of Computer Science (1997-1999). Head of the Communications and Distributed
39
  Systems Research Group (CDSRG), a team of 40 staff and research students;

40
- Head of Department (1994 – 1998). During that period the Department established itself as one of the
  most rapidly improving Computer Science departments in the UK;

41
- Author of the text: *Internetworking - Designing the Right Architectures*, Addison-Wesley Longmans,
42
  1995, p.471, ISBN 0-201-56536-6.

43
44
July 1985 – May 1989   Hyperion Systems Limited

45
Co-founder and Director of Hyperion Systems Ltd, a systems house specialising in the provision of
Computing and Communication services. Rôles adopted during this period were those of Managing
46
Director, Marketing Director, Company Secretary and Principal Consultant.

47
48
January 1986 – July 1992   University of Surrey

49
Lecturer in *Data Communications* within the Department of Electronic and Electrical Engineering.

50
51
February 1982 – December 1985   University of Durham

52
Lecturer in *Digital Electronics* within the department of Applied Physics and Electronics. Studied PhD
entitled *Direct Sequence Spread Spectrum Techniques in Local Area Networks.*
53

54
October 1979 – February 1982   Logica Limited

55
Responsibilities and achievements

56
- Senior designer for the communications software of an OSI/RM based architecture. Responsible for a
57
  three person team.

58
- Member of a thirty person team producing a cabin simulation of the EH101 helicopter for Westland
  Helicopters.

5.1.2   The XML Instance

The equivalent XML instance for this resume is (note that this is only one instance of the large number of possible
mappings. The actual form adopted should be determined by other factors e.g. to minimise space, for sequential
parsing, etc.):

```
1       <learnerinformation>
2           <comment>An example Engineering Resume.</comment>
3           <contentype>
4               <referential>
5                   <sourcedid>
6                       <source>IMS_LIP_V1p0_Example</source>
7                       <id>colinsmythe</id>
```

```
8                      </sourcedid>
9                  </referential>
10          </contentype>
11          <identification>
12              <contentype>
13                  <referential>
14                      <indexid>identification_01</indexid>
15                  </referential>
16              </contentype>
17              <name>
18                  <typename>
19                      <tysource sourcetype="imsdefault"/>
20                      <tyvalue>Preferred</tyvalue>
21                  </typename>
22                  <contentype>
23                      <referential>
24                          <indexid>name_01</indexid>
25                      </referential>
26                  </contentype>
27                  <partname>
28                      <typename>
29                          <tysource sourcetype="imsdefault"/>
30                          <tyvalue>First</tyvalue>
31                      </typename>
32                      <text>Colin</text>
33                  </partname>
34                  <partname>
35                      <typename>
36                          <tysource sourcetype="imsdefault"/>
37                          <tyvalue>Last</tyvalue>
38                      </typename>
39                      <text>Smythe</text>
40                  </partname>
41                  <partname>
42                      <typename>
43                          <tysource sourcetype="imsdefault"/>
44                          <tyvalue>Suffix</tyvalue>
45                      </typename>
46                      <text>BSc, PhD, FBCS, C.Eng</text>
47                  </partname>
48              </name>
49              <address>
50                  <typename>
51                      <tysource sourcetype="imsdefault"/>
52                      <tyvalue>Work</tyvalue>
53                  </typename>
54                  <contentype>
55                      <referential>
56                          <indexid>address_01</indexid>
57                      </referential>
58                  </contentype>
59                  <street>
60                      <streetnumber>34</streetnumber>
61                      <streetname>Acorn Hill</streetname>
62                  </street>
63                  <locality>Stannington</locality>
64                  <city>Sheffield</city>
65                  <postcode>S66AW</postcode>
66              </address>
67              <contactinfo>
68                  <typename>
69                      <tysource sourcetype="imsdefault"/>
70                      <tyvalue>Work</tyvalue>
71                  </typename>
72                  <contentype>
73                      <referential>
74                          <indexid>contact_01</indexid>
75                      </referential>
76                  </contentype>
77                  <telephone>
78                      <countrycode>44</countrycode>
```

```
79                      <areacode>0114</areacode>
80                      <indnumber>2334009</indnumber>
81                  </telephone>
82              </contactinfo>
83              <contactinfo>
84                  <typename>
85                      <tysource sourcetype="imsdefault"/>
86                      <tyvalue>Work</tyvalue>
87                  </typename>
88                  <contentype>
89                      <referential>
90                          <indexid>contact_02</indexid>
91                      </referential>
92                  </contentype>
93                  <facsimile>
94                      <countrycode>44</countrycode>
95                      <areacode>0114</areacode>
96                      <indnumber>2334009</indnumber>
97                  </facsimile>
98              </contactinfo>
99              <contactinfo>
100                 <typename>
101                     <tysource sourcetype="imsdefault"/>
102                     <tyvalue>Work</tyvalue>
103                 </typename>
104                 <contentype>
105                     <referential>
106                         <indexid>contact_03</indexid>
107                     </referential>
108                 </contentype>
109                 <email>colin@dunelm.com</email>
110             </contactinfo>
111             <demographics>
112                 <typename>
113                     <tysource sourcetype="imsdefault"/>
114                     <tyvalue>Adult</tyvalue>
115                 </typename>
116                 <contentype>
117                     <referential>
118                         <indexid>demographics_01</indexid>
119                     </referential>
120                 </contentype>
121                 <date>
122                 <typename>
123                     <tysource sourcetype="imsdefault"/>
124                     <tyvalue>Birth</tyvalue>
125                 </typename>
126                     <datetime>1958:02:18</datetime>
127                 </date>
128             </demographics>
129             <ext_identification>
130                 <fieldlabel>
131                     <typename>
132                         <tyvalue>Nationality</tyvalue>
133                     </typename>
134                 </fieldlabel>
135                 <fielddata>British</fielddata>
136             </ext_identification>
137         </identification>
138         <qcl>
139             <typename>
140                 <tysource sourcetype="imsdefault"/>
141                 <tyvalue>Qualification</tyvalue>
142             </typename>
143             <contentype>
144                 <referential>
145                     <indexid>qcl_01</indexid>
146                 </referential>
147             </contentype>
148             <title>PhD in Communications</title>
149             <organization>
```

```
150              <typename>
151                  <tysource sourcetype="imsdefault"/>
152                  <tyvalue>Educational</tyvalue>
153              </typename>
154              <description>
155                  <short>University of Durham</short>
156              </description>
157          </organization>
158          <date>
159              <typename>
160                  <tysource sourcetype="imsdefault"/>
161                  <tyvalue>Start</tyvalue>
162              </typename>
163              <datetime>1982</datetime>
164          </date>
165          <date>
166              <typename>
167                  <tysource sourcetype="imsdefault"/>
168                  <tyvalue>Finish</tyvalue>
169              </typename>
170              <datetime>1985</datetime>
171          </date>
172      </qcl>
173      <qcl>
174          <typename>
175              <tysource sourcetype="imsdefault"/>
176              <tyvalue>Qualification</tyvalue>
177          </typename>
178          <contentype>
179              <referential>
180                  <indexid>qcl_02</indexid>
181              </referential>
182          </contentype>
183          <title>BSc in Applied Physics</title>
184          <organization>
185              <typename>
186                  <tysource sourcetype="imsdefault"/>
187                  <tyvalue>Educational</tyvalue>
188              </typename>
189              <description>
190                  <short>University of Durham</short>
191              </description>
192          </organization>
193          <level>
194              <text>Honours</text>
195          </level>
196          <date>
197              <typename>
198                  <tysource sourcetype="imsdefault"/>
199                  <tyvalue>Start</tyvalue>
200              </typename>
201              <datetime>1976</datetime>
202          </date>
203          <date>
204              <typename>
205                  <tysource sourcetype="imsdefault"/>
206                  <tyvalue>Finish</tyvalue>
207              </typename>
208              <datetime>1979</datetime>
209          </date>
210      </qcl>
211      <affiliation>
212          <typename>
213              <tysource sourcetype="imsdefault"/>
214              <tyvalue>Professional</tyvalue>
215          </typename>
216          <contentype>
217              <referential>
218                  <indexid>affiliation_01</indexid>
219              </referential>
220          </contentype>
```

```
221              <classification>Fellow</classification>
221              <role>
222                  <typename>
223                      <tysource sourcetype="imsdefault"/>
224                      <tyvalue>Member</tyvalue>
225                  </typename>
226                  <contentype>
227                      <referential>
228                          <indexid>role_01</indexid>
229                      </referential>
230                  </contentype>
231                  <date>
232                      <typename>
233                          <tysource sourcetype="imsdefault"/>
234                          <tyvalue>Start</tyvalue>
235                      </typename>
236                      <datetime>1998</datetime>
237                  </date>
238              </role>
239              <organization>
240                  <typename>
241                      <tysource sourcetype="imsdefault"/>
242                      <tyvalue>Professional</tyvalue>
243                  </typename>
244                  <description>
245                      <short>British Computer Society</short>
246                  </description>
247              </organization>
248          </affiliation>
249          <affiliation>
250              <typename>
251                  <tysource sourcetype="imsdefault"/>
252                  <tyvalue>Professional</tyvalue>
253              </typename>
254              <contentype>
255                  <referential>
256                      <indexid>affiliation_02</indexid>
257                  </referential>
258              </contentype>
259              <classification>Member</classification>
260              <organization>
261                  <typename>
262                      <tysource sourcetype="imsdefault"/>
263                      <tyvalue>Professional</tyvalue>
264                  </typename>
265                  <description>
266                      <short>IEEE</short>
267                  </description>
268              </organization>
269          </affiliation>
270          <affiliation>
271              <typename>
272                  <tysource sourcetype="imsdefault"/>
273                  <tyvalue>Professional</tyvalue>
274              </typename>
275              <contentype>
276                  <referential>
277                      <indexid>affiliation_03</indexid>
278                  </referential>
279              </contentype>
280              <classification>Member</classification>
281              <organization>
282                  <typename>
283                      <tysource sourcetype="imsdefault"/>
284                      <tyvalue>Professional</tyvalue>
285                  </typename>
286                  <description>
287                      <short>ACM</short>
288                  </description>
289              </organization>
290          </affiliation>
```

```
291          <affiliation>
292              <typename>
293                  <tysource sourcetype="imsdefault"/>
294                  <tyvalue>Professional</tyvalue>
295              </typename>
296              <contentype>
297                  <referential>
298                      <indexid>affiliation_04</indexid>
299                  </referential>
300              </contentype>
301              <classification>Chartered Engineer</classification>
302              <role>
303                  <typename>
304                      <tysource sourcetype="imsdefault"/>
305                      <tyvalue>Member</tyvalue>
306                  </typename>
307                  <contentype>
308                      <referential>
309                          <indexid>role_04</indexid>
310                      </referential>
311                  </contentype>
312                  <date>
313                      <typename>
314                          <tysource sourcetype="imsdefault"/>
315                          <tyvalue>Start</tyvalue>
316                      </typename>
317                      <datetime>1998</datetime>
318                  </date>
319              </role>
320          </affiliation>
321          <transcript>
322              <contentype>
323                  <referential>
324                      <indexid>transcript_01</indexid>
325                  </referential>
326              </contentype>
327              <description>
328                  <short>Primary Skills</short>
329                  <long>
330                      Networks consultancy (Data networking and internetworking) – Ten years
331                      Standards and specification development - Five years
332                      Project management (inc. European projects)  Ten years
333                      Proposal tendering and writing (inc. European projects) - Fifteen years
334                      Computer systems implementation (inc. C) - Twenty years
335                      IT training (Data networking and software engineering) - Ten years
336                  </long>
337              </description>
338          </transcript>
339          <activity>
340              <typename>
341                  <tysource sourcetype="imsdefault"/>
342                  <tyvalue>Work</tyvalue>
343              </typename>
344              <contentype>
345                  <referential>
346                      <indexid>activity_01</indexid>
347                  </referential>
348              </contentype>
349              <date>
350                  <typename>
351                      <tysource sourcetype="imsdefault"/>
352                      <tyvalue>Start</tyvalue>
353                  </typename>
354                  <datetime>1998:06</datetime>
355              </date>
356              <description>
357                  <short>Dunelm Services Limited</short>
358                  <long>
359                      Co-founder and Director of Dunelm Systems Ltd.  Dunelm specialises in
360                      providing: consultancy and implementation skills in Information and
361                      Communications Technology (ICT); and IT training in Data Networking and
```

```
362                    Software Engineering.
363                </long>
364            </description>
365        <activity>
366            <typename>
367                <tysource sourcetype="imsdefault"/>
368                <tyvalue>Work</tyvalue>
369            </typename>
370            <contentype>
371                <referential>
372                    <indexid>activity_01_subactivity_01</indexid>
373                </referential>
374            </contentype>
375            <date>
376                <typename>
377                    <tysource sourcetype="imsdefault"/>
378                    <tyvalue>Start</tyvalue>
379                </typename>
380                <datetime>1999</datetime>
381            </date>
382            <description>
383                <short>DISTRIBUTED LEARNING SPECIFICATIONS(24 months)</short>
384                <long>
385                    Responsible for the editing and authoring of the IMS Question
386                    and Test Interoperability, and the Learner Information Packaging
387                    Specifications.
388                </long>
389            </description>
390        </activity>
391        <activity>
392            <typename>
393                <tysource sourcetype="imsdefault"/>
394                <tyvalue>Work</tyvalue>
395            </typename>
396            <contentype>
397                <referential>
398                    <indexid>activity_01_subactivity_02</indexid>
399                </referential>
400            </contentype>
401            <date>
402                <typename>
403                    <tysource sourcetype="imsdefault"/>
404                    <tyvalue>Start</tyvalue>
405                </typename>
406                <datetime>1995</datetime>
407            </date>
408            <date>
409                <typename>
410                    <tysource sourcetype="imsdefault"/>
411                    <tyvalue>Finish</tyvalue>
412                </typename>
413                <datetime>1998</datetime>
414            </date>
415            <description>
416                <short>RENAISSANCE Project - ACTS AC100 (30 months)</short>
417                <long>
418                    Responsible for the development of CBT materials (inc. HTML)
419                    used on a Pan-European demonstrator.
420                </long>
421            </description>
422        </activity>
423        </activity>
424        <activity>
425            <typename>
426                <tysource sourcetype="imsdefault"/>
427                <tyvalue>Work</tyvalue>
428            </typename>
429            <contentype>
430                <referential>
431                    <indexid>activity_02</indexid>
432                </referential>
```

```
433            </contentype>
434            <date>
435                <typename>
436                    <tysource sourcetype="imsdefault"/>
437                    <tyvalue>Start</tyvalue>
438                </typename>
439                <datetime>1992:08</datetime>
440            </date>
441            <date>
442                <typename>
443                    <tysource sourcetype="imsdefault"/>
444                    <tyvalue>Finish</tyvalue>
445                </typename>
446                <datetime>1999:10</datetime>
447            </date>
448            <description>
449                <short>University of Sheffield</short>
450                <long>
451                    A member of the Department of Computer Science which consists of
452                    26 full-time academics, 2 EPSRC Advanced Research Fellows, 7
453                    technical staff, 7 secretaries, 35 research assistants, 55
454                    PhD/MPhil research students, 350 undergraduates and 60 MRes/MSc
455                    postgraduates.
456                </long>
457            </description>
458            <activity>
459                <typename>
460                    <tysource sourcetype="imsdefault"/>
461                    <tyvalue>Work</tyvalue>
462                </typename>
463                <contentype>
464                    <referential>
465                        <indexid>activity_02_subactivity_01</indexid>
466                    </referential>
467                </contentype>
468                <date>
469                    <typename>
470                        <tysource sourcetype="imsdefault"/>
471                        <tyvalue>Start</tyvalue>
472                    </typename>
473                    <datetime>1997</datetime>
474                </date>
475                <date>
476                    <typename>
477                        <tysource sourcetype="imsdefault"/>
478                        <tyvalue>Finish</tyvalue>
479                    </typename>
480                    <datetime>1999</datetime>
481                </date>
482                <description>
483                    <short>Full Professor of Computer Science</short>
484                    <long>
485                        Head of the Communications and Distributed Systems Research
486                        Group (CDSRG), a team of 40 staff and research students.
487                    </long>
488                </description>
489            </activity>
490            <activity>
491                <typename>
492                    <tysource sourcetype="imsdefault"/>
493                    <tyvalue>Work</tyvalue>
494                </typename>
495                <contentype>
496                    <referential>
497                        <indexid>activity_02_subactivity_02</indexid>
498                    </referential>
499                </contentype>
500                <date>
501                    <typename>
502                        <tysource sourcetype="imsdefault"/>
503                        <tyvalue>Start</tyvalue>
```

```
504                    </typename>
505                    <datetime>1994</datetime>
506                </date>
507                <date>
508                    <typename>
509                        <tysource sourcetype="imsdefault"/>
510                        <tyvalue>Finish</tyvalue>
511                    </typename>
512                    <datetime>1998</datetime>
513                </date>
514                <description>
515                    <short>Head of Department</short>
516                    <long>
517                        During that period the Department established itself as one of
518                        the most rapidly improving Computer Science departments in the UK.
519                    </long>
520                </description>
521            </activity>
522            <activity>
523                <typename>
524                    <tysource sourcetype="imsdefault"/>
525                    <tyvalue>Work</tyvalue>
526                </typename>
527                <contentype>
528                    <referential>
529                        <indexid>activity_02_subactivity_03</indexid>
530                    </referential>
531                </contentype>
532                <date>
533                    <typename>
534                        <tysource sourcetype="imsdefault"/>
535                        <tyvalue>Start</tyvalue>
536                    </typename>
537                    <datetime>1995</datetime>
538                </date>
539                <description>
540                    <short>Author</short>
541                    <long>
542                        Internetworking - Designing the Right Architectures, Addison-
543                        Wesley Longmans, p.471, ISBN 0-201-56536-6.
544                    </long>
545                </description>
546            </activity>
547        </activity>
548        <activity>
549            <typename>
550                <tysource sourcetype="imsdefault"/>
551                <tyvalue>Work</tyvalue>
552            </typename>
553            <contentype>
554                <referential>
555                    <indexid>activity_03</indexid>
556                </referential>
557            </contentype>
558            <date>
559                <typename>
560                    <tysource sourcetype="imsdefault"/>
561                    <tyvalue>Start</tyvalue>
562                </typename>
563                <datetime>1985:07</datetime>
564            </date>
565            <date>
567                <typename>
568                    <tysource sourcetype="imsdefault"/>
569                    <tyvalue>Finish</tyvalue>
570                </typename>
571                <datetime>1989:05</datetime>
572            </date>
573            <description>
574                <short>Hyperion Systems Limited</short>
575                <long>
```

```
576                         Co-founder and Director of Hyperion Systems Ltd, a systems house
577                         specialising in the provision of Computing and Communication services.
578                         Roles adopted during this period were those of Managing Director,
579                         Marketing Director, Company Secretary and Principal Consultant.
580                     </long>
581                 </description>
582             </activity>
583             <activity>
584                 <typename>
585                     <tysource sourcetype="imsdefault"/>
586                     <tyvalue>Work</tyvalue>
587                 </typename>
588                 <contenttype>
589                     <referential>
590                         <indexid>activity_04</indexid>
591                     </referential>
592                 </contenttype>
593                 <date>
594                     <typename>
595                         <tysource sourcetype="imsdefault"/>
596                         <tyvalue>Start</tyvalue>
597                     </typename>
598                     <datetime>1986:01</datetime>
599                 </date>
600                 <date>
601                     <typename>
602                         <tysource sourcetype="imsdefault"/>
603                         <tyvalue>Finish</tyvalue>
604                     </typename>
605                     <datetime>1992:07</datetime>
606                 </date>
607                 <description>
608                     <short>University of Surrey</short>
609                     <long>
610                         Lecturer in Data Communications within the Department of
611                         Electronic and Electrical Engineering.
612                     </long>
613                 </description>
614             </activity>
615             <activity>
616                 <typename>
617                     <tysource sourcetype="imsdefault"/>
618                     <tyvalue>Work</tyvalue>
619                 </typename>
620                 <contenttype>
621                     <referential>
622                         <indexid>activity_05</indexid>
623                     </referential>
624                 </contenttype>
625                 <date>
626                     <typename>
627                         <tysource sourcetype="imsdefault"/>
628                         <tyvalue>Start</tyvalue>
629                     </typename>
630                     <datetime>1982:02</datetime>
631                 </date>
632                 <date>
633                     <typename>
634                         <tysource sourcetype="imsdefault"/>
635                         <tyvalue>Finish</tyvalue>
636                     </typename>
637                     <datetime>1985:12</datetime>
638                 </date>
639                 <description>
640                     <short>University of Durham</short>
641                     <long>
642                         Lecturer in Digital Electronics within the department of Applied
643                         Physics and Electronics. Studied PhD entitled Direct Sequence
644                         Spread Spectrum Techniques in Local Area Networks.
645                     </long>
646                 </description>
```

```
647          </activity>
648          <activity>
649              <typename>
650                  <tysource sourcetype="imsdefault"/>
651                  <tyvalue>Work</tyvalue>
652              </typename>
653              <contenttype>
654                  <referential>
655                      <indexid>activity_06</indexid>
656                  </referential>
657              </contenttype>
658              <date>
659                  <typename>
660                      <tysource sourcetype="imsdefault"/>
661                      <tyvalue>Start</tyvalue>
662                  </typename>
663                  <datetime>1979:10</datetime>
664              </date>
665              <date>
666                  <typename>
667                      <tysource sourcetype="imsdefault"/>
668                      <tyvalue>Finish</tyvalue>
669                  </typename>
670                  <datetime>1982:02</datetime>
671              </date>
672              <description>
673                  <short>Logica Limited</short>
674              </description>
675              <activity>
676                  <typename>
677                      <tysource sourcetype="imsdefault"/>
678                      <tyvalue>Work</tyvalue>
679                  </typename>
680                  <contenttype>
681                      <referential>
682                          <indexid>activity_6_subactivity_01</indexid>
683                      </referential>
684                  </contenttype>
685                  <description>
686                      <short>Senior designer for the communications software of an OSI/RM
687                          based architecture.  Responsible for a three man team.
688                      </short>
689                  </description>
690              </activity>
691              <activity>
692                  <typename>
693                      <tysource sourcetype="imsdefault"/>
694                      <tyvalue>Work</tyvalue>
695                  </typename>
696                  <contenttype>
697                      <referential>
698                          <indexid>activity_6_subactivity_02</indexid>
699                      </referential>
700                  </contenttype>
701                  <description>
702                      <short>
703                          Member of a 30 person team producing a cabin simulation of the
704                          EH101 helicopter for Westland Helicopters.
705                      </short>
706                  </description>
707              </activity>
708          </activity>
709      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Advanced/engresume_001/engresume_001.xml

5.1.3　Key Features of the Engineering Resume Example

The key features of this example are:

- The sourcedid for the the learner is defined in the <contenttype> element in lines 3-10;

- The name on the CV (line 1) is held within the XML instance as a name (lines 17-48). Note that the 'BSc, PhD…" part is held as a partname suffix (lines 41-47);

- The contact address on the CV (line 4) is contained within the address element within the XML instance (lines 49-66);

- The telephone, fax and email information from the CV (lines 5-6) are contained within the <contactinfo> elements within the XML instance (lines 67-110). All of the contact information is typed a 'Work' related (lines 70, 86 and 102). The telephone number is given in lines 77-81, the fax number in lines 93-97 and the email address as lines 109;

- The date of birth information from the CV (line 7) is contained within the <demographics> information in the XML instance (line 111-128);

- The nationality infromation from the CV (line 8) is given as an extension to the identification element in the XML instance (lines 129-136);

- The education information from the CV (line9) is contained within the XML instance as <qcl> (lines 138-210). The PhD information is stored in lines 138-172 with the associated dates (158-171), title (line 148) and awarding institution (lines 113-118). The degree information is stored in lines 171-210 with the associated dates (lines 196-209), title (line 183) and awarding institution (lines 184-192);

- The affiliations information in the CV (lines 10-11) are contained within the <affiliation> elements in the XML instance (lines 211-320). The British Computer Society affiliation is stored in lines 211-248 with the associated classification (line 221) and date (lines 231-237). The 'IEEE' and 'ACM' affiliations are stored in lines 249-269 and 270-290 respectively. In each case only the classification is required as there are no roles or associated dates to be stored. The 'Chartered Engineer' information is stored in lines 291-320 with classification (line 301) and date (lines 321-318);

- The 'Experience …' information in the CV (line 12) is not included in the XML instance;

- The 'Primary Skills' information in the CV (lines 13-19) are contained with the <transcript> element within the XML instance (lines 321-338). This information is included within the <description> element (lines 240-247);

- The 'Detailed Job History' information from the CV (lines 20-58) is contained within the XML instance as a set of hierarchically related activities (lines 339-708). Ecah of the top level activities are defined within their own group of hierarchical <activity> elements;

- The 'Dunelm Services Limited' work experience (CV lines 22-30) is defined in lines 339-423. The core information is defined in the associated <activity> description (lines 356-364) and date (lines 349-355). The two 'Responsibilities and achievements' (CV lines 26-30) are included as sub-activities within the XML instance (lines 365-390 and 391-422 respectively). In each case the corresponding dates and descriptions are included;

- The 'University of Sheffield' work experience (CV lines 33-42) is defined in lines 424-547. The core information is defined in the associated <activity> description (lines 448-457) and dates (lines 434-447). The three 'Responsibilities and achievements' (CV lines 38-42) are included as sub-activities within the XML instance (lines 458-489, 490-521 and 522-546 respectively). In each case the corresponding dates and descriptions are included;

- The 'Hyperion Systems Limited' work experience (CV lines 43-46) is defined in lines 548-582. The core information is defined in the associated <activity> description (lines 573-581) and dates (lines 558-572);

- The 'University of Surrey' work experience (CV lines 48-49) is defined in lines 583-614. The core information is defined in the associated <activity> description (lines 607-613) and date (lines 593-606);

- The 'University of Durham' work experience (CV lines 50-53) is defined in lines 615-647. The core information is defined in the associated <activity> description (lines 625-638) and dates (lines 639-646);

- The 'Logica Limited' work experience (CV lines 54-58) is defined in lines 648-708. The core information is defined in the associated <activity> description (lines 672-674) and dates (lines 658-671). The two 'Responsibilities and achievements' (CV lines 56-58) are included as sub-activities within the XML instance (lines 675-690 and 691-707 respectively). In each case the corresponding dates and descriptions are included.

5.2   FEFC Funding Records Exchange

The following is an example of using the IMS LIP to support the exchange of funding record information.

5.2.1   The Example

The Further Education Funding Council (FEFC) within the UK is evaluating the IMS LIP to support the exchange of Individualised Student Records (ISRs). An ISR describes a student attending a particular college and is used by the FEFC to determine the amount of funding the college should receive as a result of the attendance of that student. The structure of an ISR is given in Table 5.1.

Table 5.1 ISR mapping to the IMS LIP.

Field Number	Field Name	IMS LIP Data Structures
S01	Student Data Set Reference	<identification><contentype>
S02	Student surname/family name	<identification><name>
S03	Student initials	<identification><name>
S04	Date of birth	<identification><demographics><date>
S05	Sex	<identification><demographics><gender>
S06	Home postcode	<identification><address><postcode>
S07	Country of domicile	<identification><address><country>
S08	Ethnicity	**<identification><ext_identification>**
S09	Learning difficulties and/or disabilities	**<accessibility><disability><ext_disability>**
S10A	Additional support cost	**<accessibility><eligibility><ext_eligibility>**
S11	Additional support assessment	**<accessibility><eligibility><ext_eligibility>**
S12	Destination	<activity><status>
S14A	Annual fees indicator	**<accessibility><eligibility><ext_eligibility>**
S14B	Amount of tuition fees received or expected for the student	**<accessibility><eligibility><ext_eligibility>**
S15	Reason for partial or full non-payment of tuition fees	**<accessibility><eligibility><ext_eligibility>**
S16	Major source of tuition fees	<identification><agent>
S17	Institution-specified data 1	**<learnerinformation><ext_learnerinfo>**
S18	Institution-specified data 2	**<learnerinformation><ext_learnerinfo>**
S19	GCE/GCSE boards' reference	<identification><demographics><uid>
S20	Widening participation factor	**<accessibility><eligibility><ext_eligibility>**
S21	Widening participation category	**<identification><ext_identification>**

Field Number	Field Name	IMS LIP Data Structures
S22	Status of qualification on entry data	\<transcript>
S23	Student initiative	**\<accessibility>\<eligibility>\<ext_eligibility>**
S24	Residential Accommodation	**\<identification>\<ext_identification>**
S25	Childcare	**\<accessibility>\<eligibility>\<ext_eligibility>**
S26	Disability	**\<accessibility>\<disability>\<ext_disability>**
S27	Learning difficulty	**\<accessibility>\<disability>\<ext_disability>**
S28	16-18 year old full-time funding entitlement	**\<accessibility>\<eligibility>\<ext_eligibility>**
S29	National Insurance number	\<identification>\<demographics>\<uid>
SHE01	Highest qualification on entry	\<transcript>
SHE02	A/AS level score	\<transcript>
SHE03	Nationality	**\<identification>\<ext_identification>**
SHE04	UCAS Applicant number	\<identification>\<demographics>\<uid>
SHE05	New entrant to HE	\<activity>\<status>
SHE06	Term-time accommodation	\<identification>\<address>
SHE07	Reason for Leaving	\<activity>\<status>
SHE09	Type of programme year	\<activity>\<status>
SHE10	Mode applicable to funding Council Early Statistics/HEIFES	\<activity>\<definition>
SHE11	Level applicable to funding Council HEIFES	\<activity>\<definition>
SHE12	Completion of year of programme of study	\<activity>\<status>
SHE13	Student FTE	**\<identification>\<ext_identification>**
Q01	Qualification aim data set reference	\<identification>\<contenttype>
Q02	Qualification reference code	\<activity>\<learningactivityref>
Q05	Type of tuition fees	**\<accessibility>\<eligibility>\<ext_eligibility>**
Q07A	Annual fees indicator	**\<accessibility>\<eligibility>\<ext_eligibility>**
Q07B	Amount of tuition fees received or expected for the student	**\<accessibility>\<eligibility>\<ext_eligibility>**
Q08	Reason for partial or full non-payment of tuition fees	**\<accessibility>\<eligibility>\<ext_eligibility>**
Q09	Major source of tuition fees	\<identification>\<agent>
Q10	Council or HEFCE funding	\<identification>\<agent>
Q11	Major source of funding other than tuition fees and Council/HEFCE funding	\<identification>\<agent>

Field Number	Field Name	IMS LIP Data Structures
Q12	Minor source of funding other than tuition fees and Council/HEFCE funding	\<identification>\<agent>
Q13	Franchised-out arrangements	\<identification>\<agent>
Q15	Expected guided learning hours	\<activity>\<units>
Q16	Start date	\<activity>\<date>
Q17	Expected end date	\<activity>\<date>
Q18	Actual end date	\<activity>\<date>
Q19	Completion status	\<activity>\<status>
Q20	Outcome	\<activity>\<evaluation>
Q21	Grade	\<activity>\<evaluation>
Q22	Resit	\<activity>\<status>
Q24	Institution-specified data 1	**\<learnerinformation>\<ext_learnerinfo>**
Q25	Institution specified data 2	**\<learnerinformation>\<ext_learnerinfo>**
Q26	NVQ delivery arrangement	**\<accessibility>\<eligibility>\<ext_eligibility>**
Q28	Expected end date at 1 February	\<activity>\<date>
Q29	Government initiative	\<activity>\<status>
Q30	Franchising partner	\<activity>\<learningactivityref>
Q31	Implied rate of Council partial funding for ESF in Q11	**\<accessibility>\<eligibility>\<ext_eligibility>**
Q32	Implied rate of Council partial funding for ESF in Q12	**\<accessibility>\<eligibility>\<ext_eligibility>**
Q33	APL hours	\<activity>\<units>
Q34	Delivery mode	\<activity>\<definition>
Q35	Employer role	\<identification>\<agent>
Q36	Main delivery method	\<activity>\<definition>
Q37	Actual guided learning hours	\<activity>\<units>
QHE01	Major source of tuition fees	**\<accessibility>\<eligibility>\<ext_eligibility>**
QHE02	Year of programme	\<activity>\<date>
E01	Qualification on entry data set reference	\<identification>\<contenttype>
E02	Qualification on entry reference code	\<qcl>
E03	Grade	\<qcl>
E04	Date awarded	\<qcl>

There are several ways in which the ISR can be mapped to the IMS LIP. Two examples are described (version 1 and version 2 in sub-sections 5.2.2 and 5.2.3 respectively) and the rational for the approach taken is briefly indicated at the start of each case.

5.2.2   The Instance – Version 1

In this example of the ISR mapping, the approach has been to minimise the size of the XML instance.

```
1        <!-- This is an example, of what an instance of the ISR      -->
2        <!-- would look like when using the IMS LIP framework         -->
3        <!-- with the required extensions.  This approach is          -->
4        <!-- optimised to minimise the XML instance size.             -->
5        <learnerinformation>
6            <!--***********************************************S01_Structure-->
7            <contentype>
8                <referential>
9                    <indexid>Entry</indexid>
10               </referential>
11           </contentype>
12           <!--**************************************************************-->
13           <!--*******************************Student Data Set Identification-->
14           <identification>
15               <name>
16                   <!--****************************************S02_Structure-->
17
18                   <partname>
19                       <text>Entry</text>
20                   </partname>
21                   <!--****************************************************-->
22                   <!--****************************************S03_Structure-->
23                   <partname>
24                       <text>Entry</text>
25                   </partname>
26                   <!--****************************************************-->
27               </name>
28               <demographics>
29                   <!--****************************************S05_Structure-->
30                   <gender gender="NA"/>
31                   <!--****************************************************-->
32                   <!--****************************************S04_Structure-->
33                   <date>
34                       <datetime>Entry</datetime>
35                   </date>
36                   <!--****************************************************-->
37                   <!--****************************************S19_Structure-->
38                   <uid>Entry</uid>
39                   <!--****************************************************-->
40               </demographics>
41               <address>
42                   <!--***************************************SHE06_Structure-->
43                   <street>
44                       <nonfieldedstreetaddress>Entry</nonfieldedstreetaddress>
45                   </street>
46                   <!--****************************************************-->
47                   <!--****************************************S07_Structure-->
48                   <country>Entry</country>
49                   <!--****************************************************-->
50                   <!--****************************************S06_Structure-->
51                   <postcode>Entry</postcode>
52                   <!--****************************************************-->
53               </address>
54               <!--***********************************************S16_Structure-->
55               <agent>
56                   <agentid>MajorSourceTuitionFees</agentid>
57                   <agentdomain/>
58                   <description>
59                       <short>Entry</short>
60                   </description>
61               </agent>
62               <!--********************************************************-->
63               <!--*********************************************S29_Structure-->
64               <demographics>
65                   <uid>Entry</uid>
66               </demographics>
```

```
67              <!--************************************************************-->
68              <!--*******************************************SHE04_Structure-->
69          <demographics>
70              <uid>Entry</uid>
71          </demographics>
72              <!--************************************************************-->
73          <ext_identification>
74              <!--**************************************S08_Structure-->
75              <fieldlabel>
76                  <typename>
77                      <tyvalue>Ethnicity</tyvalue>
78                  </typename>
79              </fieldlabel>
80              <fielddata>Entry</fielddata>
81              <!--*******************************************************-->
82              <!--*****************************************S21_Structure-->
83              <fieldlabel>
84                  <typename>
85                      <tyvalue>WideningParticpationCategory</tyvalue>
86                  </typename>
87              </fieldlabel>
88              <fielddata>Entry</fielddata>
89              <!--*******************************************************-->
90              <!--*****************************************S24_Structure-->
91              <fieldlabel>
92                  <typename>
93                      <tyvalue>ResidentialAccomodation</tyvalue>
94                  </typename>
95              </fieldlabel>
96              <fielddata>Entry</fielddata>
97              <!--*******************************************************-->
98              <!--*****************************************SHE03_Structure-->
99              <fieldlabel>
100                 <typename>
101                     <tyvalue>ISR_Nationality</tyvalue>
102                 </typename>
103             </fieldlabel>
104             <fielddata>Entry</fielddata>
105             <!--*******************************************************-->
106             <!--*****************************************SHE13_Structure-->
107             <fieldlabel>
108                 <typename>
109                     <tyvalue>StudentFTE</tyvalue>
110                 </typename>
111             </fieldlabel>
112             <fielddata>Entry</fielddata>
113             <!--*******************************************************-->
114         </ext_identification>
115     </identification>
116     <!--******************************Student Data Set Identification-->
117     <!--******************************Student Data Set Accessibility-->
118     <accessibility>
119         <disability>
120             <ext_disability>
121                 <!--**************************************S09_Structure-->
122                 <fieldlabel>
123                     <typename>
124                         <tyvalue>LearningDifficulties</tyvalue>
125                     </typename>
126                 </fieldlabel>
127                 <fielddata>Entry</fielddata>
128                 <!--*******************************************************-->
129                 <!--**************************************S26_Structure-->
130                 <fieldlabel>
131                     <typename>
132                         <tyvalue>Disability</tyvalue>
133                     </typename>
134                 </fieldlabel>
135                 <fielddata>Entry</fielddata>
136                 <!--*******************************************************-->
137                 <!--**************************************S27_Structure-->
```

```
138                      <fieldlabel>
139                          <typename>
140                              <tyvalue>LearningDifficulties</tyvalue>
141                          </typename>
142                      </fieldlabel>
143                      <fielddata>Entry</fielddata>
144                      <!--**************************************************-->
145                  </ext_disability>
146              </disability>
147              <eligibility>
148                  <ext_eligibility>
149                      <!--*********************************S10A_Structure-->
150                      <fieldlabel>
151                          <typename>
152                              <tyvalue>AdditionalSupportCost</tyvalue>
153                          </typename>
154                      </fieldlabel>
155                      <fielddata>Entry</fielddata>
156                      <!--**************************************************-->
157                      <!--**********************************S11_Structure-->
158                      <fieldlabel>
159                          <typename>
160                              <tyvalue>AdditionalSupportElement</tyvalue>
161                          </typename>
162                      </fieldlabel>
163                      <fielddata>Entry</fielddata>
164                      <!--**************************************************-->
165                      <!--*********************************S14A_Structure-->
166                      <fieldlabel>
167                          <typename>
168                              <tyvalue>AnnualfeesIndicator</tyvalue>
169                          </typename>
170                      </fieldlabel>
171                      <fielddata>Entry</fielddata>
172                      <!--**************************************************-->
173                      <!--*********************************S14B_Structure-->
174                      <fieldlabel>
175                          <typename>
176                              <tyvalue>AmountofTuitionFees</tyvalue>
177                          </typename>
178                      </fieldlabel>
179                      <fielddata>Entry</fielddata>
180                      <!--**************************************************-->
181                      <!--**********************************S15_Structure-->
182                      <fieldlabel>
183                          <typename>
184                              <tyvalue>NonPaymentofTuitionFees</tyvalue>
185                          </typename>
186                      </fieldlabel>
187                      <fielddata>Entry</fielddata>
188                      <!--**************************************************-->
189                      <!--**********************************S20_Structure-->
190                      <fieldlabel>
191                          <typename>
192                              <tyvalue>WideningParticpationFactor</tyvalue>
193                          </typename>
194                      </fieldlabel>
195                      <fielddata>Entry</fielddata>
196                      <!--**************************************************-->
197                      <!--**********************************S23_Structure-->
198                      <fieldlabel>
199                          <typename>
200                              <tyvalue>StudentInitiative</tyvalue>
201                          </typename>
202                      </fieldlabel>
203                      <fielddata>Entry</fielddata>
204                      <!--**************************************************-->
205                      <!--**********************************S25_Structure-->
206                      <fieldlabel>
207                          <typename>
208                              <tyvalue>Childcare</tyvalue>
```

```
209                         </typename>
210                     </fieldlabel>
211                     <fielddata>Entry</fielddata>
212                     <!--**************************************************-->
213                     <!--*************************************S28_Structure-->
214                     <fieldlabel>
215                         <typename>
216                             <tyvalue>16-18FundingEntitlement</tyvalue>
217                         </typename>
218                     </fieldlabel>
219                     <fielddata>Entry</fielddata>
220                     <!--**************************************************-->
221                 </ext_eligibility>
222             </eligibility>
223         </accessibility>
234         <!--*****************************Student Data Set Accessibility-->
235         <!--***********************************Student Data Set Activity-->
236         <activity>
237             <!--*********************************************S12_Structure-->
238             <status>
239                 <description>
240                     <short>Entry</short>
241                 </description>
242             </status>
243             <!--**************************************************************-->
244             <!--********************************************SHE10_Structure-->
245             <definition>
246                 <description>
247                     <short>Entry</short>
248                 </description>
249             </definition>
250             <!--**************************************************************-->
251             <!--********************************************SHE11_Structure-->
252             <definition>
253                 <description>
254                     <short>Entry</short>
255                 </description>
256             </definition>
257             <!--**************************************************************-->
258             <!--********************************************SHE05_Structure-->
259             <activity>
260                 <status>
261                     <description>
262                         <short>Entry</short>
263                     </description>
264                 </status>
265             </activity>
266             <!--**************************************************************-->
267             <!--********************************************SHE07_Structure-->
268             <activity>
269                 <status>
270                     <description>
271                         <short>Entry</short>
272                     </description>
273                 </status>
274             </activity>
275             <!--**************************************************************-->
276             <!--********************************************SHE09_Structure-->
277             <activity>
278                 <status>
279                     <description>
280                         <short>Entry</short>
281                     </description>
282                 </status>
283             </activity>
284             <!--**************************************************************-->
285             <!--********************************************SHE12_Structure-->
286             <activity>
287                 <status>
288                     <description>
289                         <short>Entry</short>
```

```
290              </description>
291            </status>
292          </activity>
293          <!--*************************************************************-->
294        </activity>
295        <!--*************************************Student Data Set Activity-->
296        <!--************************************************S22_Structure-->
297        <transcript>
298          <exrefrecord>
299            <recformat/>
300            <recdata>Entry</recdata>
301          </exrefrecord>
302        </transcript>
303        <!--*************************************************************-->
304        <!--**********************************************SHE01_Structure-->
305        <transcript>
306          <exrefrecord>
307            <recformat/>
308            <recdata>Entry</recdata>
309          </exrefrecord>
310        </transcript>
311        <!--*************************************************************-->
312        <!--**********************************************SHE02_Structure-->
313        <transcript>
314          <exrefrecord>
315            <recformat/>
316            <recdata>Entry</recdata>
317          </exrefrecord>
318        </transcript>
319        <!--*************************************************************-->
320        <!--****************************Student Data Set ext_learnerinfo-->
321        <ext_learnerinfo>
322          <!--**********************************************S17_Structure-->
323          <fieldlabel>
324            <typename>
325              <tyvalue>S17_Structure</tyvalue>
326            </typename>
327          </fieldlabel>
328          <fielddata>Entry</fielddata>
329          <!--*********************************************************-->
330          <!--**********************************************S18_Structure-->
331          <fieldlabel>
332            <typename>
333              <tyvalue>S18_Structure</tyvalue>
334            </typename>
335          </fieldlabel>
336          <fielddata>Entry</fielddata>
337          <!--*********************************************************-->
338        </ext_learnerinfo>
339        <!--****************************Student Data Set ext_learnerinfo-->
340        <!--*********************Qualification Aim Data Set Identification-->
341        <identification>
342          <!--**********************************************Q01_Structure-->
343          <contentype>
344            <referential>
345              <indexid>Entry</indexid>
346            </referential>
347          </contentype>
348          <!--*********************************************************-->
349          <!--**********************************************Q09_Structure-->
350          <agent>
351            <agentid>MajorSourceTuitionFees</agentid>
352            <agentdomain/>
353            <description>
354              <short>Entry</short>
355            </description>
356          </agent>
357          <!--*********************************************************-->
358          <!--**********************************************Q10_Structure-->
359          <agent>
360            <agentid>CouncilorHEFCEFunding</agentid>
```

```
361              <agentdomain/>
362              <description>
363                  <short>Entry</short>
364              </description>
365          </agent>
366          <!--**************************************************************-->
367          <!--*********************************************Q11_Structure-->
368          <agent>
369              <agentid>MajorSourceOtherthanTuitionFees</agentid>
370              <agentdomain/>
371              <description>
372                  <short>Entry</short>
373              </description>
374          </agent>
375          <!--**************************************************************-->
376          <!--*********************************************Q12_Structure-->
377          <agent>
378              <agentid>MinorSourceOtherthanTuitionFees</agentid>
379              <agentdomain/>
380              <description>
381                  <short>Entry</short>
382              </description>
383          </agent>
384          <!--**************************************************************-->
385          <!--*********************************************Q13_Structure-->
386          <agent>
387              <agentid>FranchisedOutArrangements</agentid>
388              <agentdomain/>
389              <description>
390                  <short>Entry</short>
391              </description>
392          </agent>
393          <!--**************************************************************-->
394          <!--*********************************************Q35_Structure-->
395          <agent>
396              <agentid>EmployerRole</agentid>
397              <agentdomain/>
398              <description>
399                  <short>Entry</short>
400              </description>
401          </agent>
402          <!--**************************************************************-->
403      </identification>
404      <!--*********************Qualification Aim Data Set Identification-->
405      <!--*********************Qualification Aim Data Set Accessibility-->
406      <accessibility>
407          <eligibility>
408              <ext_eligibility>
409                  <!--************************************Q05_Structure-->
410                  <fieldlabel>
411                      <typename>
412                          <tyvalue>TypeofTuitionFees</tyvalue>
413                      </typename>
414                  </fieldlabel>
415                  <fielddata>Entry</fielddata>
416                  <!--****************************************************-->
417                  <!--***********************************Q07A_Structure-->
418                  <fieldlabel>
419                      <typename>
420                          <tyvalue>ISR_AnnualFeesIndicator</tyvalue>
421                      </typename>
422                  </fieldlabel>
423                  <fielddata>Entry</fielddata>
424                  <!--****************************************************-->
425                  <!--***********************************Q07B_Structure-->
426                  <fieldlabel>
427                      <typename>
428                          <tyvalue>ISR_TuitionFees</tyvalue>
429                      </typename>
430                  </fieldlabel>
431                  <fielddata>Entry</fielddata>
```

```
432                          <!--***************************************************-->
433                          <!--****************************************Q08_Structure-->
434                     <fieldlabel>
435                         <typename>
436                             <tyvalue>NonpaymentofTuitionFees</tyvalue>
437                         </typename>
438                     </fieldlabel>
439                     <fielddata>Entry</fielddata>
440                          <!--***************************************************-->
441                          <!--****************************************Q26_Structure-->
442                     <fieldlabel>
443                         <typename>
444                             <tyvalue>NVQDeliveryArrangement</tyvalue>
445                         </typename>
446                     </fieldlabel>
447                     <fielddata>Entry</fielddata>
448                          <!--***************************************************-->
449                          <!--****************************************Q31_Structure-->
450                     <fieldlabel>
451                         <typename>
452                             <tyvalue>ImpliedRateforESFinQ11</tyvalue>
453                         </typename>
454                     </fieldlabel>
455                     <fielddata>Entry</fielddata>
456                          <!--***************************************************-->
457                          <!--****************************************Q32_Structure-->
458                     <fieldlabel>
459                         <typename>
460                             <tyvalue>ImpliedRateforESFinQ12</tyvalue>
461                         </typename>
462                     </fieldlabel>
463                     <fielddata>Entry</fielddata>
464                          <!--***************************************************-->
465                          <!--****************************************QHE01_Structure-->
466                     <fieldlabel>
467                         <typename>
368                             <tyvalue>ISR_TuitionFees</tyvalue>
469                         </typename>
470                     </fieldlabel>
471                     <fielddata>Entry</fielddata>
472                          <!--***************************************************-->
473                 </ext_eligibility>
474             </eligibility>
475         </accessibility>
476         <!--**********************Qualification Aim Data Set Accessibility-->
477         <!--**********************Qualification Aim Data Set Activity-->
478         <activity>
479             <!--***********************************************Q16_Structure-->
480             <date>
481                 <datetime>Entry</datetime>
482             </date>
483             <!--***********************************************************-->
484             <!--***********************************************Q17_Structure-->
485             <date>
486                 <datetime>Entry</datetime>
487             </date>
488             <!--***********************************************************-->
489             <!--***********************************************Q18_Structure-->
490             <date>
491                 <datetime>Entry</datetime>
492             </date>
493             <!--***********************************************************-->
493             <!--***********************************************Q28_Structure-->
495             <date>
496                 <datetime>Entry</datetime>
497             </date>
498             <!--***********************************************************-->
499             <!--***********************************************QHE02_Structure-->
500             <date>
501                 <datetime>Entry</datetime>
502             </date>
```

```
503            <!--***********************************************************-->
504            <!--*******************************************Q19_Structure-->
505            <status>
506                <description>
507                    <short>Entry</short>
508                </description>
509            </status>
510            <!--***********************************************************-->
511            <!--*******************************************Q15_Structure-->
512            <units>
513                <unitsfield>
514                    <fieldlabel>
515                        <typename>
516                            <tyvalue>ExpectedGuidedLearningHours</tyvalue>
517                        </typename>
518                    </fieldlabel>
519                    <fielddata>Entry</fielddata>
520                </unitsfield>
521            </units>
522            <!--***********************************************************-->
523            <!--*******************************************Q02_Structure-->
524            <learningactivityref>
525                <text>Entry</text>
526            </learningactivityref>
527            <!--***********************************************************-->
528            <!--*******************************************Q20_Structure-->
529            <evaluation>
530                <result>
531                    <score>
532                        <fieldlabel>
533                            <typename>
534                                <tyvalue>Outcome</tyvalue>
535                            </typename>
536                        </fieldlabel>
537                        <fielddata>Entry</fielddata>
538                    </score>
539                </result>
540            </evaluation>
541            <!--***********************************************************-->
542            <!--*******************************************Q21_Structure-->
543            <evaluation>
544                <result>
545                    <score>
546                        <fieldlabel>
547                            <typename>
548                                <tyvalue>Grade</tyvalue>
549                            </typename>
550                        </fieldlabel>
551                        <fielddata>Entry</fielddata>
552                    </score>
553                </result>
554            </evaluation>
556            <!--***********************************************************-->
557            <!--*******************************************Q22_Structure-->
558            <evaluation>
559                <status>
560                    <description>
561                        <short>Entry</short>
562                    </description>
563                </status>
564            </evaluation>
565            <!--***********************************************************-->
566            <!--*******************************************Q29_Structure-->
567            <evaluation>
568                <status>
569                    <description>
570                        <short>Entry</short>
571                    </description>
572                </status>
573            </evaluation>
574            <!--***********************************************************-->
```

```
575              <!--**********************************************Q30_Structure-->
576              <learningactivityref>
577                 <text>Entry</text>
578              </learningactivityref>
579              <!--**********************************************************-->
580              <!--**********************************************Q34_Structure-->
581              <definition>
582                 <description>
583                    <short>Entry</short>
584                 </description>
585              </definition>
586              <!--**********************************************************-->
587              <!--**********************************************Q36_Structure-->
588              <definition>
589                 <description>
590                    <short>Entry</short>
591                 </description>
592              </definition>
593              <!--**********************************************************-->
594              <!--**********************************************Q33_Structure-->
595              <activity>
596                 <units>
597                    <unitsfield>
598                       <fieldlabel>
599                          <typename>
600                             <tyvalue>APLHours</tyvalue>
601                          </typename>
602                       </fieldlabel>
603                       <fielddata>Entry</fielddata>
604                    </unitsfield>
605                 </units>
606              </activity>
607              <!--**********************************************************-->
608              <!--**********************************************Q37_Structure-->
609              <activity>
610                 <units>
611                    <unitsfield>
612                       <fieldlabel>
613                          <typename>
614                             <tyvalue>ActualGuidedLearningHours</tyvalue>
615                          </typename>
616                       </fieldlabel>
617                       <fielddata>Entry</fielddata>
618                    </unitsfield>
619                 </units>
620              </activity>
621              <!--**********************************************************-->
622           </activity>
623           <!--***************************Qualification Aim Data Set Activity-->
624           <!--************************Qualification Aim Data ext_learnerinfo-->
625           <ext_learnerinfo>
626              <!--**********************************************Q24_Structure-->
627              <fieldlabel>
628                 <typename>
629                    <tyvalue>Q24_Structure</tyvalue>
630                 </typename>
631              </fieldlabel>
632              <fielddata>Entry</fielddata>
633              <!--**********************************************************-->
634              <!--**********************************************Q25_Structure-->
635              <fieldlabel>
636                 <typename>
637                    <tyvalue>Q25_Structure</tyvalue>
638                 </typename>
639              </fieldlabel>
640              <fielddata>Entry</fielddata>
641              <!--**********************************************************-->
642           </ext_learnerinfo>
643           <!--************************Qualification Aim Data ext_learnerinfo-->
644           <!--****************************Qualification on Entry Data Set QCL-->
645           <qcl>
```

```
646              <!--**********************************************E01_Structure-->
647              <contentype>
648                  <referential>
649                      <indexid>Entry</indexid>
650                  </referential>
651              </contentype>
652              <!--***********************************************************-->
653              <!--**********************************************E02_Structure-->
654              <registrationno>Entry</registrationno>
655              <!--***********************************************************-->
656              <!--**********************************************E03_Structure-->
657              <level>
658                  <text>Entry</text>
659              </level>
660              <!--***********************************************************-->
661              <!--**********************************************E04_Structure-->
662              <date>
663                  <datetime>Entry</datetime>
664              </date>
665              <!--***********************************************************-->
666          </qcl>
667          <!--***************************Qualification on Entry Data Set QCL-->
668      </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Advanced/isrmapv1_001/isrmapv1_001.xml

5.2.3   The Instance – Version 2

In this example of the ISR mapping, the approach has been to ensure that the sequence of the ISR fields is maintained as per the ISR specification. This takes advantage of the LIP's ability to have multiple instances of each type which can be used in any order. Thus each of the ISRs fields is mapped onto the Information Model's top level types. The trade-off of maintaining the sequence of the ISR fields is that the resulting XML instance is longer.

```
1        <!-- This is an example, of what an instance of the ISR    -->
2        <!-- would look like when using the IMS LIP framework       -->
3        <!-- with the required extensions.  This approach is        -->
4        <!-- optimised for sequential parsing of the database.      -->
5        <learnerinformation>
6            <!--**********************************************S01_Structure-->
7            <contentype>
8                <referential>
9                    <indexid>Entry</indexid>
10               </referential>
11           </contentype>
12           <!--***********************************************************-->
13           <!--**********************************************S02_Structure-->
14           <identification>
16               <name>
17                   <partname>
18                       <text>Entry</text>
19                   </partname>
20               </name>
21           </identification>
22           <!--***********************************************************-->
23           <!--**********************************************S03_Structure-->
24           <identification>
25               <name>
26                   <partname>
27                       <text>Entry</text>
28                   </partname>
29               </name>
30           </identification>
31           <!--***********************************************************-->
32           <!--**********************************************S04_Structure-->
33           <identification>
34               <demographics>
35                   <date>
36                       <datetime>Entry</datetime>
```

```
37                    </date>
38                </demographics>
39            </identification>
40        <!--****************************************************************-->
41        <!--************************************************S05_Structure-->
42        <identification>
43            <demographics>
44                <gender gender="NA"/>
45            </demographics>
46        </identification>
47        <!--****************************************************************-->
48        <!--************************************************S06_Structure-->
49        <identification>
50            <address>
51                <postcode>Entry</postcode>
52            </address>
53        </identification>
54        <!--****************************************************************-->
55        <!--************************************************S07_Structure-->
56        <identification>
57            <address>
58                <country>Entry</country>
59            </address>
60        </identification>
61        <!--****************************************************************-->
62        <!--************************************************S08_Structure-->
63        <identification>
64            <ext_identification>
65                <fieldlabel>
66                    <typename>
67                        <tyvalue>Ethnicity</tyvalue>
68                    </typename>
69                </fieldlabel>
70                <fielddata>Entry</fielddata>
71            </ext_identification>
72        </identification>
73        <!--****************************************************************-->
74        <!--************************************************S09_Structure-->
75        <accessibility>
76            <disability>
77                <ext_disability>
78                    <fieldlabel>
79                        <typename>
80                            <tyvalue>ISR_learndifficulty</tyvalue>
81                        </typename>
82                    </fieldlabel>
83                    <fielddata>Entry</fielddata>
84                </ext_disability>
85            </disability>
86        </accessibility>
87        <!--****************************************************************-->
88        <!--************************************************S10A_Structure-->
89        <accessibility>
90            <eligibility>
91                <ext_eligibility>
92                    <fieldlabel>
93                        <typename>
94                            <tyvalue>AdditionalSupportCost</tyvalue>
95                        </typename>
96                    </fieldlabel>
97                    <fielddata>Entry</fielddata>
98                </ext_eligibility>
99            </eligibility>
100        </accessibility>
101        <!--****************************************************************-->
102        <!--************************************************S11_Structure-->
103        <accessibility>
104            <eligibility>
105                <ext_eligibility>
106                    <fieldlabel>
107                        <typename>
```

```
108                         <tyvalue>AdditionalSupportAssessment</tyvalue>
109                     </typename>
110                 </fieldlabel>
111                 <fielddata>Entry</fielddata>
112             </ext_eligibility>
113         </eligibility>
114     </accessibility>
115     <!--**************************************************************-->
116     <!--*************************************************S12_Structure-->
117     <activity>
118         <status>
119             <description>
120                 <short>Destination</short>
121             </description>
122         </status>
123     </activity>
124     <!--**************************************************************-->
125     <!--************************************************S14A_Structure-->
126     <accessibility>
127         <eligibility>
128             <ext_eligibility>
129                 <fieldlabel>
130                     <typename>
131                         <tyvalue>ISR_Annualfeesindicator</tyvalue>
132                     </typename>
133                 </fieldlabel>
134                 <fielddata>Entry</fielddata>
135             </ext_eligibility>
136         </eligibility>
137     </accessibility>
138     <!--**************************************************************-->
139     <!--************************************************S14B_Structure-->
140     <accessibility>
141         <eligibility>
142             <ext_eligibility>
143                 <fieldlabel>
144                     <typename>
145                         <tyvalue>ISR_Tuitionfees</tyvalue>
146                     </typename>
147                 </fieldlabel>
148                 <fielddata>Entry</fielddata>
149             </ext_eligibility>
150         </eligibility>
151     </accessibility>
152     <!--**************************************************************-->
153     <!--*************************************************S15_Structure-->
154     <accessibility>
155         <eligibility>
156             <ext_eligibility>
157                 <fieldlabel>
158                     <typename>
159                         <tyvalue>NonPaymentofTuitionFees</tyvalue>
160                     </typename>
161                 </fieldlabel>
162                 <fielddata>Entry</fielddata>
163             </ext_eligibility>
164         </eligibility>
165     </accessibility>
166     <!--**************************************************************-->
167     <!--*************************************************S16_Structure-->
168     <identification>
169         <agent>
170             <agentid>MajorSourceTuitionFees</agentid>
171             <agentdomain/>
172             <description>
173                 <short>Entry</short>
174             </description>
175         </agent>
176     </identification>
177     <!--**************************************************************-->
178     <!--*************************************************S17_Structure-->
```

```
179        <ext_learnerinfo>
180            <fieldlabel>
181                <typename>
182                    <tyvalue>ISR_Instspecificdataset</tyvalue>
183                </typename>
184            </fieldlabel>
185            <fielddata>Entry</fielddata>
186        </ext_learnerinfo>
187        <!--*************************************************************-->
188        <!--*************************************************S18_Structure-->
189        <ext_learnerinfo>
190            <fieldlabel>
191                <typename>
192                    <tyvalue>ISR_Instspecificdataset</tyvalue>
193                </typename>
194            </fieldlabel>
195            <fielddata>Entry</fielddata>
196        </ext_learnerinfo>
197        <!--*************************************************************-->
198        <!--*************************************************S19_Structure-->
199        <identification>
200            <demographics>
201                <uid>Entry</uid>
202            </demographics>
203        </identification>
204        <!--*************************************************************-->
205        <!--*************************************************S20_Structure-->
206        <accessibility>
207            <eligibility>
208                <ext_eligibility>
209                    <fieldlabel>
210                        <typename>
211                            <tyvalue>WideningParticipationFactor</tyvalue>
212                        </typename>
213                    </fieldlabel>
214                    <fielddata>Entry</fielddata>
215                </ext_eligibility>
216            </eligibility>
217        </accessibility>
218        <!--*************************************************************-->
219        <!--*************************************************S21_Structure-->
220        <identification>
221            <ext_identification>
222                <fieldlabel>
223                    <typename>
234                        <tyvalue>WideningParticipationCategory</tyvalue>
235                    </typename>
236                </fieldlabel>
237                <fielddata>Entry</fielddata>
238            </ext_identification>
239        </identification>
240        <!--*************************************************************-->
241        <!--*************************************************S22_Structure-->
242        <transcript>
243            <exrefrecord>
244                <recformat/>
245                <recdata>Entry</recdata>
246            </exrefrecord>
247        </transcript>
248        <!--*************************************************************-->
249        <!--*************************************************S23_Structure-->
250        <accessibility>
251            <eligibility>
252                <ext_eligibility>
253                    <fieldlabel>
254                        <typename>
255                            <tyvalue>StudentInitiative</tyvalue>
256                        </typename>
257                    </fieldlabel>
258                    <fielddata>Entry</fielddata>
259                </ext_eligibility>
```

```
260                </eligibility>
261            </accessibility>
262        <!--****************************************************************-->
263        <!--*************************************************S24_Structure-->
264        <identification>
265            <ext_identification>
266                <fieldlabel>
267                    <typename>
268                        <tyvalue>ResidentialAccomodation</tyvalue>
269                    </typename>
270                </fieldlabel>
271                <fielddata>Entry</fielddata>
272            </ext_identification>
273        </identification>
274        <!--****************************************************************-->
275        <!--*************************************************S25_Structure-->
276        <accessibility>
277            <eligibility>
278                <ext_eligibility>
279                    <fieldlabel>
280                        <typename>
281                            <tyvalue>Childcare</tyvalue>
282                        </typename>
283                    </fieldlabel>
284                    <fielddata>Entry</fielddata>
285                </ext_eligibility>
286            </eligibility>
287        </accessibility>
288        <!--****************************************************************-->
289        <!--*************************************************S26_Structure-->
290        <accessibility>
291            <disability>
292                <ext_disability>
293                    <fieldlabel>
294                        <typename>
295                            <tyvalue>ISR_Disability</tyvalue>
296                        </typename>
297                    </fieldlabel>
298                    <fielddata>Entry</fielddata>
299                </ext_disability>
300            </disability>
301        </accessibility>
302        <!--****************************************************************-->
303        <!--*************************************************S27_Structure-->
304        <accessibility>
305            <disability>
306                <ext_disability>
307                    <fieldlabel>
308                        <typename>
309                            <tyvalue>ISR_Learnerdifficulty</tyvalue>
310                        </typename>
311                    </fieldlabel>
312                    <fielddata>Entry</fielddata>
313                </ext_disability>
314            </disability>
315        </accessibility>
316        <!--****************************************************************-->
317        <!--*************************************************S28_Structure-->
318        <accessibility>
319            <eligibility>
320                <ext_eligibility>
321                    <fieldlabel>
322                        <typename>
323                            <tyvalue>16-18YearOldFullTimeFundingEntitlement</tyvalue>
324                        </typename>
325                    </fieldlabel>
326                    <fielddata>Entry</fielddata>
327                </ext_eligibility>
328            </eligibility>
329        </accessibility>
330        <!--****************************************************************-->
```

```
331          <!--****************************************************S29_Structure-->
332          <identification>
333              <demographics>
334                  <uid>Entry</uid>
335              </demographics>
336          </identification>
337          <!--*************************************************************-->
338          <!--*************************************************SHE01_Structure-->
339          <transcript>
340              <exrefrecord>
341                  <recformat/>
342                  <recdata>Entry</recdata>
343              </exrefrecord>
344          </transcript>
345          <!--*************************************************************-->
346          <!--*************************************************SHE02_Structure-->
347          <transcript>
348              <exrefrecord>
349                  <recformat/>
350                  <recdata>Entry</recdata>
351              </exrefrecord>
352          </transcript>
353          <!--*************************************************************-->
354          <!--*************************************************SHE03_Structure-->
355          <identification>
356              <ext_identification>
357                  <fieldlabel>
358                      <typename>
359                          <tyvalue>ISR_Nationality</tyvalue>
360                      </typename>
361                  </fieldlabel>
362                  <fielddata>Entry</fielddata>
363              </ext_identification>
364          </identification>
365          <!--*************************************************************-->
366          <!--*************************************************SHE04_Structure-->
367          <identification>
368              <demographics>
369                  <uid>Entry</uid>
370              </demographics>
371          </identification>
372          <!--*************************************************************-->
373          <!--*************************************************SHE05_Structure-->
374          <activity>
375              <status>
376                  <description>
377                      <short>Entry</short>
378                  </description>
379              </status>
380          </activity>
381          <!--*************************************************************-->
382          <!--*************************************************SHE06_Structure-->
383          <identification>
384              <address>
385                  <street>
386                      <nonfieldedstreetaddress>Entry</nonfieldedstreetaddress>
387                  </street>
388              </address>
389          </identification>
390          <!--*************************************************************-->
391          <!--*************************************************SHE07_Structure-->
392          <activity>
393              <status>
394                  <description>
395                      <short>Entry</short>
396                  </description>
397              </status>
398          </activity>
399          <!--*************************************************************-->
400          <!--*************************************************SHE09_Structure-->
401          <activity>
```

```
402            <status>
403                <description>
404                    <short>Entry</short>
405                </description>
406            </status>
407        </activity>
408        <!--*****************************************************************-->
409        <!--*********************************************SHE10_Structure-->
410        <activity>
411            <definition>
412                <description>
413                    <short>Entry</short>
414                </description>
415            </definition>
416        </activity>
417        <!--*****************************************************************-->
418        <!--*********************************************SHE11_Structure-->
419        <activity>
420            <definition>
412                <description>
422                    <short>Entry</short>
423                </description>
424            </definition>
425        </activity>
426        <!--*****************************************************************-->
427        <!--*********************************************SHE12_Structure-->
428        <activity>
429            <status>
430                <description>
431                    <short>Entry</short>
432                </description>
433            </status>
434        </activity>
435        <!--*****************************************************************-->
436        <!--*********************************************SHE13_Structure-->
437        <identification>
438            <ext_identification>
439                <fieldlabel>
440                    <typename>
441                        <tyvalue>ISR_FTE</tyvalue>
442                    </typename>
443                </fieldlabel>
444                <fielddata>Entry</fielddata>
445            </ext_identification>
446        </identification>
447        <!--*****************************************************************-->
448        <!--*********************************************Q01_Structure-->
449        <identification>
450            <contentype>
451                <referential>
452                    <indexid>Entry</indexid>
453                </referential>
454            </contentype>
455        </identification>
456        <!--*****************************************************************-->
457        <!--*********************************************Q02_Structure-->
458        <activity>
459            <learningactivityref>
460                <sourcedid>
461                    <source>FEFCISR</source>
462                    <id>Entry</id>
463                </sourcedid>
464            </learningactivityref>
465        </activity>
466        <!--*****************************************************************-->
467        <!--*********************************************Q05_Structure-->
468        <accessibility>
469            <eligibility>
470                <ext_eligibility>
471                    <fieldlabel>
472                        <typename>
```

```
473                        <tyvalue>TypeofTuitionFees</tyvalue>
474                    </typename>
475                </fieldlabel>
476                <fielddata>Entry</fielddata>
477            </ext_eligibility>
478        </eligibility>
479    </accessibility>
480    <!--****************************************************************-->
481    <!--*********************************************Q07A_Structure-->
482    <accessibility>
483        <eligibility>
483            <ext_eligibility>
485                <fieldlabel>
486                    <typename>
487                        <tyvalue>ISR_AnnualFeesIndicator</tyvalue>
488                    </typename>
489                </fieldlabel>
490                <fielddata>Entry</fielddata>
491            </ext_eligibility>
492        </eligibility>
493    </accessibility>
494    <!--****************************************************************-->
495    <!--*********************************************Q07B_Structure-->
496    <accessibility>
497        <eligibility>
498            <ext_eligibility>
499                <fieldlabel>
500                    <typename>
501                        <tyvalue>ISR_TuitionFees</tyvalue>
502                    </typename>
503                </fieldlabel>
504                <fielddata>Entry</fielddata>
505            </ext_eligibility>
506        </eligibility>
507    </accessibility>
508    <!--****************************************************************-->
509    <!--**********************************************Q08_Structure-->
510    <accessibility>
511        <eligibility>
512            <ext_eligibility>
513                <fieldlabel>
514                    <typename>
515                        <tyvalue>NonpaymentofTuitionFees</tyvalue>
516                    </typename>
517                </fieldlabel>
518                <fielddata>Entry</fielddata>
519            </ext_eligibility>
520        </eligibility>
521    </accessibility>
522    <!--****************************************************************-->
523    <!--***********************************************Q09_Structure-->
524    <identification>
525        <agent>
526            <agentid>MajorSourceTuitionFees</agentid>
527            <agentdomain/>
528            <description>
529                <short>Entry</short>
530            </description>
531        </agent>
532    </identification>
533    <!--****************************************************************-->
534    <!--***********************************************Q10_Structure-->
535    <identification>
536        <agent>
537            <agentid>CouncilorHEFCEFunding</agentid>
538            <agentdomain/>
539            <description>
540                <short>Entry</short>
541            </description>
542        </agent>
543    </identification>
```

```
544          <!--****************************************************************-->
545          <!--***************************************************Q11_Structure-->
546          <identification>
547              <agent>
548                  <agentid>MajorSourceOtherthanTuitionFees</agentid>
549                  <agentdomain/>
550                  <description>
551                      <short>Entry</short>
552                  </description>
553              </agent>
554          </identification>
556          <!--****************************************************************-->
557          <!--***************************************************Q12_Structure-->
558          <identification>
559              <agent>
560                  <agentid>MinorSourceOtherthanTuitionFees</agentid>
561                  <agentdomain/>
562                  <description>
563                      <short>Entry</short>
564                  </description>
565              </agent>
566          </identification>
567          <!--****************************************************************-->
568          <!--***************************************************Q13_Structure-->
569          <identification>
570              <agent>
571                  <agentid>FranchisedOutArrangements</agentid>
572                  <agentdomain/>
573                  <description>
574                      <short>Entry</short>
575                  </description>
576              </agent>
577          </identification>
578          <!--****************************************************************-->
579          <!--***************************************************Q15_Structure-->
580          <activity>
581              <units>
582                  <unitsfield>
583                      <fieldlabel>
584                          <typename>
585                              <tyvalue>ExpectedGuidedLearningHours</tyvalue>
586                          </typename>
587                      </fieldlabel>
588                      <fielddata>Entry</fielddata>
589                  </unitsfield>
590              </units>
591          </activity>
592          <!--****************************************************************-->
593          <!--***************************************************Q16_Structure-->
594          <activity>
595              <date>
596                  <datetime>Entry</datetime>
597              </date>
598          </activity>
599          <!--****************************************************************-->
600          <!--***************************************************Q17_Structure-->
601          <activity>
602              <date>
603                  <datetime>Entry</datetime>
604              </date>
605          </activity>
606          <!--****************************************************************-->
607          <!--***************************************************Q18_Structure-->
608          <activity>
609              <date>
610                  <datetime>Entry</datetime>
611              </date>
612          </activity>
613          <!--****************************************************************-->
614          <!--***************************************************Q19_Structure-->
615          <activity>
```

```
616              <status>
617                  <description>
618                      <short>Entry</short>
619                  </description>
620              </status>
621          </activity>
622          <!--*****************************************************************-->
623          <!--*********************************************Q20_Structure-->
624          <activity>
625              <evaluation>
626                  <result>
627                      <score>
628                          <fieldlabel>
629                              <typename>
630                                  <tyvalue>Outcome</tyvalue>
631                              </typename>
632                          </fieldlabel>
633                          <fielddata>Entry</fielddata>
634                      </score>
635                  </result>
636              </evaluation>
637          </activity>
638          <!--*****************************************************************-->
639          <!--*********************************************Q21_Structure-->
640          <activity>
641              <evaluation>
642                  <result>
643                      <score>
644                          <fieldlabel>
645                              <typename>
646                                  <tyvalue>Grade</tyvalue>
647                              </typename>
648                          </fieldlabel>
649                          <fielddata>Entry</fielddata>
650                      </score>
651                  </result>
652              </evaluation>
653          </activity>
654          <!--*****************************************************************-->
655          <!--*********************************************Q22_Structure-->
656          <activity>
657              <evaluation>
658                  <status>
659                      <description>
660                          <short>Entry</short>
661                      </description>
662                  </status>
663              </evaluation>
664          </activity>
665          <!--*****************************************************************-->
666          <!--*********************************************Q24_Structure-->
667          <ext_learnerinfo>
668              <fieldlabel>
669                  <typename>
670                      <tyvalue>ISR_Instspecificdataset</tyvalue>
671                  </typename>
672              </fieldlabel>
673              <fielddata>Entry</fielddata>
674          </ext_learnerinfo>
675          <!--*****************************************************************-->
676          <!--*********************************************Q25_Structure-->
678          <ext_learnerinfo>
679              <fieldlabel>
680                  <typename>
681                      <tyvalue>ISR_Instspecificdataset</tyvalue>
682                  </typename>
683              </fieldlabel>
684              <fielddata>Entry</fielddata>
685          </ext_learnerinfo>
686          <!--*****************************************************************-->
687          <!--*********************************************Q26_Structure-->
```

```
688          <accessibility>
689              <eligibility>
690                  <ext_eligibility>
691                      <fieldlabel>
692                          <typename>
693                              <tyvalue>NVQDeliveryArrangement</tyvalue>
694                          </typename>
695                      </fieldlabel>
696                      <fielddata>Entry</fielddata>
697                  </ext_eligibility>
698              </eligibility>
699          </accessibility>
700          <!--************************************************************-->
701          <!--*************************************************Q28_Structure-->
702          <activity>
703              <date>
704                  <datetime>Entry</datetime>
705              </date>
706          </activity>
707          <!--************************************************************-->
708          <!--*************************************************Q29_Structure-->
709          <activity>
710              <evaluation>
711                  <status>
712                      <description>
713                          <short>Entry</short>
714                      </description>
715                  </status>
716              </evaluation>
717          </activity>
718          <!--************************************************************-->
719          <!--*************************************************Q30_Structure-->
720          <activity>
721              <learningactivityref>
722                  <sourcedid>
723                      <source>FEFCISR</source>
724                      <id>Entry</id>
725                  </sourcedid>
726              </learningactivityref>
727          </activity>
728          <!--************************************************************-->
729          <!--*************************************************Q31_Structure-->
730          <accessibility>
731              <eligibility>
732                  <ext_eligibility>
733                      <fieldlabel>
734                          <typename>
375                              <tyvalue>ImpliedRateforESFinQ11</tyvalue>
736                          </typename>
737                      </fieldlabel>
738                      <fielddata>Entry</fielddata>
739                  </ext_eligibility>
740              </eligibility>
741          </accessibility>
742          <!--************************************************************-->
743          <!--*************************************************Q32_Structure-->
744          <accessibility>
745              <eligibility>
746                  <ext_eligibility>
747                      <fieldlabel>
748                          <typename>
749                              <tyvalue>ImpliedRateforESFinQ12</tyvalue>
750                          </typename>
751                      </fieldlabel>
752                      <fielddata>Entry</fielddata>
753                  </ext_eligibility>
754              </eligibility>
755          </accessibility>
756          <!--************************************************************-->
757          <!--*************************************************Q33_Structure-->
758          <activity>
```

```
759              <units>
760                  <unitsfield>
761                      <fieldlabel>
762                          <typename>
763                              <tyvalue>APLHours</tyvalue>
764                          </typename>
765                      </fieldlabel>
766                      <fielddata>Entry</fielddata>
767                  </unitsfield>
768              </units>
769          </activity>
770          <!--****************************************************-->
771          <!--*************************************Q34_Structure-->
772          <activity>
773              <definition>
774                  <description>
775                      <short>Entry</short>
776                  </description>
777              </definition>
778          </activity>
779          <!--****************************************************-->
780          <!--*************************************Q35_Structure-->
781          <identification>
782              <agent>
783                  <agentid>EmployerRole</agentid>
784                  <agentdomain/>
785                  <description>
786                      <short>Entry</short>
787                  </description>
788              </agent>
789          </identification>
790          <!--****************************************************-->
791          <!--*************************************Q36_Structure-->
792          <activity>
793              <definition>
794                  <description>
795                      <short>Entry</short>
796                  </description>
797              </definition>
798          </activity>
799          <!--****************************************************-->
800          <!--*************************************Q37_Structure-->
801          <activity>
802              <units>
803                  <unitsfield>
804                      <fieldlabel>
805                          <typename>
806                              <tyvalue>ActualGuidedLearningHours</tyvalue>
807                          </typename>
808                      </fieldlabel>
809                      <fielddata>Entry</fielddata>
810                  </unitsfield>
811              </units>
812          </activity>
813          <!--****************************************************-->
814          <!--************************************QHE01_Structure-->
815          <accessibility>
816              <eligibility>
817                  <ext_eligibility>
818                      <fieldlabel>
819                          <typename>
820                              <tyvalue>ISR_TuitionFees</tyvalue>
821                          </typename>
822                      </fieldlabel>
823                      <fielddata>Entry</fielddata>
824                  </ext_eligibility>
825              </eligibility>
826          </accessibility>
827          <!--****************************************************-->
828          <!--************************************QHE02_Structure-->
829          <activity>
```

```
830            <date>
831                <datetime>Entry</datetime>
832            </date>
833        </activity>
834        <!--****************************************************************-->
835        <!--*************************************************E01_Structure-->
836        <identification>
837            <contentype>
838                <referential>
839                    <indexid>Entry</indexid>
840                </referential>
841            </contentype>
842        </identification>
843        <!--****************************************************************-->
844        <!--*************************************************E02_Structure-->
845        <qcl>
846            <registrationno>Entry</registrationno>
847        </qcl>
848        <!--****************************************************************-->
849        <!--*************************************************E03_Structure-->
850        <qcl>
851            <level>
852                <text>Entry</text>
853            </level>
854        </qcl>
855        <!--****************************************************************-->
856        <!--*************************************************E04_Structure-->
857        <qcl>
858            <date>
859                <datetime>Entry</datetime>
860            </date>
861        </qcl>
862        <!--****************************************************************-->
863    </learnerinformation>
```

This example is stored in the file: IMS_LIPv1p0/Valid/Advanced/isrmapv2_001/isrmapv2_001.xml

5.2.4   Key Features of the ISR Mapping Examples

The key features of these examples are:

- In Version 1 the different database entries are arranged in the greatest packing density e.g. the <identification> element contains thirteen fields (in Version 1 it would only contain a single field). This means that the field sequence is not maintained e.g. lines 28-40. The extension fields are accompanied by the usage of the <fieldlabel> element which is used to define the associated field structure number e.g. lines 77, 85, etc.);

- In Version 2 each separate ISR field is allocated its own core data structure object. This ensures that the order of the fields is maintained as per the ISR documentation. The 'indexid' feature is, in general' not used as the sequence of the fields is predefined and maintained within the XML instance;

- In both Versions 1 and 2 the extension facilities are defined in a manner that avoids the usage of new elements i.e. the available set of elements are reused in a creative fashion.

The initial aim is to use subsets of the complete mapping for different exchange purposes e.g. enrolment data from an enrolment system to MIS, basic student and enrolment data to LMS/VLE, and data generated during learning that needs to be returned from the LMS/VLE to the MIS. For these purposes the order of the data is less important than minimising the transfers sizes and processing time, and so the first approach has been adopted. If in future the mapping were to be adopted for the transfer of the ISR records themselves from Colleges to the Funding Council, replacing the existing formnat for the benefits brought by using XML and XML Schema parsers, and other XML related software, then it may be desirable to adopt the second approach of maintaining the current sequence or the ISR fields.

6. IMS LIP and Other Relevant Specifications

6.1 IMS Specifications

6.1.1 Enterprise

The IMS LIP specification does **NOT** replace the IMS Enterprise specification. The two specifications are **COMPLIMENTARY**.

The scope of the IMS Enterprise specification is focused on defining interoperability between systems residing within the same enterprise or organization. Data exchange may be possible between separate enterprises, but the documents comprising the IMS Enterprise specification are not targeted at solving the issues of data integrity, communication, overall security, and others inherent when investigating cross-enterprise data exchange. The IMS Enterprise Information Model is designed to support interoperability for the following four business process components, which typically require interaction between Learning Management systems and these types of Enterprise systems:

- *Personal Profile Data Maintenance* – typically, data about people is maintained in the Enterprise systems, and is passed to the Learning Management environment. When this personal profile data changes in the Enterprise system, it needs to be updated in the Learning Management system;

- *Group Management* - group management processes can include data from class creation and class scheduling, and the ongoing maintenance of that data. A source system creates and maintains group information, which needs to be shared with other systems that are involved with group management functions. The flow of group management information is not necessarily one way; some data may be updated by a target system and passed back to the source system.

- *Enrolment Management* – enrolment management encompasses the initial creation of Group membership and various changes to that data over time. Examples of enrolment management include learner enrolment in courses and instructor assignment to courses;

- *Final Result Processing* – final result processing refers to the evaluation and recording of final group membership results (final grade, course completion, etc.). This processing can occur in the Learning Management systems or in the Enterprise system.

This model is supported through the use of three data objects, described briefly below:

- *Person* – this data object contains elements describing an individual of interest to the Learning Management environment;

- *Group* – this object contains elements describing a group of interest to the Learning Management environment. There are many types of groups that may be shared between systems. The most common is a Course Instance, but they may also include Training Programs, Academic Programs, Course sub-groups, clubs, etc. A group can also have any number of relationships with other groups;

- *Group Membership* – this data object contains elements describing the membership of a person or group within a group. Group members may be instructors, learners, content developers, members, managers, mentors, or administrators.

The salient points with respect to the relationship between the IMS LIP and IMS Enterprise specifications are:

- **The IMS LIP specification should be used for the exchange of learner information. This means that the *Personal Profile Data Maintenance* features of the IMS Enterprise specification should be deprecated to the IMS LIP. The IMS LIP specification should also be used to exchange information about an organisation;**

- **All group memberships and group oriented information should be exchanged using the IMS Enterprise specification. The only membership information structures within the IMS LIP refer to the formal affiiations of a learner with a professional organisation. Group-based results should be exchanged using**

the IMS Enterprise specification whereas individual-based results should be exchanged using the IMS LIP specification.

6.1.2   Content Packaging

The IMS Content Packaging specification is to be used for the packaging of a LIP XML instance both in terms of a single learner instance and the the aggregation of several instances for a single learner or for multiple learners. Consider the following use-case required by the IMS LIP in which the LIP-XML instances for three learners are to be packaged:

- The sets of learner information have to be created i.e. in the files 'learnerA.xml', 'learnerB.xml' and 'learnerB.xml. In each case the learner information has three associated files – a meta-data file and other material files (See Figure 6.1).
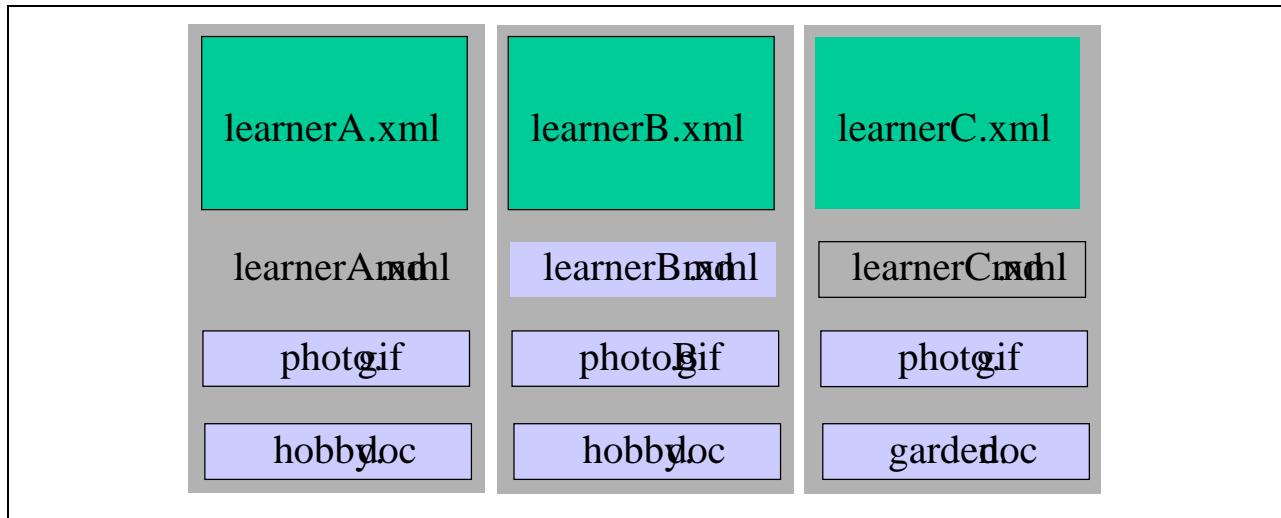
Figure 6.1 Schematic representation of the files to be packaged.

The issue becomes one of ensuring that when these three learner information sets are packaged together so that there are no name clashes between:

- The 'photo.gif' filers from learners A and C;

- The 'hobby.doc' files from learner B and C.

The IMS Content Packaging requires that all of the packaged files are uniquely named i.e. an explicit file directory structure has to be used to ensure that file clashes do not occur when creating the packaging manifest. The actual example is the XML used to refer to the 'photo.gif' files references in the XML instances for learner 'A' and 'C'. The original partial XML could be of the form:
Learner A – original XML instance:

```
<representation>
    <media mediamode="Image" mimetype="image/gif" encoding="uri">photo.gif</media>
</representation>
```

Learner C – original XML instance:

```
<representation>
    <media mediamode="Image" mimetype="image/gif" encoding="uri">photo.gif</media>
</representation>
```

There are two ways to ensure that name clashes are avoided. The first is that whenever external linkages are made then the corresponding directory structure is also included. This would mean that the two examples above now become:

Learner A – modified XML instance:

```
<representation>
    <media mediamode="Image" mimetype="image/gif" encoding="uri">learnerA/photo.gif
    </media>
</representation>
```

Learner C – modified XML instance:

```
<representation>
    <media mediamode="Image" mimetype="image/gif" encoding="uri">learnerC/photo.gif
    </media>
</representation>
```

The two files now have different names and so no clash occurs. The name can include any level of directories. The issue now becomes one of ensuring that the directory structures ensure a uniquely named path. The same approach must now be adopted for the 'hobby.doc' references used in Figure 6.1. Alternatively, and the preferred approach, is to:

- In a Content Package create a sub-directory for each Learner with a unique name within the package;

- In that directory place the LIP instance and the associated portfolio files;

- If the portfolio files reference each other using relative sub-directories, then these should be maintained within the allocated sub-directory;

- References to portfolio files should be relative to their shared allocated sub-directory i.e. top-level references will only need to be preceded by a slash but not directory name and existing relative sub-directory names are also used as defined;

- A resource element is used to specify the file name of the LIP instance and all the associated portfolio files;

- The *xml:base* attribute of the LIP's resource element is used to specify the relative address of the allocated sub-directory.

6.1.3   Meta-data

There is **NO** meta-data as per the IMS Meta-data, IEEE LOM or Dublin Core definitions within the IMS LIP. The exchange of IMS LIP will be achieved through the packaging of the XML instance and all of its associated files using the IMS Content Packaging specification. This packaging specification includes the usage of meta-data. From an IMS LIP perspective the meta-data would normally be used to describe the packaging of the information e.g. the size of the file, the type of material include, etc. Therefore, the usage of the meta-data within the IMS Content Packaging specification is best and so no meta-data is included within the IMS LIP specification itself.

6.1.4   Accessibility

The IMS Accesibility working-group was incorporated in February 2001. Parts of the 'accessibility core data structure will be modified when they release their V1.0 specification.

6.1.5   Competency Definitions

The IMS Competency Definition working-group was incorporated in August 2000. Parts of the 'competency' corer data structure will be amended appropriately when they release their V1.0 specification.

6.1.6   Question & Test Interoperability

Results summary information can be exchanged using the 'activity' core data structure within LIP. V1.2 of the IMS QTI specification will produce a more detailed results reporting mechanism; this version is timetabled for release in August 2001.

6.2   Other Specifications

6.2.1   IETF vCard

The IMS LIP is fully compatible with the IETF vCard specification i.e. all of the vCard fields can be contained by an LIP-XML instance. This relationship is shown in Table 6.1, namely:

Table 6.1 The usage of IMS LIP to support the IETF vCard specification.

vCard Element	IMS LIP Element(s)	Notes
FN	identification.fnme	The formatted name.
n	identification.name	The name.
family	identification.name.partname	The name with a typed partname entry.
given	identification.name.partname	The name with a typed partname entry.
other	identification.name.partname	The name with a typed partname entry.
prefix	identification.name.partname	The name with a typed partname entry.
suffix	identification.name.partname	The name with a typed partname entry.
nickname	identification.name.partname	The name with a typed partname entry.
photo	identification.demographics. representation.media	A photograph of the individual.
bday	identification.ext_identification	Requires the usage of the identification extension feature.
addr	identification.address	The address.
pobox	identification.address.pobox	The PO Box address component.
extadd	identification.address. nonfieldedstreetaddress	The extended address.
street	identification.address.street	The street address component.
locality	identification.address.locality	The locality address component.
region	identification.address.region	The region address component.
pcode	identification.address.postcode	The post code/zip code address component.
country	identification.address.county	The country address component.
label	identification.ext_identification	Requires the usage of the identification extension feature.
tel	identification.contactinfo. telephone	The telephone number.
email	identification.contactinfo.email	The email address.
mailer	identification.ext_identification	Requires the usage of the identification extension feature.
tz	identification.address.timezone	The time zone address component.
geo	identification.address.geo	The geographical location address component.
lat	identification.address.geo.lat	The latitude location address component.
lon	identification.address.geo.lon	The longitude location address component.
title	affiliation.organisation.role	The title of the individual in their organisation.
role	affiliation.organisation.role	The individual's role in their organisation
logo	affiliation.description.full.media	A organisation's logo.

vCard Element	IMS LIP Element(s)	Notes
agent	identification.agent	Authorised agent representative for the individual.
org	affiliation.organisation	Details of the individuals host organisation.
categories	learnerinformation.ext_learnerinfo	Requires the usage of the learnerinformation extension feature.
item	learnerinformation.ext_learnerinfo	Requires the usage of the learnerinformation extension feature.
note	learnerinformation.comment	Could be supported in any of the IMS LIP comment elements.
sort	identification.name.partname	This will require the usage of the extension of the partname voicabulary.
sound	identification.demographics. representation.media	An audio representation of the individual.
url	identification.contactinfo.web	The web URL.
key	securitykey.keyfields	Security keys.

Note that the information shown in Table 6.1. describes one possible relationship. Others are possible. It is our intention to show that at least way in which the IMS LIP can be used to contain the vCard information (the inverse is not possible as vCard is designed to act as an electronic business card only).

6.2.2   IEEE PAPI

The development of the IMS LIP incorporated the work undertaken on the IEEE PAPI. The relationship between the IEEE PAPI and the IMS LIP is shown schematically in Figure 6.2.
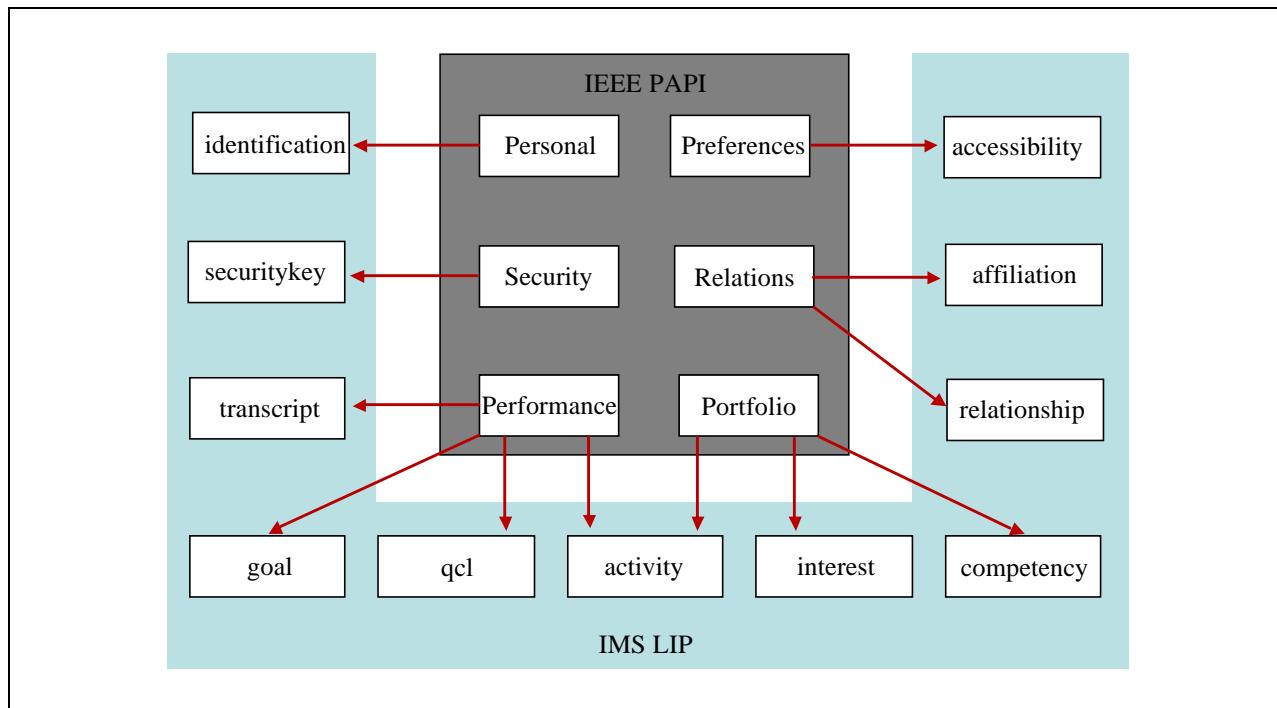
Figure 6.2 The usage of IMS LIP to support IEEE PAPI.

The ways in which eleven core data structures of the IMS LIP can contain the information of the six structures that underpin the IEEE PAPI are denoted by the arrows. A more detailed mapping is not currently possible because at presnt there is no binding for the IEEE PAPI.

6.2.3   Internet2/Educase 'eduPerson'

The eduParson specification is an obect class for LDAP services whereas LIP is a set of data objects for the exchange of learner information and not just directory-related information. The relationship between the eduPerson V1.0 specification and the IMS LIP V1.0 is summarised in Table 6.2.

Table 6.2 The usage of IMS LIP to exchange the eduPerson information

EduPerson Object Definition	IMS LIP Data Structure	Comments
EduPersonAffiliation (OID: 1.3.6.1.4.1.5923.1.1.1.1)	affiliation.classification	Specifies the person's relationship(s) to the institution in broad categories such as student, faculty, staff, alum, etc. This is to use a controlled vocabulary and IMS will work with Internet2/Educause to achieve a common vocabulary base.
EduPersonNickname (OID: 1.3.6.1.4.1.5923.1.1.1.2)	identification.name or identification.formname	Person's nickname, or the informal name by which they are accustomed to be hailed. This can be contained in either of two LIP data structures both within the <identification> element.
EduPersonOrgDN (OID: 1.3.6.1.4.1.5923.1.1.1.3)	affiliation.organization	The distinguished name (DN) of the directory entry representing the institution with which the person is associated. The organization structure within the <affiliation> element can be used to store this identifier.
EduPersonOrgUnitDN (OID: 1.3.6.1.4.1.5923.1.1.1.4)	affiliation.organization	The distinguished name (DN) of the directory entries representing the person's Organizational Unit(s). With a distinguished name, the client can do an efficient lookup in the institution's directory for information about the person's organizational unit(s).
EduPersonPrimaryAffiliation (OID: 1.3.6.1.4.1.5923.1.1.1.5)	affiliation.classification	Specifies the person's PRIMARY relationship to the institution in broad categories such as student, faculty, staff, alum, etc. This is to use a controlled vocabulary and IMS will work with Internet2/Educause to achieve a common vocabulary base.
EduPersonPrincipalName (OID: 1.3.6.1.4.1.5923.1.1.1.6)	identification.name or identification.formname or identification.contactinfo.email	The "NetID" of the person for the purposes of inter-institutional authentication. Should be stored in the form of user@univ.edu, where univ.edu is the name of the local security domain. This information can be supported within LIP using one of three structures all within the <identification> element.

It is recommended that when the LIP is used to exchange the eduPerson information that the appropriate 'indexid' references are used to contain either the OID or the name of the eduPerson object. This gives rise to:

```
1       <learnerinformation>
2           <comment>eduPerson exchange</comment>
3           <identification>
4               </contentype>
5               <name>
6                   <contentype>
7                       <referential>
8                           <indexid>OID:1.3.6.1.4.1.5923.1.1.1.2</indexid>
9                       </referential>
10                  </contentype>
11                  <partname>
12                      <text>Entry</text>
13                  </partname>
14              </name>
15              <contactinfo>
16                  <contentype>
17                      <referential>
18                          <indexid> ID:1.3.6.1.4.1.5923.1.1.1.6</indexid>
19                      </referential>
20                  </contentype>
21                  <email>Entry</email>
22              </contactinfo>
23          </identification>
24          <affiliation>
25              <contentype>
26                  <referential>
27                      <indexid>OID:1.3.6.1.4.1.5923.1.1.1.1</indexid>
28                  </referential>
29              </contentype>
30              <classification>Entry</classification>
31          </affiliation>
32          <affiliation>
33              <contentype>
34                  <referential>
35                      <indexid>OID:1.3.6.1.4.1.5923.1.1.1.5</indexid>
36                  </referential>
37              </contentype>
38              <classification>Entry</classification>
39          </affiliation>
40          <affiliation>
41              <contentype>
42                  <referential>
43                      <indexid>OID:1.3.6.1.4.1.5923.1.1.1.3</indexid>
44                  </referential>
45              </contentype>
46              <organization>
47                  <description>
48                      <short>Entry</short>
49                  </description>
50              </organization>
51          <affiliation>
52              <contentype>
53                  <referential>
54                      <indexid>OID:1.3.6.1.4.1.5923.1.1.1.4</indexid>
55                  </referential>
56              </contentype>
57              <organization>
58                  <description>
59                      <short>Entry</short>
60                  </description>
61              </organization>
62      </learnerinformation>
```

7.   Implementation Guidance

7.1   Nomenclature

The LIP specification supports the exchange of learner information among learning management systems, human resource systems, student information systems, enterprise e-learning systems, knowledge management systems, resume repositories, and other systems used in the learning process. Such systems will be called *learner information systems* regardless of any other functionality they possess or roles they fulfil. The IMS Learner Information Package specification does not address requests for learner information or the exchange transaction mechanism. It is important to note that:

- The LIP is concerned with the interoperability for the exchange of learner information between communicating LIP systems. It makes no comment on how the data should be stored in the communicating systems once the exchange has occurred;

- The LIP specification contains the description of the data model for the learner information. It does not address behavioural models for the learner information nor does it describe the mechanisms used for the electronic exchange the information;

- The LIP data model is incomplete. It was not created to be a definitive model of all the possible information that could be exchanged between LIP systems. Instead it describes many of the common data structures and provides several extension features (see Section 9) that can be used to tailor the LIP for a particular implementation.

7.2   Using the Core Data Structures

7.2.1   <accessibility>

The *accessibility* learner information consists of the cognitive, technical and physical preferences for the learner, disability, eligibility and language capabilities. These describe the learner's capabilities to interact with the learning environment. The *accessibility* data structure is complex in that it consists of four other sub-data structures any one of which can be supplied independently of the others. The minimum XML-instance for an *accessibility* data structure is:

```
<accessibility>
    <language>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>German</tyvalue>
        </typename>
        <proficiency profmode="Write">Poor</proficiency>
    </language>
    <preference>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>InputTech</tyvalue>
        </typename>
        <prefcode>Large Font Display Devices</prefcode>
    </preference>
</accessibility>
```

Note that the type of language and preference should be supplied otherwise the information is nonsensical. The maximal form of a useful *accessibility* structure is (this ignores the eligibility and disability data structures that are for further study as part of the IMS Accessibility working-group's activities):

```
<accessibility>
    <contentype>
        <referential>
            <indexid>accessibility_01</indexid>
        </referential>
    </contentype>
    <language>
    <typename>
        <tysource sourcetype="imsdefault"/>
```

```
            <tyvalue>German</tyvalue>
    </typename>
        <comment>----------------------------------------Language</comment>
        <contentype>
            <referential>
                <indexid>language_01</indexid>
            </referential>
        </contentype>
        <proficiency profmode="OralSpeak">Excellent</proficiency>
        <proficiency profmode="OralComp">Excellent</proficiency>
        <proficiency profmode="Read">Good</proficiency>
        <proficiency profmode="Write">Poor</proficiency>
    </language>
    <preference>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>InputTech</tyvalue>
        </typename>
        <comment>--------------------------------------Preference</comment>
        <contentype>
            <referential>
                <indexid>preference_01</indexid>
            </referential>
        </contentype>
        <prefcode>Large Font Display Devices</prefcode>
    </preference>
</accessibility>
```

More information concerning this example is given in Section 4.1.

7.2.2   <activity>

The *activity* learner information consists of the education/training, work and service (military, community, voluntary, etc.) record and products (excluding formal awards). This information may include the descriptions of the courses undertaken and the records of the corresponding assessment. A separate *activity* structure will be used for each entry. The *activity* data structure is complex in that it consists of several other sub-data structures any one of which can be supplied independently of the others. The minimum complete XML-instance for an *activity* data structure is:

```
<activity>
    <units>
        <unitsfield>
            <fieldlabel>
                <typename>
                    <tyvalue>CreditNumber</tyvalue>
                </typename>
            </fieldlabel>
            <fielddata>10</fielddata>
        </unitsfield>
    </units>
    <learningactivityref>
        <text>Degree in Philiosphy</text>
    </learningactivityref>
    <definition>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Curriculum</tyvalue>
        </typename>
        <definitionfield>
            <fieldlabel>
                <typename>
                    <tyvalue>Duration</tyvalue>
                </typename>
            </fieldlabel>
            <fielddata>3</fielddata>
        </definitionfield>
    </definition>
    <product>
        <typename>
            <tysource sourcetype="imsdefault"/>
```

```
                <tyvalue>Coursework</tyvalue>
            </typename>
            <description>
                <short>Thesis on violins</short>
                <full>
                    <media mediamode="Text" mimetype="text/word" contentreftype="uri">
                        sh/thesis.doc
                    </media>
                </full>
            </description>
        </product>
        <testimonial>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Academic</tyvalue>
            </typename>
            <description>
                <short>Tutors reference</short>
                <full>
                    <media mediamode="Text" mimetype="text/word" contentreftype="uri">
                        tutor/ref.doc
                    </media>
                </full>
            </description>
        </testimonial>
        <evaluation>
            <result>
                <score>
                    <fieldlabel>
                        <typename>
                            <tyvalue>Total</tyvalue>
                        </typename>
                    </fieldlabel>
                    <fielddata>80</fielddata>
                </score>
            </result>
        </evaluation>
    </activity>
```

The maximal form of a useful *activity* structure is:

```
<activity>
    <typename>
        <tysource sourcetype="imsdefault"/>
        <tyvalue>Education</tyvalue>
    </typename>
    <contentype>
        <referential>
            <indexid>activity_1</indexid>
        </referential>
    </contentype>
    <date>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Award</tyvalue>
        </typename>
        <datetime>1919:7</datetime>
    </date>
    <status>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Completed</tyvalue>
        </typename>
        <date>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Finish</tyvalue>
            </typename>
            <datetime>1919:6</datetime>
        </date>
    </status>
```

```
<units>
    <unitsfield>
        <fieldlabel>
            <typename>
                <tyvalue>CreditNumber</tyvalue>
            </typename>
        </fieldlabel>
        <fielddata>10</fielddata>
    </unitsfield>
</units>
<learningactivityref>
    <text>Degree in Philiosphy</text>
</learningactivityref>
<definition>
    <typename>
        <tysource sourcetype="imsdefault"/>
        <tyvalue>Curriculum</tyvalue>
    </typename>
    <contentype>
        <referential>
            <indexid>degreecourse</indexid>
        </referential>
    </contentype>
    <definitionfield>
        <fieldlabel>
            <typename>
                <tyvalue>Duration</tyvalue>
            </typename>
        </fieldlabel>
        <fielddata>3</fielddata>
    </definitionfield>
</definition>
<product>
    <typename>
        <tysource sourcetype="imsdefault"/>
        <tyvalue>Coursework</tyvalue>
    </typename>
    <contentype>
        <referential>
            <indexid>activity_product_01</indexid>
        </referential>
    </contentype>
    <description>
        <short>Thesis on violins</short>
        <full>
            <media mediamode="Text" mimetype="text/word" contentreftype="uri">
                sh/thesis.doc
            </media>
        </full>
    </description>
</product>
<testimonial>
    <typename>
        <tysource sourcetype="imsdefault"/>
        <tyvalue>Academic</tyvalue>
    </typename>
    <contentype>
        <referential>
            <indexid>activity_testimonial_01</indexid>
        </referential>
    </contentype>
    <description>
        <short>Tutors reference</short>
        <full>
            <media mediamode="Text" mimetype="text/word" contentreftype="uri">
                tutor/ref.doc
            </media>
        </full>
    </description>
</testimonial>
<evaluation>
```

```
            <contentype>
                <referential>
                    <indexid>activity_evaluation_01</indexid>
                </referential>
            </contentype>
            <result>
                <interpretscore>
                    <fieldlabel>
                        <typename>
                            <tyvalue>MinScore</tyvalue>
                        </typename>
                    </fieldlabel>
                    <fielddata>0</fielddata>
                </interpretscore>
                <interpretscore>
                    <fieldlabel>
                        <typename>
                            <tyvalue>MaxScore</tyvalue>
                        </typename>
                    </fieldlabel>
                    <fielddata>100</fielddata>
                </interpretscore>
                <score>
                    <fieldlabel>
                        <typename>
                            <tyvalue>Total</tyvalue>
                        </typename>
                    </fieldlabel>
                    <fielddata>80</fielddata>
                </score>
            </result>
        </evaluation>
        <description>
            <short>Final degree information.</short>
        </description>
    </activity>
```

More information concerning this example is given in Section 4.2.

7.2.3   <affiliation>

The *affiliation* learner information is used to store the descriptions of the organisation affiliations associated with the learner. These affiliations may include education groups e.g. classes, cohorts, etc. but it is expected that these will be exchanged using the IMS Enterprise specification technique. The minimum XML-instance for an *affiliation* is:

```
<affiliation>
    <classification>Fellow</classification>
    <affiliationid>2457923A</affiliationid>
    <organization>
        <description>
            <short>Royal Institution of Criminology: London Branch</short>
        </description>
    </organization>
</affiliation>
```

The maximal form of a useful *affiliation* structure is (this includes information concerning the role within the organisation to which the learner is affiliated):

```
<affiliation>
    <typename>
        <tysource sourcetype="imsdefault"/>
        <tyvalue>Professional</tyvalue>
    </typename>
    <classification>Fellow</classification>
    <affiliationid>2457923A</affiliationid>
    <role>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Officer</tyvalue>
        </typename>
```

```
            <date>
                <typename>
                    <tysource sourcetype="imsdefault"/>
                    <tyvalue>Start</tyvalue>
                </typename>
                <datetime>1924:04:01</datetime>
            </date>
            <date>
                <typename>
                    <tysource sourcetype="imsdefault"/>
                    <tyvalue>Finish</tyvalue>
                </typename>
                <datetime>1925:03:31</datetime>
            </date>
            <description>
                <short>Treasurer for the Local Branch of Criminology</short>
            </description>
        </role>
        <organization>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Professional</tyvalue>
            </typename>
            <description>
                <short>Royal Academy</short>
            </description>
        </organization>
        <date>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Join</tyvalue>
            </typename>
            <datetime>1922</datetime>
        </date>
        <status>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Active</tyvalue>
            </typename>
        </status>
        <description>
            <short>All fees paid</short>
        </description>
    </affiliation>
```

More information concerning this example is given in Section 4.3.

7.2.4   <competency

The *competency* learner information consists of the descriptions of the skills the learner has acquired. These skills may be associated with some formal or informal training or work history (described in the 'activity') and formal awards (described in the 'qcl'). A different 'competency' structure will be used for each competency through an external reference mechanism. The adopted competency definition will be amended to follow the work of the IMS Competency Definition working-group when that specification is completed. The minimum form of a useful competency structure is:

```
<competency>
    <exrefrecord>
        <recformat>MSWord</recformat>
        <recdata uri="filename.doc"/>
    </exrefrecord>
</competency>
```

The possible entries within the *recformat* element are undefined but the associated entry within the *recdata* element should be consistent with it (cf. the *transcript* element). Note that the competency structure has no *typename* element. This is because, until the IMS Competency Definition work is completed, we could find no appropriate typing of the competency. The maximal form of a useful competency structure is:

```
<competency>
    <contentype>
        <referential>
            <indexid>competency_01</indexid>
        </referential>
    </contentype>
    <exrefrecord>
        <recformat uri="compformats/criminology.doc"/>
        <recdata uri="holmes/competency.doc"/>
        <date>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Award</tyvalue>
            </typename>
            <datetime>1927:10:21</datetime>
        </date>
    </exrefrecord>
    <description>
        <short>Competencies in Criminology</short>
    </description>
</competency>
```

More information concerning this example is given in Section 4.4.

7.2.5   <goal>

The *goal* learner information consists of the description of the personal objectives and aspirations. These descriptions may also include information for monitoring the progress in achieving the goals. A goal can be defined in terms of sub-goals. A different *goal* structure will be used for each entry. The minimum XML-instance for a *goal* is:

```
<goal>
    <description>
        <short>To graduate</short>
        <full>
            <media mediamode="Text" mimetype="text/base" contentreftype="uri">lifeplan.doc
            </media>
        </full>
    </description>
</goal>
```

The maximum contents for a goal XML-instance is (this example contains a sub-goal):

```
<goal>
    <typename>
        <tysource sourcetype="imsdefault"/>
        <tyvalue>Work</tyvalue>
    </typename>
    <contentype>
        <referential>
            <indexid>goal_01</indexid>
        </referential>
    </contentype>
    <date>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Start</tyvalue>
        </typename>
        <datetime>1925</datetime>
    </date>
    <priority>Primary Objective</priority>
    <status>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Active</tyvalue>
        </typename>
        <date>
            <typename>
                <tysource sourcetype="imsdefault"/>
```

```
                    <tyvalue>Create</tyvalue>
                </typename>
                <datetime>1926:3:30</datetime>
            </date>
        </status>
        <description>
            <short>To arrest Moriarty</short>
            <full>
                <media mediamode="Image" mimetype="image/gif" contentreftype="uri">
                    sh/moriarty.gif
                </media>
            </full>
        </description>
        <goal>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Work</tyvalue>
            </typename>
            <contentype>
                <referential>
                    <indexid>goal_01_subgoal_02</indexid>
                </referential>
            </contentype>
            <description>
                <short>Train Watson to be a competent detective.</short>
            </description>
        </goal>
    </goal>
```

More information concerning this example is given in Section 4.5.

7.2.6   <identification>

The *identification* learner information contains all of the data for a specific individual or organisation. This includes data such as: name, address, contact information, agent and demographics. The *identification* data structure is complex in that it consists of several other sub-data structures any one of which can be supplied independently of the others. The minimum complete XML-instance for an *identification* data structure is:

```
<identification>
    <formname>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Preferred</tyvalue>
        </typename>
        <text>Mr Sherlock Holmes</text>
    </formname>
    <name>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Preferred</tyvalue>
        </typename>
        <partname>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Last</tyvalue>
            </typename>
            <text>Holmes</text>
        </partname>
    </name>
    <address>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Permanent</tyvalue>
        </typename>
        <street>
            <streetname>Baker Street</streetname>
            <aptnumber>22</aptnumber>
            <aptnumsuffix>b</aptnumsuffix>
        </street>
        <city>London</city>
```

```
            <country>England</country>
        </address>
        <contactinfo>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Private</tyvalue>
            </typename>
            <telephone>
                <countrycode>44</countrycode>
                <areacode>020</areacode>
                <indnumber>6472239</indnumber>
            </telephone>
        </contactinfo>
        <demographics>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Adult</tyvalue>
            </typename>
            <gender gender="M"/>
        </demographics>
        <agent>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Aide</tyvalue>
            </typename>
            <agentid>Dr.Watson</agentid>
            <agentdomain>
                <typename>
                    <tysource sourcetype="imsdefault"/>
                    <tyvalue>Medical</tyvalue>
                </typename>
            </agentdomain>
        </agent>
    </identification>
```

The maximal complete form of a useful *identification* structure is:

```
<identification>
    <comment>---------------------------------------Identification</comment>
    <contentype>
        <referential>
            <indexid>identification_01</indexid>
        </referential>
    </contentype>
    <formname>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Preferred</tyvalue>
        </typename>
        <comment>--------------------------Formatted Name details</comment>
        <contentype>
            <referential>
                <indexid>formname_01</indexid>
            </referential>
        </contentype>
        <text>Mr Sherlock Holmes</text>
    </formname>
    <name>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Preferred</tyvalue>
        </typename>
        <comment>----------------------------------Name details</comment>
        <contentype>
            <referential>
                <indexid>name_01</indexid>
            </referential>
        </contentype>
        <partname>
            <typename>
                <tysource sourcetype="imsdefault"/>
```

```
                    <tyvalue>First</tyvalue>
                </typename>
                <text>Sherlock</text>
            </partname>
            <partname>
                <typename>
                    <tysource sourcetype="imsdefault"/>
                    <tyvalue>Last</tyvalue>
                </typename>
                <text>Holmes</text>
            </partname>
        </name>
        <address>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Permanent</tyvalue>
            </typename>
            <comment>-------------------------------Address details</comment>
            <contentype>
                <referential>
                    <indexid>address_01</indexid>
                </referential>
            </contentype>
            <street>
                <streetname>Baker Street</streetname>
                <aptnumber>22</aptnumber>
                <aptnumsuffix>b</aptnumsuffix>
            </street>
            <city>London</city>
            <country>England</country>
        </address>
        <contactinfo>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Private</tyvalue>
            </typename>
            <comment>--------------------------------Contact details</comment>
            <contentype>
                <referential>
                    <indexid>contactinfo_01</indexid>
                </referential>
            </contentype>
            <telephone>
                <countrycode>44</countrycode>
                <areacode>020</areacode>
                <indnumber>6472239</indnumber>
            </telephone>
        </contactinfo>
        <demographics>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Adult</tyvalue>
            </typename>
            <comment>----------------------------Demographic details</comment>
            <contentype>
                <referential>
                    <indexid>demographics_01</indexid>
                </referential>
            </contentype>
            <gender gender="M"/>
            <date>
                <typename>
                    <tysource sourcetype="imsdefault"/>
                    <tyvalue>Birth</tyvalue>
                </typename>
                <datetime>1901:04:01</datetime>
            </date>
        </demographics>
        <agent>
            <typename>
                <tysource sourcetype="imsdefault"/>
```

```
                <tyvalue>Aide</tyvalue>
            </typename>
            <comment>----------------------------------Agent details</comment>
            <contentype>
                <referential>
                    <indexid>agent_01</indexid>
                </referential>
            </contentype>
            <agentid>Dr.Watson</agentid>
            <agentdomain>
                <typename>
                    <tysource sourcetype="imsdefault"/>
                    <tyvalue>Medical</tyvalue>
                </typename>
            </agentdomain>
        </agent>
    </identification>
```

More information concerning this example is given in Section 4.6.

7.2.7   <interest>

The *interest* learner information consists of descriptions of hobbies and other recreational activities. These interests may have formal awards (as described in the associated 'qcl'). Electronic versions of the products of these interests may also be contained. Each interest will be described within its own *interest* structure. The minimum XML-instance for an *interest* is:

```
<interest>
    <product>
        <description>
            <full>
                <media mediamode="Text" mimetype="text/base" contentreftype="uri">file.txt
                </media>
            </full>
        </description>
    </product>
</interest>
```

The maximal form of a useful *interest* structure is:

```
<interest>
    <typename>
        <tysource sourcetype="imsdefault"/>
        <tyvalue>Recreational</tyvalue>
    </typename>
    <contentype>
        <referential>
            <indexid>interest_01</indexid>
        </referential>
    </contentype>
    <product>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Portfolio</tyvalue>
        </typename>
        <contentype>
            <referential>
                <indexid>product_01</indexid>
            </referential>
        </contentype>
        <date>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Create</tyvalue>
            </typename>
            <datetime>1928:10:21</datetime>
        </date>
        <description>
            <full>
                <media mediamode="Text" mimetype="text/base" contentreftype="uri">file.txt
```

```
            </media>
        </full>
    </description>
</product>
<description>
    <short>Favourite hobby.</short>
</description>
</interest>
```

More information concerning this example is given in Section 4.7.

7.2.8   <qcl>

The *qcl* learner information consists of the qualifications, certifications and licenses awarded to the learner i.e. the formally recognised products of their learning and work history. This includes information on the awarding body and may also include electronic copies of the actual documents. A different *qcl* structure will be used for each qualification, etc. The minimum XML-instance for a *qcl* is:

```
<qcl>
    <title>Physics</title>
    <organization>
        <description>
            <short>Princeton University</short>
        </description>
    </organization>
    <level>
        <text>Honours</text>
    </level>
</qcl>
```

The maximal form of a useful *qcl* structure is:

```
<qcl>
    <typename>
        <tysource sourcetype="imsdefault"/>
        <tyvalue>Qualification</tyvalue>
    </typename>
    <contentype>
        <referential>
            <indexid>qcl_01</indexid>
        </referential>
    </contentype>
    <title>MA Criminology</title>
    <organization>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Educational</tyvalue>
        </typename>
        <description>
            <short>Cambridge University</short>
        </description>
    </organization>
    <level>
        <text>First Class Honours</text>
    </level>
    <date>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Award</tyvalue>
        </typename>
        <datetime>1920</datetime>
    </date>
    <description>
        <full>
            <media mediamode="Image" mimetype="image/gif" contentreftype="uri">
                holmes/degree.gif
            </media>
        </full>
    </description>
</qcl>
```

More information concerning this example is given in Section 4.8.

7.2.9   <relationship>

The *relationship* learner information is used to store the description of the relations between the other core data structures. All of the relationship information has been removed from the other structures to enable these to be collected at a single place. This structure may also be used to describe mapping relationships to be used by the communicating systems. The minimum XML-instance for a *relationship* is:

```
<relationship>
    <tuple>
        <tuplesource>
            <indexid>qcl_01</indexid>
        </tuplesource>
        <tuplerelation>
            <typename>
                <tyvalue>results_from</tyvalue>
            </typename>
        </tuplerelation>
        <tupledest>
            <indexid>transcript_01</indexid>
        </tupledest>
    </tuple>
</relationship>
```

In this example a relationship between a 'qcl' (the absence of a sourcedid means that the record was previously associated with this learner information) is created with a transcript (also previously associated with this learner information). The maximal form of a useful *relationship* structure is:

```
<relationship>
    <typename>
        <tysource sourcetype="imsdefault"/>
        <tyvalue>Qcl</tyvalue>
    </typename>
    <contenttype>
        <referential>
            <indexid>relationship_01</indexid>
        </referential>
    </contenttype>
    <tuple>
        <tuplesource>
            <sourcedid>
                <source>IMS_LIP_V1p0_Example</source>
                <id>1001</id>
            </sourcedid>
            <indexid>qcl_01</indexid>
        </tuplesource>
        <tuplerelation>
            <typename>
                <tyvalue>results_from</tyvalue>
            </typename>
        </tuplerelation>
        <tupledest>
            <sourcedid>
                <source>IMS_LIP_V1p0_Example</source>
                <id>1001</id>
            </sourcedid>
            <indexid>transcript_01</indexid>
        </tupledest>
    </tuple>
    <description>
        <short>The QCL was based upon the identified transcript.</short>
    </description>
</relationship>
```

More information concerning this example is given in Section 4.9.

7.2.10   <securitykey>

The *securitykey* learner information is used to store the passwords and security codes that are to be used when communicating with the learner. A different *securitykey* structure will be used for each key and class of key. The minimum XML-instance for a *securitykey* is:

```
<securitykey>
    <keyfields>
        <fieldlabel>
            <typename>
                <tyvalue>PersonalPassword</tyvalue>
            </typename>
        </fieldlabel>
        <fielddata>asits9</fielddata>
    </keyfields>
</securitykey>
```

The maximal form of a useful *securitykey* structure is:

```
<securitykey>
    <typename>
        <tysource sourcetype="imsdefault"/>
        <tyvalue>Password</tyvalue>
    </typename>
    <contentype>
        <referential>
            <indexid>securitykey_1</indexid>
        </referential>
    </contentype>
    <keyfields>
        <fieldlabel>
            <typename>
                <tyvalue>PersonalPassword</tyvalue>
            </typename>
        </fieldlabel>
        <fielddata>asits9</fielddata>
    </keyfields>
    <keyfields>
        <fieldlabel>
            <typename>
                <tyvalue>LMSPassword</tyvalue>
            </typename>
        </fieldlabel>
        <fielddata>moriarty</fielddata>
    </keyfields>
</securitykey>
```

More information concerning this example is given in Section 4.10.

7.2.11   <transcript>

The *transcript* learner information is used to store the summary records of the academic performance at an institution. This information may contain an arbitrary level of detail and so there is no proscribed structure for a transcript. The minimum form of a useful *transcript* structure is:

```
<transcript>
    <exrefrecord>
        <recformat>MSWord98</recformat>
        <recdata uri="holmes/cambridge_degree.doc"/>
    </exrefrecord>
</transcript>
```

The possible entries within the *recformat* element are undefined but the associated entry within the *recdata* element should be consistent with it (cf. the *competency* element). The maximal form of a useful *transcript* structure is:

```
<transcript>
    <typename>
        <tysource sourcetype="imsdefault"/>
        <tyvalue>Academic</tyvalue>
    </typename>
```

```
    <contentype>
        <referential>
            <indexid>transcript_01</indexid>
        </referential>
    </contentype>
    <exrefrecord>
        <recformat>MSWord98</recformat>
        <recdata uri="holmes/cambridge_degree.doc"/>
        <date>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Award</tyvalue>
        </typename>
            <datetime>1920:9:30</datetime>
        </date>
    </exrefrecord>
    <description>
        <short>Cambridge University Transcript</short>
    </description>
</transcript>
```

More information concerning this example is given in Section 4.11.

7.3   LIP Structural Meta-data

The information model contains both *data* and *meta-data* about that data. The model defines fields into which the data can be placed and the type of data that may be put into these fields. Typical data might be the name of a learner, a course or training completed, a learning objective, a preference for a particular type of technology, and so on. Meta-data (this has nothing to with the IMS Meta-data specification et al) about each field can include:

- Referential – the information structure that can be used to contain the data that uniquely identifies the data itself;

- Temporal – the information structure that can be used to contain time-based data about the data itself e.g. the date of creation of the data;

- Privacy – the information structure that can be used to contain privacy data (such as access control rights) and to ensure the integrity of the data e.g. a checksums.

7.3.1   Referential Structure

The referential information is used to uniquely identify the learner information record as a whole and the individual data components within that record. These enable each piece of information to be identified. The actual identification system is outside the scope of this specification. The referential system is based upon the use of *sourcedids* and *indexids* (see Section 7.6).

7.3.2   Temporal Structure

This information is used to describe any time-based dependencies of the data. This includes information such as the date of creation, time-stamp and expiry date of the learner information. The date/time descriptions are expected to conform to the ISO8601 standard and are based upon the *date* element. An example of the *temporal* structure is:

```
    <contentype>
        <temporal>
            <temporalfield>
                <fieldlabel>
                    <typename
                        <tyvalue>Creation</tyvalue>
                    </typename>
                </fieldlabel>
                <fielddata>2000:12:31T17:00:00</fielddata>
            </temporalfield>
            <temporalfield>
                <fieldlabel>
                    <typename
                        <tyvalue>Expiry</tyvalue>
                    </typename>
                </fieldlabel>
```

```
                  <fielddata>2001:12:31T17:00:00</fielddata>
              </temporalfield>
              <temporalfield>
                  <fieldlabel>
                      <typename
                          <tyvalue>Deletion</tyvalue>
                      </typename>
                  </fieldlabel>
                  <fielddata>2002:12:31T17:00:00</fielddata>
              </temporalfield>
          </temporal>
      </contentype>
```

In this example the associated data structure has a defined creation, expiry and deletion data/time. The ways in which this information is stored within the communicating systems is beyond the scope of the LIP specification.

7.3.3   Privacy Structure

All of the data relevant to the privacy, authenticity and integrity of the learner information is contained within this structure. The actual privacy etc. mechanism and architectures used to support the learner information are outside of the scope of the specification but they interact with the learner information through these structures. An example of the *privacy* structure is:

```
<contentype>
    <privacy>
        <typename>
            <tysource sourcetype="imsdefault"/>
            <tyvalue>Owner</tyvalue>
        </typename>
        <privacyfield>
            <fieldlabel>
                <typename
                    <tyvalue>Access</tyvalue>
                </typename>
            </fieldlabel>
            <fielddata>Delete,Read,Write</fielddata>
        </privacyfield>
        <date>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Create</tyvalue>
            </typename>
            <datetime>2000:12:31</datetime>
        <date>
        <date>
            <typename>
                <tysource sourcetype="imsdefault"/>
                <tyvalue>Expiry</tyvalue>
            </typename>
            <datetime>2001:06:30</datetime>
        <date>
    </privacy>
</contentype>
```

In this example the associated data structure has a defined a privacy mechanism to be applied to the data structure with respect to the 'Owner' of the data. This defines the access rights as write, delete and read. The privacy instructions are defined as valid between the date of creation and the date of expiry.

7.4   The LIP Vocabularies

During the development of the LIP there was a great deal of discussion concerning the contents and structure of the LIP vocabularies. The vocabularies are used in three ways:

- To define the content of data structure e.g. to mark an address as the referring to the 'billing', 'mailing', etc;

- To define the type of a data structure e.g. to mark activity as referring to 'work', 'service', etc. activities. This technique was used to allow us to create a more concise information model;

- To define the label of a data entry e.g. for the results element which is composed of a user defined data structure.

7.4.1   The Basic Vocabularies

Thirty one vocabularies have been identified and these are listed in Table 7.1 of the LIP Information Model [LIP, 01a]. The contents of these vocabularies are not definitive and we seek recommendations for their extension and amendment. In particular, these vocabularies are to be inclusive and we are not seeking to produce the definitive entry for each possible entry within the vocabulary i.e. we are willing to have more than one entry referring to a particular type of data e.g. for part names we have 'last' and 'surname'.

The type of vocabulary is defined using the *sourcetype* attribute with the *tysource* element. The *sourcetype* attribute defines four ways in which vocabularies can be referenced: an included list, using the IMS default, using an externally referenced proprietary vocabulary and as an externally referenced standardised vocabulary.

Explicit List

An example of the inclusion of an explicit list is:

```
<affiliation>
    <typename
        <tysource sourcetype="List">IEEE,ACM,BCS,IEE</tysource>
        <tyvalue>ACM</tyvalue>
    </typename>
    …
</affiliation>
```

In this example the list given in the *tysource* element defines the set of possible affiliations and the data content for the *tyvalue* element shows the selected entry. It is undefined whether or not the list created in this manner is an extension to the default IMS vocabulary for affiliations. The validation of the selected entry against the given vocabulary list must be performed by some data validation system as it cannot be supported by the XML parsers.

IMS Default

An example of the usage of the default IMS vocabularies is:

```
<affiliation>
    <typename
        <tysource sourcetype="imsdefault"/>
        <tyvalue>Professional</tyvalue>
    </typename>
    …
</affiliation>
```

In this example the *tysource* element indicates that the default IMS vocabularies are to be used (the fact that the affiliation vocabulary is to be used is taken from the context of the usage of the *typename* element). It should be noted that the specification does not define how the systems and their parsers obtain the actual default vocabularies as these are not defined with in XML Schema or the XML instances. It is assumed that the system has access to these vocabularies and that the data is validated against these vocabularies using some internal data validation mechanism i.e. the XML parser does not perform this validation. If necessary it may be possible to pass the default file name to be used i.e.

```
<affiliation>
    <typename
        <tysource sourcetype="imsdefault">imsdefaultdirectory/imsdefaultfilename.txt
        </tysource>
        <tyvalue>Professional</tyvalue>
    </typename>
    …
</affiliation>
```

or an extension to the default vocabulary could be supported by:

```
<affiliation>
    <typename
        <tysource sourcetype="imsdefault">IEEE,ACM,BCS,IEE</tysource>
        <tyvalue>Professional</tyvalue>
```

```
        </typename>
        …
    </affiliation>
```

The operation of the system is undefined for both of these techniques. It is of interest to know if early adopters wish to make use of these latter extensions to the usage of the default IMS vocabularies.

Proprietary

An example of the usage of the proprietary vocabularies is:

```
<affiliation>
    <typename
        <tysource sourcetype="proprietary">directory/filename.txt</tysource>
        <tyvalue>IEEE</tyvalue>
    </typename>
    …
</affiliation>
```

In this example the file name of the proprietary vocabulary has been given however an alternative method is to pass a logical identifier for the vocabulary e.g.

```
<affiliation>
    <typename
        <tysource sourcetype="proprietary">affiliationvocab1</tysource>
        <tyvalue>IEEE</tyvalue>
    </typename>
    …
</affiliation>
```

It is assumed that the selected entry from the vocabulary is contained within the proprietary vocabulary. The proprietary vocabularies make contain some or all of the entries contained within the default IMS vocabularies. The key difference is that IMS has no responsibility for the maintenance of the proprietary vocabularies.

Standardised

The standardised vocabularies are assumed to be controlled by some appropriate external standards and/or specifications organisation i.e. the IEEE, ISO, etc. An example of this approach is:

```
<affiliation>
    <typename
        <tysource sourcetype="standard">ISO</tysource>
        <tyvalue>IEEE</tyvalue>
    </typename>
    …
</affiliation>
```

The possible identifiers for the content of the *tysource* element are undefined. At present no externally standardised vocabularies have been identified. Recommendations for such vocabularies are requested so that we can establish an appropriate mnemonic to be supplied as the content of the *tysource* element.

7.4.2   Extending the Vocabularies

The vocabularies can be extended by:

- Owners of the proprietary extensions can make additions as and when required;

- IMS will make additions to their default vocabularies in a controlled fashion. Such amendments will take place subject to the agreement of the IMS Technical Board and will be accompanied by the corresponding changes in the LIP Information Model. At some point the vocabularies may be defined as a series of independent XML instances with the appropriate version control information;

- The organisations responsible for the standard vocabularies will make the necessary changes using their own agreed mechanisms.

It is recommended that the adopters of the LIP clearly mark on their conformance statement the versions of the vocabularies that they support. Systems exchanging learner information using the LIP should ensure that their systems are using compatible vocabularies.

7.4.3   Data Entry Using the Vocabularies

An example of data entry using the vocabularies:

```
<activity>
    <evaluation>
        <result>
            <score>
                <fieldlabel>
                    <typename>
                        <tyvalue>Score</tyvalue>
                    </typename>
                </fieldlabel>
                <fielddata>65</fielddata>
            </score>
        </result>
    </evaluation>
</activity>
```

In this example a result is defined in which the field label is 'Score' and the corresponding data entry for the score is '65'. Note that an associated vocabulary has not been defined as this could be considered unnecessary as just the label of the data field is required. If considered necessary then an appropriate vocabulary could be included; there are no corresponding default IMS vocabularies.

7.5   Building Relationships within the LIP

During the development of the LIP specification many of the core data structures had pointers to some of the other core data structures thereby showing a relationship. It became clear that we could not define all of the relationships between the core data structures and we did not wish to build a relational database within the LIP. Instead, the *relationship* core data structure was added. The *relationship* data structure supports the construction of arbitrary relations between the other core data structures within the LIP and also external data structures that can be identified using a *sourcedid* and/or *indexid*.

The underlying approach for defining a relationship is to identify, using a tuple, the source object, the destination object(s) and the relationship between them. Each tuple defines either a one-to-one or a one-to-many relationship. Many-to-many relationships require the creation of many tuples. Both the source and the destination are defined in terms of a *sourcedid*, *indexid* or *sourcedid.indexid*. The actual relationship, defined within the *tuplerelation* element, uses the standard LIP vocabulary mechanism. At the present time there is no default IMS vocabulary to support these definitions.

Once the *relationship* data structure had been considered it was realised it could be used in ways that had not been originally envisaged. The ways in which the relationship structure can be used are to create:

- A relationship between two or more data structures contained within an LIP (these data structure must have an associated *sourcedid* or *indexid*);

- A relationship between two or more learner profiles. Each learner profile has a *sourcedid* and so these can be related;

- The relationship between the internal data structure referencing mechanism and the exchange reference mechanism inherent within LIP. This is the equivalent of exchanging the mapping tables or dictionary between the communication profile servers;

- The relationship between two or more externally defined referencing mechanisms. This means that the *relationship* data structure can be used to exchange the relational database between any two systems.

This approach means that the relationships are defined by the communicating systems and not established as part of the specification itself. A consequence of this is that two identical transactions may define different relationships between the data itself.

7.6   Identifiers

The LIP is capable of supporting the exchange of data between distributed learner information systems. This is achieved by using a flexible referencing system that can be used to identify the learner information record and data structures within that record. The two separate referencing mechanisms are based upon the following identifiers:

- Sourcedid – the learner information record identifier. This consists of a source label, unique to the source responsible for creating the learner information, and the identifier of the record within that source. The source is responsible for ensuring that each different learner information record has a unique identifier. The uniqueness of the source label is outside of the scope of this specification and assumes that each learner information server has an unique source label pre-assigned to it. Once IMS has agreed the definition mechanism for the Global User Identifier (GUID) it is assumed that this will be the basis for the generation of the unique 'sourcedid';

- Indexid – the eleven core data structures and the associated sub-structures used to contain the learner information may be assigned an index number that is unique within the learner information record as a whole. This allows later operations on the record to identify the appropriate piece of information thereby requiring only that piece of information to be transferred as opposed to the full learner information. An important implication for this approach is that the *indexid* is a persistent pointer and so a system that uses it must maintain a mapping table between the *indexid* (as used for interoperability) and the local database address resolution structure.

A *sourcedid* takes the form of:

```
<contentype>
    <referential>
        <sourcedid>
            <source>IMS_LIP_V1p0_Example</source>
            <id>1001</id>
        </sourcedid>
    </referential>
</contentype>
```

An *indexid* takes the form of:

```
<contentype>
    <referential>
        <indexid>interest_01</indexid>
    </referential>
</contentype>
```

The key points to note about the two identifier mechanisms are:

- The LIP allows both the *sourcedid* and *indexid* technique to be used to identify any data structure. The only difference between the two identifiers is that the *indexid* is only required to be unique with respect to the full learner information profile for a learner i.e. for all LIP components for the full profile whereas the *sourcedid* should be globally unique;

- A profile may have more than one *sourcedid*. The mapping of the sourcedids to the same profile is beyond the scope of the specification but it is an important implementation consideration. It may be that no relationship between the multiple sourcedids is to be supplied – this may be because of security considerations etc;

- The persistence of the indexids is only required if some form of transaction processing between the communication systems is to be supported. Persistence is only required between the communicating systems as some internal mapping between the indexids and the local referencing system may be employed;

- The use of identifiers is not a requirement. If the order of the information in a LIP instance is predefined and persistent then another referencing system may not be required.

7.7   Packaging, Transactions, Messaging & Protocols

The LIP is concerned with defining the data model for the information that is to be exchanged by Profile servers. The realisation of the actual exchange of information requires many more system features. A schematic representation of the layered profiles system architecture is shown in Figure 7.1
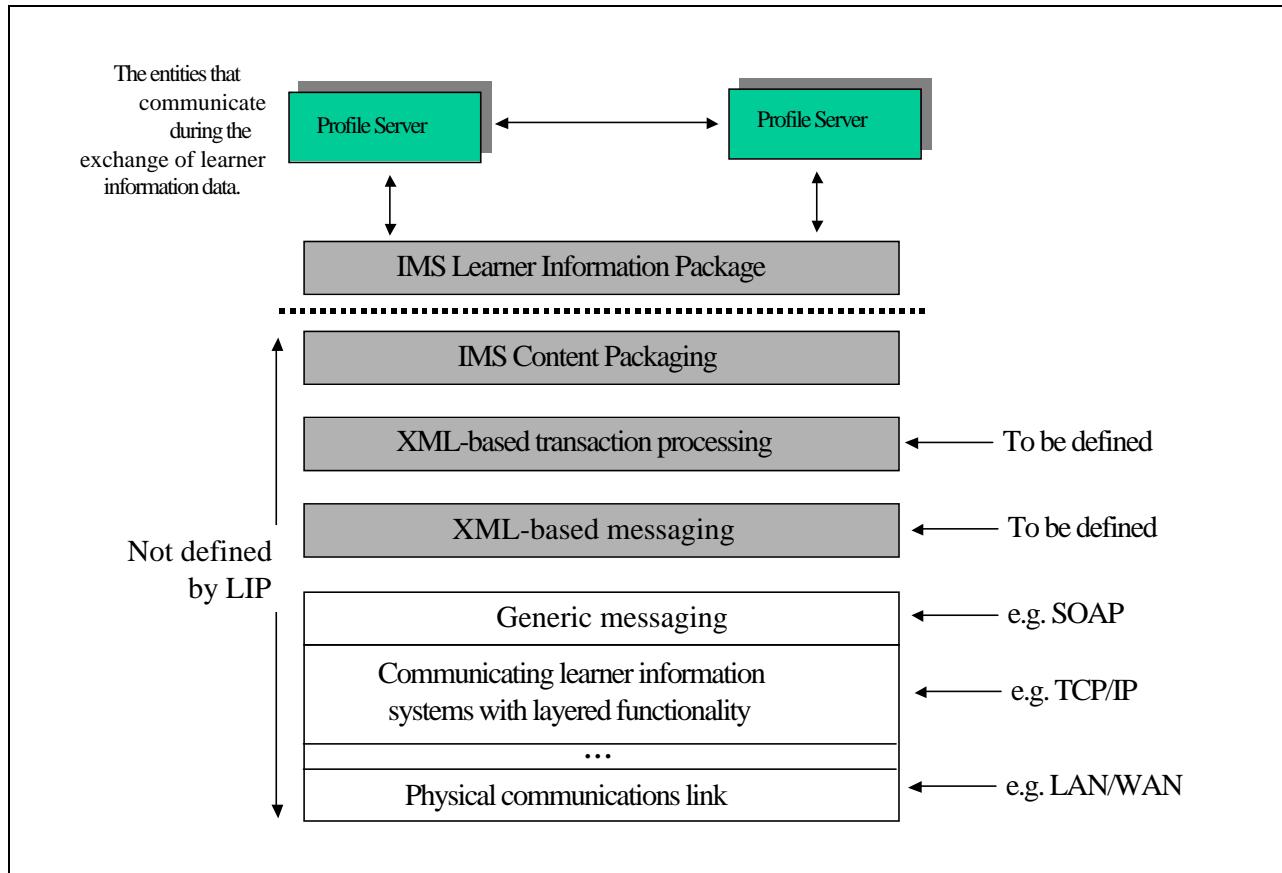
Figure 7.1 A schematic model of layer-based communicating profile servers.

The exchange of learner information is based upon the following constructs:

- Learner information package – this is the data model for the exchange of the learner information and is defined within the IMS LIP specifications. **This is the only layer defined within the IMS LIP specifications**;

- Aggregated learner information packaging – the packaging of multiple LIPs can be used to collect together related information or a set of individual records that need to be exchanged between different organisations. The IMS Content Packaging specification is adopted for this exchange (see Section 6.1.2);

- Learner information transaction – the basic operation on the learner information e.g. create a learner information structure, change a learner information structure, delete a learner information structure, etc. This transaction requires the definition of the appropriate behavioural model which must be supported using a corresponding service and protocol;

- Learner information message – the actual messages/objects that are exchanged by the learner information entities. A protocol consists of the exchange of one or more learner information messages and this should be supported using an XML-based messaging mechanism. This XML-based messaging system is also applicable to the other IMS specifications;

- Generic messaging – the messaging and object management system that is used to encapsulate the XML messages/objects. This could be based upon SOAP, CORBA, etc;

- Communications system – the underlying communications architecture that is responsible for supplying a reliable end-to-end communications link. Typically, but not exclusively, this system will be based upon the Transmission Control Protocol/Internet Protocol combination (TCP/IP);

- Physical communications link – this is the actual data network that is used to interconnect the communicating profile servers. Typically these systems will be interconnected using a combination of wide-area and local-are networks (LAN/WAN).

Profiles servers that wish to exchange LIP information will have to agree on an equivalent architecture. At some time in the future IMS will make a series of recommendations concerning the implementation of the XML transaction, XML-based messaging and generic messaging layers. These recommendations will focus on simplifying successful interoperability.

7.8 Security Architectures & Considerations[3]

Definition of the security architecture within which the LIP records are exchanged is outside of the scope of the LIP specification. However, we briefly describe the ways in which different security issues and architectures can be supported using the LIP data structures:

- LIP identifiers;
- Access control;
- Privacy;
- Data integrity;
- Miscellaneous.

It is considered an essential part of the LIP architecture that the appropriate security features are supported. In Figure 7.1 this could mean that these security features are supported in several of the different layers to create a trusted communication system.

7.8.1   LIP Identifiers

The LIP identifiers are logical identifiers for the learner information as a whole and the LIP data structures as components. As such this information is for labelling. The *sourcedid* information is considered a globally unique identifier and as such it an essential piece of information to be used in identifying the learner information record. Access to and/or presentation of this identifier should not be considered the equivalent of allowing access to the corresponding information.

7.8.2   Access Control

Typically, learner information may be accessed by learners, their agents e.g. parents and other authorized representatives. Not all administrative personnel have access to learner information. There may be restrictions on the kind of learner information that can be stored and can be changed.

The learner information can be structured according to the learner's environment. If the learner is alone and not collaborating, then the learner information might be minimal and, probably, private. If the learner is in a traditional learning institution where there are well-defined roles e.g. classmate, teacher, instructor, principal, etc. yet there is little on-line collaboration among learners, then the learner information might describe these institutional relationships, and the information might be private. If the learner is in an on-line, collaborative environment, then this kind of relationship information may be stored as learner information, and portions of the learner information might be available to other collaborators. Some parts of learner information is very private e.g. private keys, while other parts are made available to the public e.g. public keys. If role-based access control is used e.g. a teacher can change the grades of his/her students, then learner information might describe the relationship and would describe the associated security parameters.

The LIP allows an access control statement to be assigned to any of the core or component data structures – see Section 7.3.3 (these are not mandatory). How the communicating systems use this information is beyond the scope of the LIP specification but the appropriate handling of this information should be covered in the corresponding implementation policy.

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[3] Many of the issues raised in this sub-Section are derived from similar ones raised within the IEEE PAPI v6 draft specification. The key difference is that we have shown how these issues can be supported using the features of the LIP.

7.8.3   Privacy

Privacy can be defined as 'A technical policy about information security that reduces outbound security threats to an acceptable level'. Privacy may include: controlling the copying of information and/or controlling transfer of information. The policy may be implemented with various techniques, technologies, procedures, and/or practices. Various security techniques may implement privacy, such as: physical security, confidentiality, permitting retrieval or read access only to authorized entities, and/or prohibiting retrieval and read access to unauthorized entities. Various security technologies may implement privacy, such as: access control and encryption. Policy-makers, such as regulators, institutional administrators, and users, may mandate privacy but may choose different (yet compatible) implementations of privacy policy.

The LIP allows a privacy statement to be assigned to any of the core or component data structures – see Section 7.3.3 (these are not mandatory). How the communicating systems use this information is beyond the scope of the LIP specification but the appropriate handling of this information should be covered in the corresponding implementation policy.

7.8.4   Data Integrity

Data integrity can be defined as 'A technical policy about information security that reduces inbound security threats to an acceptable level'. Data integrity may include: controlling the creation of information and/or controlling changes to information. The policy may be implemented with various techniques, technologies, procedures, and/or practices. Various security techniques may implement data integrity, such as: physical security, permitting storage or write access only to authorized entities, and/or prohibiting storage and write access to unauthorized entities. Various security technologies may implement data integrity, such as: digital signatures, access control, and read-only media. Policy makers, such as regulators, institutional administrators, and users, may mandate data integrity but may choose different, yet compatible, implementations of integrity policy.

Support for data integrity is outside the scope of the LIP. We would expect that the exchange of LIP instances is supported using an appropriate trusted communications system that guarantees data integrity. However, in the privacy statement to be assigned to any of the core or component data structures – see Section 7.3.3 – it s possible to include a checksum that can be used to detect unauthorised alteration of the data.

7.8.5   Miscellaneous

Nomadic Access

Learning technology components may need to read/write learner information in nomadic (sometimes-connected) environments. Many of these systems have local content e.g. CD-ROM, but remote or distance records management systems. Nomadic access is one way in which the LIP instances may be exchanged.

Granularity

Learner information is stored in various levels of granularity. It is desirable to exclude or include certain levels when retrieving records from the profile server. The LIP supports the exchange of any level of granularity of the learner information.

7.9   Distributed Architectures & Considerations

Definition of the distributed architecture within which the LIP records are exchanged is outside of the scope of the LIP specification. However, we briefly describe the ways in which different distributed architectures can be supported using the LIP data structures:

- LIP identifiers – the global uniqueness of the *sourcedid* means that in principle any learner information record can be identified using this identifier. It is possible for the learner information to have more than one *sourcedid* however the ways in which their relationship is reconciled is a system implementation issue (it may use the relationship structure in the LIP);

- Commitment, concurrency, recovery and replication – this is normally considered a feature of the transaction and the messaging components of a system. These functions are outside the scope of the LIP specification;

- Transaction granularity and scalability – the LIP has been designed so that as much or as little information needs to be exchanged. This means that the LIP is ideal for sending both small and large amounts of information in either a single or a group of packaged LIP instances;

- Nomadic access – nothing in the operation of the LIP excludes support for nomadic-access systems. Indeed, the variation in granularity levels, the usage of a flexible indexing system and support for temporal and privacy meta-data makes the LIP ideal for learner information exchange between nomadic-access systems.

8.   V2.0 Elements

The elements listed in Table 8.1 are used to indicate where new functionality will be added in later releases of the specifications:

Table 8.1 List of V1.x/2.0 specific elements.

Extension Element Name	Host Element	Description
disability	accessibility	Used to contain information concerning the learner's range of disabilities and learning difficulties. Will incorporate the work undertaken by the IMS Accessibility working-group.
eligibility	accessibility	Used to contain information concerning the issues of the learner's eligibility e.g. for sponsorship, prerequistities, etc.
competency	competency	Will incorporate the work undertaken by the IMS Competency Definitions working-group.
transcript	transcript	Will incorporate the work that is currently being undertaken by the ANSI X.12 group.
taxonomy	learnerinformation	Will be used to incorporate the definition of taxonomies that will be used to support the core data objects.

Note:

The structure of these elements will change in V1.x/V2.0 releases of these specifications. Their main role is to indicate the type of functions to be included in later releases of these specifications and as such vendors are encouraged NOT to make use of these in V1.0 implementations.

9.   Extensibility

The proprietary extensions facilities listed in Table 9.1 are supported as elements within the specifications:

Table 9.1 List of proprietary extension elements.

Extension Element Name	Host Element	Description
ext_accessibility	accessibility	Allows the inclusion of proprietary features to the *accessibility* core data structure. A single extension is permitted per instance.
ext_activity	activity	Allows the inclusion of proprietary features to the *activity* core data structure. A single extension is permitted per instance.
ext_affiliation	affiliation	Allows the inclusion of proprietary features to the *affiliation* core data structure. A single extension is permitted per instance.
ext_competency	competency	Allows the inclusion of proprietary features to the *competency* core data structure. A single extension is permitted per instance.
ext_contentype	contentype	Allows the inclusion of proprietary features to the *contentype* element that is a part of all the core data structures, the root element and many other data objects.
ext_date	date	Allows the inclusion of proprietary features to the *date* element that is a part of the several core data structures.
ext_definition	definition	Allows the inclusion of proprietary features to the *definition* element that is a part of the *activity* core data structure.
ext_disability	disability	Allows the inclusion of proprietary features to the *disability* element that is a part of the *accessibility* core data structure. Note that the eligibility element is for development in further releases of the specification.
ext_eligibility	eligibility	Allows the inclusion of proprietary features to the *eligibility* element that is a part of the *accessibility* core data structure. Note that the eligibility element is for development in further releases of the specification.
ext_evaluation	evaluation	Allows the inclusion of proprietary features to the *evaluation* element that is a part of the *activity* core data structure.
ext_exrefrecord	exrefrecord	Allows the inclusion of proprietary features to the *exrefrecord* element that is a part of the several core data structures.
ext_goal	goal	Allows the inclusion of proprietary features to the *goal* core data structure. A single extension is permitted per instance.
ext_identification	identification	Allows the inclusion of proprietary features to the *identification* core data structure. A single extension is permitted per instance.
ext_interest	interest	Allows the inclusion of proprietary features to the *interest*

Extension Element Name	Host Element	Description
		core data structure. A single extension is permitted per instance.
ext_language	language	Allows the inclusion of proprietary features to the *language* element that is a part of the *accessibility* core data structure.
ext_learnerinfo	learnerinformation	Allows the extension of the root element structure. This enables new core data structures to be added to the root. Note that new core structures could be considered for adoption within the main framework in later releases of the specification.
ext_objectives	objectives	Allows the inclusion of proprietary features to the *objectives* element that is a part of *evaluation* element within the *activity* core data structure.
ext_preference	preference	Allows the inclusion of proprietary features to the *preference* element that is a part of the *accessibility* core data structure.
ext_product	product	Allows the inclusion of proprietary features to the *product* element that is a part of several core data structures.
ext_qcl	qcl	Allows the inclusion of proprietary features to the *qcl* core data structure. A single extension is permitted per instance.
ext_relationship	relationship	Allows the inclusion of proprietary features to the *relationship* core data structure. A single extension is permitted per instance.
ext_role	role	Allows the inclusion of proprietary features to the *role* element that is a part of the *affiliation* core data structure.
ext_securitykey	securitykey	Allows the inclusion of proprietary features to the *securitykey* core data structure. A single extension is permitted per instance.
ext_testimonial	testimonial	Allows the inclusion of proprietary features to the *testimonial* element that is a part of the *activity* core data structure.
ext_transcript	transcript	Allows the inclusion of proprietary features to the *transcript* core data structure. A single extension is permitted per instance.

Note:

The working-group considers these extensions as a key capability within the LIP specification and unlike some of the other specifications makes a guarantee to provide these extension points in all further releases of the specification. This is because we recognise that the LIP will never be definitive (indeed we have not and will not be attempting to make it definitive) in terms of including all possible types of learner information and that extensions used in specific systems is desireable.

10. Conformance

The purpose of this conformance statement is to provide a mechanism for customers to fairly compare vendors of Learner Information content and tools. It is not required for a vendor to support every feature to claim conformance, however, a vendor must detail their level of conformance with a "Conformance Statement".   As such this is an Informative Conformance statement only.

10.1 Valid Data Issues

Vendors claiming conformance shall be able to read and write valid instances of the learner information data as defined by the XML Schema including proprietary extensions where applicable. For the handling of an IMS LIP instance the conformance statement shall:

* Indicate that all of the mandatory information model elements are correctly formed and located within the instance;

* Indicate that all of the optional information model elements are correctly formed and located when relevant to the instance;

* Indicate where the extension facilities made available within the LIP have been used and/or required.

10.2 Conformance Statement

Vendors claiming conformance must provide a "Conformance Statement", detailing their level of conformance. The Conformance Statement takes the form of twelve tables, namely:

* Table 10.1 – <learnerinformation> data structure conformance;

* Table 10.2 – <accessibility> data structure conformance;

* Table 10.3 – <activity> data structure conformance;

* Table 10.4 – <affiliation> data structure conformance;

* Table 10.5 – <competency> data structure conformance;

* Table 10.6 – <goal> data structure conformance;

* Table 10.7 – <identification> data structure conformance;

* Table 10.8 – <interest> data structure conformance;

* Table 10.9 – <qcl> data structure conformance;

* Table 10.10 – <relationship> data structure conformance;

* Table 10.11 – <securitykey> data structure conformance;

* Table 10.12 – <transcript> data structure conformance.

In each table the relevant tick-boxes are checked to indicate that the corresponding property is supported. The conformance statement then becomes the collection of the checked tick-boxes.

10.2.1   Learnerinformation Conformance Statement Table

Table 10.1 Learnerinformation conformance statement table.

Learnerinformation		
Optional Fields:	*Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*	
❏ contentype		
❏ referential	❏ temporal	❏ privacy
❏ comment	❏ qcl	❏ affiliation
❏ identification	❏ activity	❏ transcript
❏ accessibility	❏ competency	❏ securitykey
❏ goal	❏ interest	❏ relationship
Extension Fields:	*These features allow the data model to be extended.*	
Vocabularies	Functions	
❏ typename	❏ ext_learnerinfo	

10.2.2   Accessibility Conformance Statement Table

Table 10.2 Accessibility conformance statement table.

Accessibility		
Optional Fields:	*Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*	
❏ contentype		
❏ referential	❏ temporal	❏ privacy
❏ comment	❏ language	❏ preference
Extension Fields:	*These features allow the data model to be extended.*	

Vocabularies

❑ typename

Functions

❑ ext_accessibility

❑ ext_language

❑ ext_preference

❑ ext_disability

❑ ext_eligibility

10.2.3   Activity Conformance Statement Table

Table 10.3 Activity conformance statement table.

Activity

Optional Fields: *Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*

❑ contentype

    ❑ referential   ❑ temporal   ❑ privacy

❑ comment	❑ learningrefactivity	❑ testimonial
❑ date	❑ product	❑ status
❑ status	❑ definition	❑ description
❑ units	❑ evaluation	

Extension Fields: *These features allow the data model to be extended.*

Vocabularies   Functions

    ❑ typename   ❑ ext_activity

                                        ❑ ext_definition

                                        ❑ ext_product

                                        ❑ ext_testimonial

                                        ❑ ext_evaluation

10.2.4   Affiliation Conformance Statement Table

Table 10.4 Affiliation conformance statement table.

Affiliation

Optional Fields: *Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*

❑ contentype

    ❑ referential   ❑ temporal   ❑ privacy

❑ comment	❑ organization	❑ status
❑ affiliationid	❑ date	❑ description
❑ role		

Extension Fields: *These features allow the data model to be extended.*

Vocabularies   Functions

❑ typename   ❑ ext_affiliation

                                                ❑ ext_role

10.2.5   Competency Conformance Statement Table

Table 10.5 Competency conformance statement table.

Competency		
Optional Fields: *Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*		
❑ contentype		
❑ referential	❑ temporal	❑ privacy
❑ comment	❑ exrefrecord	❑ description
Extension Fields: *These features allow the data model to be extended.*		
Functions		
❑ ext_competency		
❑ ext_exrefrecord		

10.2.6   Goal Conformance Statement Table

Table 10.6 Goal conformance statement table.

Goal		
Optional Fields: *Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*		
❑ contentype		
❑ referential	❑ temporal	❑ privacy
❑ comment	❑ priority	❑ description
❑ date	❑ status	
Extension Fields: *These features allow the data model to be extended.*		
Vocabularies	Functions	
❑ typename	❑ ext_goal	

10.2.7   Identification Conformance Statement Table

Table 10.7 Identification conformance statement table.

Identification		
Optional Fields: *Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*		
❑ contentype		
❑ referential	❑ temporal	❑ privacy
❑ comment	❑ address	❑ demographics
❑ formname	❑ pobox	❑ representation
❑ name	❑ street	❑ gender
❑ contactinfo	❑ locality	❑ date
❑ telephone	❑ city	❑ uid
❑ facsimile	❑ country	
❑ mobile	❑ statepr	❑ agent
❑ pager	❑ region	❑ agentid
❑ email	❑ postcode	❑ agentdomain
❑ web	❑ timezone	
	❑ geo	❑ description
Extension Fields: *These features allow the data model to be extended.*		
Vocabularies		Functions
❑ typename		❑ ext_identification

10.2.8   Interest Conformance Statement Table

Table 10.8 Interest conformance statement table.

Interest		
Optional Fields: *Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*		
❑ contentype		
❑ referential	❑ temporal	❑ privacy
❑ comment	❑ product	❑ description
Extension Fields: *These features allow the data model to be extended.*		

Vocabularies   Functions

❑ typename   ❑ ext_interest

                                                ❑ ext_product

10.2.9   Qcl Conformance Statement Table

Table 10.9 Qcl conformance statement table.

Qcl		
Optional Fields: *Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*		
❑ contentype		
❑ referential	❑ temporal	❑ privacy
❑ comment	❑ registrationno	❑ date
❑ title	❑ level	❑ description
❑ organization		
Extension Fields: *These features allow the data model to be extended.*		
Vocabularies	Functions	
❑ typename	❑ ext_qcl	

10.2.10   Relationship Conformance Statement Table

Table 10.10 Relationship conformance statement table.

Relationship		
Optional Fields: *Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*		
❑ contentype		
❑ referential	❑ temporal	❑ privacy
❑ comment	❑ tuplerelation	❑ description
❑ tuplesource	❑ tupledest	
Extension Fields: *These features allow the data model to be extended.*		
Vocabularies	Functions	
❑ typename	❑ ext_relationship	

10.2.11 Securitykey Conformance Statement Table

Table 10.11 Securitykey conformance statement table.

Goal		
Optional Fields: *Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*		
❑ contentype		
❑ referential	❑ temporal	❑ privacy
❑ comment	❑ keyfields	❑ description
Extension Fields: *These features allow the data model to be extended.*		
Vocabularies	Functions	
❑ typename	❑ ext_securitykey	

10.2.12 Transcript Conformance Statement Table

Table 10.12 Transcript conformance statement table.

Transcript		
Optional Fields: *Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*		
❑ contentype		
❑ referential	❑ temporal	❑ privacy
❑ comment	❑ exrefrecord	❑ description
Extension Fields: *These features allow the data model to be extended.*		
Vocabularies	Functions	
❑ typename	❑ ext_transcript	
	❑ ext_exrefrecord	

10.3 A Conformance Statement Example

In the following tables is an example of how the conformance Tables 10.1 to 10.12 can be completed. In this example only the <identification> and <qcl> core data structures are supported. This gives rise to the three conformance tables of:

- Table 10.13 – the example *learnerinformation* conformance statement.

- Table 10.14 – the example *identification* conformance statement.

- Table 10.15 – the example *qcl* conformance statement.

Table 10.13 Example learnerinformation conformance statement table.

Learnerinformation

Optional Fields:	*Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*

✔ contentype

❏ referential	❏ temporal	❏ privacy
✔ comment	✔ qcl	❏ affiliation
✔ identification	❏ activity	❏ transcript
❏ accessibility	❏ competency	❏ securitykey
❏ goal	❏ interest	❏ relationship

Extension Fields:	*These features allow the data model to be extended.*

Vocabularies	Functions
✔ typename	❏ ext_learnerinfo

Table 10.14 Example identification conformance statement table.

Identification

Optional Fields:	*Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*

✔ contentype

❏ referential	❏ temporal	❏ privacy
✔ comment	❏ address	✔ demographics
✔ formname	✔ pobox	❏ representation
✔ name	✔ street	❏ gender
✔ contactinfo	✔ locality	❏ date
❏ telephone	✔ city	❏ uid
❏ facsimile	✔ country	
❏ mobile	✔ statepr	❏ agent
❏ pager	❏ region	❏ agentid
❏ email	✔ postcode	❏ agentdomain
❏ web	❏ timezone	
	❏ geo	✔ description

Extension Fields:	*These features allow the data model to be extended.*	
Vocabularies		Functions
✓ typename		❏ ext_identification

Table 10.15 Example qcl conformance statement table.

Qcl		
Optional Fields:	*Optional fields are informative. Checking an optional field implies that all of the associated mandatory elements are supported.*	
✓ contentype		
❏ referential	❏ temporal	❏ privacy
✓ comment	✓ registrationno	✓ date
✓ title	✓ level	✓ description
✓ organization		
Extension Fields:	*These features allow the data model to be extended.*	
Vocabularies		Functions
✓ typename		❏ ext_qcl

The salient features to note from Tables 10.13, 10.14 and 10.15 are:

- The entries in Table 10.13 show that only the <identification> and <qcl> core data structures are supported. No extensions are supported at the <learnerinformation> level. All of the mandatory features are supported. All of the vocabularies are supported and their associated extension facilities;

- The entries in Table 10.14 show that all of the mandatory features are supported. All of the <comment>, <formname>, <name>, <contactinfo>, <demographics> and <description> features are supported. Within the <address> element the <region>, <timezone> and <geo> features are not supported (thus the <address> tick-box is unmarked). Within the extension features no functional extensions are permitted i.e. <ext_identification> is not supported;

- The entries in table 10.15 show that all of the features are supported within the <qcl> with the exception of the extension function i.e. the element <ext_qcl> is not supported.

Appendix A – LIP and its Schemas

A1   Overview

The Version 1.0 IMS Learner Information Packaging XML Schema (XSD) and Document Type Definitions (DTDs) files are contained in a directory that has:

- **xmla** - the directory that contains all of the XSDs and DTDs in native XML Authority format. XML Authority (v1.2) is a product supplied by eXtensibility Inc;

- **mac** - the directory that contains all of the XSDs and DTDs in text file format. These text files are designed for usage with Macintosh systems;

- **ibm**- the directory that contains all of the XSDs and DTDs in text file format. These text files are designed for usage with PC systems;

- **unix**- the directory that contains all of the XSDs and DTDs in text file format. These text files are designed for usage with Unix systems.

The further directory structure under each of these directories is identical. This further structure is:

- XSDs

    – LIPfulldtd - full commented XSD

    – LIPfullncdtd - full non-commented XSD;

- DTDs

    – LIPfulldtd - full commented DTD

    – LIPfullncdtd - full non-commented DTD;

Within each of the directories the schema file name is:

- XSD directory: **ims_lip_rootv1p0.xsd;**

- DTD directory: **ims_lipv1p0.dtd**;

This approach means that the different types of XSD and DTD can be applied without requiring any editing of the associated source XML files. The full directory structure is given in Appendix A4 of this document.

A2   Features of the Different DTDs/XDRs

The key features of the different DTD/XDR implementations are:

- LIPfull/xsd/dtd – this is the full XSD/DTD with all of the corresponding comments. The comments are used to provide an explanation of the intended functionality of the corresponding schema component;

- LIPfullnc/xsd/dtd – this is the full XSD/DTD but with all of the comments removed. This makes the file smaller and it is easier to see the internal structure.

A3   Recommended Usage of the XSDs and DTDs

The recommended uses of the different XSDs/DTDs are:

- Select the set of XSDs/DTDs that suit your system. All of the mac/unix/ibm text versions are derived from the XML Authority version and created using the Alpha text processing application;

- In most cases only the non-commented versions need to be used. The fully commented files are intended to be informative;

- The DTD set is based upon a monolithic binding whereas the XSD uses a set of included files. It is recommeneded that the XSD is used whenever possible as the DTD is supplied on an informative basis whereas the XSD is treated as the normative version of the specification.

A4   Full Directory Structure

The full directory structure is:

Xmla
- xsds
  - LIPfullxsd
    - ims_lip_rootv1p0.xsd
    - ims_lip_accessibilityv1p0.xsd
    - ims_lip_activityv1p0.xsd
    - ims_lip_affiliationv1p0.xsd
    - ims_lip_competencyv1p0.xsd
    - ims_lip_goalv1p0.xsd
    - ims_lip_identificationv1p0.xsd
    - ims_lip_interestv1p0.xsd
    - ims_lip_qclv1p0.xsd
    - ims_lip_relationshipv1p0.xsd
    - ims_lip_securitykeyv1p0.xsd
    - ims_lip_transcriptv1p0.xsd
    - ims_lip_attributesv1p0.xsd
    - ims_lip_commonlipv1p0.xsd
    - ims_lip_descriptionv1p0.xsd
    - ims_lip_evaluationv1p0.xsd
    - ims_lip_exrefrecordv1p0.xsd
    - ims_lip_extensionv1p0.xsd
    - ims_lip_mediav1p0.xsd
    - ims_lip_organizationv1p0.xsd
    - ims_lip_rolev1p0.xsd
    - ims_lip_tuplev1p0.xsd
  - LIPfullncxsd
    - ims_lip_rootv1p0.xsd
    - ims_lip_accessibilityv1p0.xsd
    - ims_lip_activityv1p0.xsd
    - ims_lip_affiliationv1p0.xsd
    - ims_lip_competencyv1p0.xsd
    - ims_lip_goalv1p0.xsd
    - ims_lip_identificationv1p0.xsd
    - ims_lip_interestv1p0.xsd
    - ims_lip_qclv1p0.xsd
    - ims_lip_relationshipv1p0.xsd
    - ims_lip_securitykeyv1p0.xsd
    - ims_lip_transcriptv1p0.xsd
    - ims_lip_attributesv1p0.xsd
    - ims_lip_commonlipv1p0.xsd
    - ims_lip_descriptionv1p0.xsd
    - ims_lip_evaluationv1p0.xsd
    - ims_lip_exrefrecordv1p0.xsd
    - ims_lip_extensionv1p0.xsd
    - ims_lip_mediav1p0.xsd
    - ims_lip_organizationv1p0.xsd
    - ims_lip_rolev1p0.xsd
    - ims_lip_tuplev1p0.xsd
- dtds
  - LIPfulldtd
    - ims_lipv1p0.dtd

Mac
- xsds
  - LIPfullxsd
    - ims_lip_rootv1p0.xsd
    - ims_lip_accessibilityv1p0.xsd
    - ims_lip_activityv1p0.xsd
    - ims_lip_affiliationv1p0.xsd
    - ims_lip_competencyv1p0.xsd
    - ims_lip_goalv1p0.xsd
    - ims_lip_identificationv1p0.xsd
    - ims_lip_interestv1p0.xsd
    - ims_lip_qclv1p0.xsd
    - ims_lip_relationshipv1p0.xsd
    - ims_lip_securitykeyv1p0.xsd
    - ims_lip_transcriptv1p0.xsd
    - ims_lip_attributesv1p0.xsd
    - ims_lip_commonlipv1p0.xsd
    - ims_lip_descriptionv1p0.xsd
    - ims_lip_evaluationv1p0.xsd
    - ims_lip_exrefrecordv1p0.xsd
    - ims_lip_extensionv1p0.xsd
    - ims_lip_mediav1p0.xsd
    - ims_lip_organizationv1p0.xsd
    - ims_lip_rolev1p0.xsd
    - ims_lip_tuplev1p0.xsd
  - LIPfullncxsd
    - ims_lip_rootv1p0.xsd
    - ims_lip_accessibilityv1p0.xsd
    - ims_lip_activityv1p0.xsd
    - ims_lip_affiliationv1p0.xsd
    - ims_lip_competencyv1p0.xsd
    - ims_lip_goalv1p0.xsd
    - ims_lip_identificationv1p0.xsd
    - ims_lip_interestv1p0.xsd
    - ims_lip_qclv1p0.xsd
    - ims_lip_relationshipv1p0.xsd
    - ims_lip_securitykeyv1p0.xsd
    - ims_lip_transcriptv1p0.xsd
    - ims_lip_attributesv1p0.xsd
    - ims_lip_commonlipv1p0.xsd
    - ims_lip_descriptionv1p0.xsd
    - ims_lip_evaluationv1p0.xsd
    - ims_lip_exrefrecordv1p0.xsd
    - ims_lip_extensionv1p0.xsd
    - ims_lip_mediav1p0.xsd
    - ims_lip_organizationv1p0.xsd
    - ims_lip_rolev1p0.xsd
    - ims_lip_tuplev1p0.xsd
- dtds
  - LIPfulldtd
    - ims_lipv1p0.dtd

LIPfullncdtd
ims_lipv1p0.dtd

Unix
xsds
LIPfullxsd
ims_lip_rootv1p0.xsd
ims_lip_accessibilityv1p0.xsd
ims_lip_activityv1p0.xsd
ims_lip_affiliationv1p0.xsd
ims_lip_competencyv1p0.xsd
ims_lip_goalv1p0.xsd
ims_lip_identificationv1p0.xsd
ims_lip_interestv1p0.xsd
ims_lip_qclv1p0.xsd
ims_lip_relationshipv1p0.xsd
ims_lip_securitykeyv1p0.xsd
ims_lip_transcriptv1p0.xsd
ims_lip_attributesv1p0.xsd
ims_lip_commonlipv1p0.xsd
ims_lip_descriptionv1p0.xsd
ims_lip_evaluationv1p0.xsd
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ims_lip_accessibilityv1p0.xsd
ims_lip_activityv1p0.xsd
ims_lip_affiliationv1p0.xsd
ims_lip_competencyv1p0.xsd
ims_lip_goalv1p0.xsd
ims_lip_identificationv1p0.xsd
ims_lip_interestv1p0.xsd
ims_lip_qclv1p0.xsd
ims_lip_relationshipv1p0.xsd
ims_lip_securitykeyv1p0.xsd
ims_lip_transcriptv1p0.xsd
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ims_lip_extensionv1p0.xsd
ims_lip_mediav1p0.xsd
ims_lip_organizationv1p0.xsd
ims_lip_rolev1p0.xsd
ims_lip_tuplev1p0.xsd
dtds
LIPfulldtd
ims_lipv1p0.dtd
LIPfullncdtd
ims_lipv1p0.dtd

LIPfullncdtd
ims_lipv1p0.dtd

IBM
xsds
LIPfullxsd
ims_lip_rootv1p0.xsd
ims_lip_accessibilityv1p0.xsd
ims_lip_activityv1p0.xsd
ims_lip_affiliationv1p0.xsd
ims_lip_competencyv1p0.xsd
ims_lip_goalv1p0.xsd
ims_lip_identificationv1p0.xsd
ims_lip_interestv1p0.xsd
ims_lip_qclv1p0.xsd
ims_lip_relationshipv1p0.xsd
ims_lip_securitykeyv1p0.xsd
ims_lip_transcriptv1p0.xsd
ims_lip_attributesv1p0.xsd
ims_lip_commonlipv1p0.xsd
ims_lip_descriptionv1p0.xsd
ims_lip_evaluationv1p0.xsd
ims_lip_exrefrecordv1p0.xsd
ims_lip_extensionv1p0.xsd
ims_lip_mediav1p0.xsd
ims_lip_organizationv1p0.xsd
ims_lip_rolev1p0.xsd
ims_lip_tuplev1p0.xsd
LIPfullncxsd
ims_lip_rootv1p0.xsd
ims_lip_accessibilityv1p0.xsd
ims_lip_activityv1p0.xsd
ims_lip_affiliationv1p0.xsd
ims_lip_competencyv1p0.xsd
ims_lip_goalv1p0.xsd
ims_lip_identificationv1p0.xsd
ims_lip_interestv1p0.xsd
ims_lip_qclv1p0.xsd
ims_lip_relationshipv1p0.xsd
ims_lip_securitykeyv1p0.xsd
ims_lip_transcriptv1p0.xsd
ims_lip_attributesv1p0.xsd
ims_lip_commonlipv1p0.xsd
ims_lip_descriptionv1p0.xsd
ims_lip_evaluationv1p0.xsd
ims_lip_exrefrecordv1p0.xsd
ims_lip_extensionv1p0.xsd
ims_lip_mediav1p0.xsd
ims_lip_organizationv1p0.xsd
ims_lip_rolev1p0.xsd
ims_lip_tuplev1p0.xsd
dtds
LIPfulldtd
ims_lipv1p0.dtd
LIPfullncdtd
ims_lipv1p0.dtd

Appendix B - The LIP XML Instance Example Files

The full set of example files, as referred to in Sections 4 and 5 are available as part of the Learner Information Package Resource Kit. Each XML example directory contains the files necessary to support the LIP example. The XML files are denote by an '.xml' extension. The following tables list the name of each example directory, the nature of the example in terms of data structures. The tables are:

- Table B1 - valid basic examples with the parent directory name of 'IMS_LIPv1p0/Valid/Basic';

- Table B2 - valid advanced examples with the parent directory name of 'IMS_LIPv1p0/Valid/Advanced'.

Table B1 The LIP XML instance valid basic example files.

Directory Name	Data Object	Description
accs_001	accessibility	The creation of an accessibility record using a new sourcedid.
accs_lang_001	accessibility.language	The creation of a language proficiency record using a new sourcedid.
accs_lang_002	accessibility.language	A second language proficiency definition using the sourcedid created in the 'accs_lang_001' example.
accs_pref_001	accessibility.preference	The creation of a preference record using a new sourcedid.
accs_pref_002	accessibility.preference	A second preference using the sourcedid created in the 'accs_pref_001' example.
actv_001	activity	The creation of an activity record using a new sourcedid.
actv_defn_001	activity_definition	The creation of an activity definition record using a new sourcedid.
actv_defn_002	activity_definition	The creation of a second activity definition record using a the sourcedid from 'actv_defn_001'.
actv_eval_001	activity_evaluation	The creation of an activity evaluation record using a new sourcedid.
actv_eval_002	activity_evaluation	The creation of a second activity evaluation record using a the sourcedid from 'actv_eval_001'.
actv_lref_001	activity_learningactivityref	The creation of an activity learner activity reference record using a new sourcedid.
actv_lref_002	activity_learningactivityref	The creation of a second activity learner activity reference record using a the sourcedid from 'actv_defn_001'.
actv_prod_001	activity_product	The creation of an activity product record using a new sourcedid.
actv_prod_002	activity_product	The creation of a second activity product record using a the sourcedid from 'actv_prod_001'.
actv_test_001	activity_testimonial	The creation of an activity testimonial record using a new sourcedid.
actv_test_002	activity_testimonial	The creation of a second activity testimonial record using a the sourcedid from 'actv_test_001'.
affl_001	affiliation	The creation of a new affiliation record using for a new

Directory Name	Data Object	Description
		learner sourcedid.
affl_002	affiliation	The creation of a new affiliation record using for a new learner sourcedid.
affl_003	affiliation	The creation of a second affiliation record using for the learner sourcedid used in 'comp_002'.
comp_001	competency	The creation of a new competency record using for a new learner sourcedid.
comp_002	competency	The creation of a new competency record using for a new learner sourcedid.
comp_003	competency	The creation of a second competency record using for the learner sourcedid used in 'comp_002'.
goal_001	goal	The creation of a new goal record using for a new learner sourcedid.
goal_002	goal	The creation of a new goal record using for a new learner sourcedid.
goal_003	goal	The addition of a sub-goal to the previously created goal record in example 'goal_002'.
iden_001	identification	The creation of an identification record using a new sourcedid.
iden_addr_001	identification_address	The creation of an address record using a new sourcedid.
iden_addr_002	identification_address	A second address record using the sourcedid created in the 'iden_addr_001' example.
iden_agnt_001	identification_agent	The creation of an agent record using a new sourcedid.
iden_agnt_002	identification_agent	A second agent record using the sourcedid created in the 'iden_agnt_001' example.
iden_cinf_001	identification_contactinfo	The creation of a contact information record using a new sourcedid.
iden_cinf_001	identification_contactinfo	A second contacvt information using the sourcedid created in the 'iden_cinf_001' example.
iden_demo_001	identification_demographics	The creation of a demographics record using a new sourcedid.
iden_demo_002	identification_demographics	A second demographics record using the sourcedid created in the 'iden_demo_001' example.
iden_fnme_001	identification_formname	The creation of a formatted name record using a new sourcedid.
iden_fnme_002	identification_formname	A second formatted name record using the sourcedid created in the 'iden_fnme_001' example.
iden_name_001	identification_name	The creation of a compound name record using a new sourcedid.
iden_name_002	identification_name	Changing of the previously created name record using the reference information given in example 'iden_name_002'.
intt_001	interest	The creation of a new interest record using for a new

Directory Name	Data Object	Description
		learner sourcedid.
intt_002	interest	The creation of a new interest record using for a new learner sourcedid.
intt_003	interest	The creation of a second interest record using for the learner sourcedid used in 'comp_002'.
qcln_001	qcl	The creation of a new qcl record using for a new learner sourcedid.
qcln_002	qcl	The creation of a new qcl record using for a new learner sourcedid.
qcln_003	qcl	The creation of a second qcl record using for the learner sourcedid used in 'comp_002'.
rltp_001	relationship	The creation of a new relationship record using for a new learner sourcedid.
rltp_002	relationship	The creation of a new relationship record using for a new learner sourcedid.
rltp_003	relationship	The creation of a second relationship record using for the learner sourcedid used in 'comp_002'.
skey_001	securitykey	The creation of a new securitykey record using for a new learner sourcedid.
skey_002	securitykey	The creation of a new securitykey record using for a new learner sourcedid.
skey_003	securitykey	The creation of a second securitykey record using for the learner sourcedid used in 'comp_002'.
trns_001	transcript	The creation of a new transcript record using for a new learner sourcedid.
trns_002	transcript	The creation of a new transcript record using for a new learner sourcedid.
trns_003	transcript	The creation of a second transcript record using for the learner sourcedid used in 'comp_002'.

Table B2 The LIP XML instance valid advanced example files.

Directory Name	Data Object	Description
engresume	Mixed	Engineering resume.
isrmapv1	Mixed	UK FEFC Individualised Student Record (ISR) to IMS LIP mapping version 1 – optimised to minimise instance size.
isrmapv2	Mixed	UK FEFC Individualised Student Record (ISR) to IMS LIP mapping version 2 – optimised for data sequencing.

Appendix C – Glossary of Terms

C1   General Terms

ADL	The Advanced Distributed Learning initiative was started in 1997 by the United States White House. Its aim is to advance the use of online training.
AICC	Aviation Industry CBT Committee is a membership-based international forum that develops recommendations on interoperable learning technologies.
Conformance statement	A conformance statement provides a mechanism for customers to fairly compare vendors of assessment tools and content.
DTD	Document Type Definition.
Element	An XML term that defines a component within an XML document that has been identified in a way a computer can understand.
Element attributes	Provides additional information about an element.
Element contents	An XML term used to describe the content of the element.
HR-XML	The HR-XML is a group of companies attempting to define XML representations to support Human Resource activities. At present they have developed three DTDs for activities such as resume exchange, etc. The relationship between the IMS LIP and the HR-XML DTDs is discussed in this document.
IEEE	Institute of Electrical and Electronics Engineers that provides a forum for developing specifications and standards.
IMS	An organization dedicated to developing specification for distributed learning.
IMS Enterprise	The IMS Enterprise specification complements the IMS LIP. The Enterprise specification should be used for the exchange of group and membership information e.g. members of a particular class, cohort, etc.
IMS Meta-data	The IMS meta-data specification was released in October 1999. This was the first specification released by IMS. It is compatible with the IEEE LOM and Dublin Core.
IMS QTI	The IMS Question & Test Interoperability specification was issued by IMS in May 2000 with version 1.1 being released in March 2001. This specification is under consideration for adoption by several of the other specification and standards development organisations.
LMS	Learning Management System that is the system responsible for the management of the learning experience.
LTSC	The IEEE's Learning Technology Standards Committee
Metadata	Tags that described the content of the associated data.
PAPI	The IEEE Personal & Private Information specification is being developed by the IEEE LTSC. The relationship between the IMS LIP and the IEEE PAPI is discussed in this document.
SIF	The Schools Interoperability Framework is an activity focussed on the development of specifications for the exchange of information between the K-12 schools. The relationship between the IMS LIP and the SIF is discussed in this document.
vCard	vCard is an IETF proposal for an electronic business card representation. It has not yet been adopted as an RFC. A vCard DTD has been developed and its core

features have been adopted by the IMS LIP. The relationship between the IMS LIP and vCard is discussed in this document.

W3C   World Wide Web Consortium.

XDR   The XML Data Representation format is a Microsoft XML schema. XDR schema is more powerful representation than DTDs.

XML   Extensible Mark-up Language is a specification, produced by the World Wide Web Consortium.

XSD   XML Schema is the preferred IMS binding for XML.

C2   LIP Elements and Attributes

accessibility   The *accessibility* learner information is one of the eleven core data structures. It is the learner information that consists of the cognitive, technical and physical preferences for the learner, their language capabilities, disability and eligibilities. Multiple accessibility definitions are permitted for each learner.

activity   The *activity* learner information is one of the eleven core data structures. It consists of the education/training, work and service (military, community, voluntary, etc.) record and products (excluding formal awards). This information may include the descriptions of the courses undertaken and the records of the corresponding evaluation. Each activity has its own structure and an activity may contain sub-activities.

address   The *address* element is a part of the *identification* element. The address contains information such as the street (this is a complex structure in its own right), state, country, zip code, geographic location, etc. Each address has an associated type (defined using *typename*) and different addresses must be contained in multiple instances of the *address* element.

affiliation   The *affiliation* learner information is one of the eleven core data structures. It is used to store the descriptions of the affiliations associated with the learner e.g. professional affiliations. A learner's membership of the relevant class, cohorts, groups, etc. undertaken when being educated, trained, etc. should be supported using the IMS Enterprise specification. Each affiliation is contained within its own instance.

affiliationid   The *affiliationid* element is used within the *affiliation* element. It is used to contain the reference number assigned by the institution to which the leaner is claiming an affiliation i.e. their membership number. The data is entered as a string of up to 128 characters.

agent   The *agent* element is used within the *identification* element. It is used to store the details concerning representatives who can act on behalf of the learner. The types of agent are Parent, Guardian, Advisor, etc. (these are defined as part of the *typename* element). The details for each agent are contained within its own *agent* element.

agentdomain   The *agentdomain* element is used within the *agent* element. It is used to define the role that the agent is permitted to undertake on behalf of the learner. The types of role permitted are legal, sponsor, etc. (these are defined as part of the *typename* element).

agentid   The *agentid* element is used within the *agent* element. It is used to contain the identifier assigned to the agent e.g. their name, reference number, etc.

aptnumber	The *aptnumber* element is used within the *street* element that itself forms a part of the *address* element. This element is used to contain the apartment number component of the learner's address. Prefix and suffix components of the apartment number are available as other elements.
aptnumprefix	The *aptnumsuffix* element is used within the *street* element that itself forms a part of the *address* element. This element is used to contain the prefix component of the apartment number. This element should be used in conjunction with the *aptnumber* element.
aptnumsuffix	The *aptnumsuffix* element is used within the *street* element that itself forms a part of the *address* element. This element is used to contain the suffix component of the apartment number e.g. the 'A' for an apartment number of 34A. This element should be used in conjunction with the *aptnumber* element.
apttype	The *apttype* element is used within the *street* element that itself forms a part of the *address* element. It is used to contain the type of apartment component of the address. The attribute *xml:lang* is used to define the language of the string entry.
areacode	The *areacode* element is used within the *telephone*, *facsimile*, *pager* and *mobile* elements. These elements are used to store the corresponding public switched telephone network number. In every case the associated number must include the *areacode* element.
city	The *city* element is used within the *address* element. This element is used to store the city name part of the learner's address. The city name is entered as a string e.g. Boston, Sheffield, Sydney, Tokyo, etc. The attribute *xml:lang* is used to define the language.
classification	The *classification* element is used within the *affiliation* element. It is used define the nature of the affiliation within the organisation. The data is entered as a string.
comment	This is the commenting facility within the XML schemas. The comments can take any form supported as #PCDATA. The key difference between this comment style and the standard '<!-- *** -->' is that the former is passed through the XML parser to the host system.
competency	The *competency* learner information is one of the eleven core data structures. It consists of the descriptions of the skills the learner has acquired. These skills may be associated with some formal or informal training or work history (described in the 'activity') and formal awards (described in the 'qcl'). The corresponding level of competency may also be defined. Each competency is defined by its own structure. This data object will be reworked once the IMS Competency Definition working-group has completed its final specification.
complex	The *complex* element is used within the *street* element which is itself contained within the *address* element. It is used to contain the name of the building complex part of the street address. The *xml:lang* attribute is used to define the language of the entered information which is submitted as a string of up to 128 characters length.
contactinfo	The *contactinfo* element is used within the *identification* element. It is used to store the information describing the ways in which the learner can be contacted electronically. This includes *telephone*, *pager*, *facsimile*, *mobile*, *email* and *web* elements to contain the corresponding contact details e.g. the actual email address. Each piece of contact information must be stored within its own *contactinfo* element and the type of information is defined using the *typename* element – this is used to define whether the details refer to the home, work, etc.
contentref	The *contentef* element is used within the *objectives* element. It is used to enable the support of an external reference mechanism, as used to reflect the <matref>

	mechanism within the IMS QTI specification. The information will be entered as a string of up to 256 characters in length.
contentreftype	The *contentreftype* attribute is is used by the *media* element only. It is used to describe the nature of the manner in which the content material is stored. It consists of an enumerated list: 'uri', 'entityref' and Base-64 (Base-64 is the default value). The 'uri' value means that the material is stored in the file defined by the external reference. The 'entityref' value means that the file is linked using the XML ENTITY structure. The Base-64 value means that the material is embedded within the XML instance itself.
contentype	The *contentype* element is the container for the control information that is used to describe the learner information. This information consists of referential, temporal and privacy information and is applied to each of the 'atomic data objects' of the learner information structure. This structure consists of *referential*, *temporal* and *privacy* information.
country	The *country* element is used within the *address* element. It is used to store the country component of the address e.g. Brazil, China, etc. The *xml:lang* attribute is used to define the language of the entered information and it is submitted as a string of up to 256 characters in length.
countrycode	The *countrycode* element is used within the *telephone*, *facsimile*, *pager* and *mobile* elements. It is used to store the country code of the corresponding telephony number. The data is entered as a two integer in the range 00-99.
date	The *date* element is used by a variety of the other elements. It is used to contain any date related information such as the start date, publishing date, finish date, etc. The tupe of date is defined using the *typename* element.
datetime	The *datetime* element is used by the *date* element. It is used to contain the actual date and/or time information. The structure of the datetime should conform to the IS8601 standard and takes te form of: YYYY:MM:DDTHH:MM:SS i.e. year, month, day, hour, minute and second.
definition	The *definition* element is used with the *activity* element only. It is used to store the description of the structure of the activity being undertaken. The activity is represented using a polyhierarchical structure and so any level of granularity can be stored. The type of structure being defined is identified using the *typename* element.
definitionfield	The *definitionfield* element is used within the *definition* element only. It is used to contain the actual description of the activity structure using one or more occurences of the element. The structure is described using the *fieldlabel* and *fielddata* elements.
demographics	The *demographics* element is used within the *identification* element. It is used to store the learner information for demographic information about the learner e.g. gender, place of birth, etc. A single demographics element can be used to contain several pieces of related demographics information.
description	The *description* element is used by a variety of other elements. It is used to contain the materials for the data object. The *description* element can include one or more of the *short*, *long* and *full* elements. The intention is for these three elements to contain related information about the same object i.e. to supply progressively increasing details.
disability	The *disability* element is used within the *accessibility* element. This will be used to contain all of the information relevant to the disabilities and learning difficulties of the learner. **This element is to be developed in further releases of this specification and in response to the work undertaken by the IMS**

Accessibility working-group.

duration	The *duration* element is used within the *evaluation* element which is itself used by the *activity* element. It is used to contain the information of the periods/durations associated with a particular evaluation e.g. the time taken to complete the examination. The nature of the duration is defined using the *fieldlabel* and *fielddata* elements.
eligibility	The *eligibility* element is used within the *accessibility* element. This will be used to contain all of the information relevant to the disabilities and learning difficulties of the learner. **This element is to be developed in further releases of this specification and in response to the work undertaken by the IMS Accessibility working-group.**
email	The *email* element is a part of the *contactinfo* element. It is used to store the email address of the learner. Multiple email addresses require the usage of multiple *contactinfo* instances. The information is supplied as string and should take the form of: 'userid@host'.
entityref	The *entityref* attribute is used as an alternative to the *uri* attribute. The key difference is that the *entityref* refers to an XML entity whose external linkage is bound to the XML instance itself. This binding also allows the XML-capable processes to intelligently handle the material. It is recommended that this attribute be used in preference to the *uri* attribute.
evalmetadata	The *evalmetadata* element is used within the *evaluation* element only. This is used to store the evaluation specific meta-data. This element is particularly important when the IMS QTI Assessment, Section and Item and their meta-data content have to be stored.
evalmetadatafield	The *evalmetadatafield* is used within the *evalmetadata* element contain each of the individualised meta-data entries. Each field should be labelled accoding to the vocabulary defined within the *evalmetadata* element.
evaluation	The *evaluation* element is used within the *activity* element. It is used to store the information concerning the assessment/evaluation of the associated activity. The *evaluation* element is a recursive structure and so complex results information can be contained. This element is to be used to store all of the summary results interoperability information and as such it will be subject to harmonisation with the V1.2 and later releases of the IMS QTI specifications.
evaluationid	The *evaluationid* element is used within the *evaluation* element only. It is used to store the identifier that is used to identify the actual evaluation. This element is particularly useful when storing the IMS QTI Assessments, Section and Items as their 'ident' value can be stored.
exrefrecord	The *exrefrecord* element is used within the *competency* and *transcript* elements. It is used to store the arbitrarily formatted material used for the competency or transcript materials. The content format is defined using the *recformat* element and the actual material is stored using the *recdata* element.
ext_accessibility	The *ext_accessibility* element is used to support any of the proprietary functions that are required within the *accessibility* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_activity	The *ext_activity* element is used to support any of the proprietary functions that are required within the *activity* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_affiliation	The *ext_affiliation* element is used to support any of the proprietary functions that

	are required within the *affiliation* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_competency	The *ext_competency* element is used to support any of the proprietary functions that are required within the *competency* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_contentype	The *ext_contentype* element is used to support any of the proprietary functions that are required within the *contentype* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_date	The *ext_date* element is used to support any of the proprietary functions that are required within the *date* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_definition	The *ext_definition* element is used to support any of the proprietary functions that are required within the *definition* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_disability	The *ext_disability* element is used to support any of the proprietary functions that are required within the *disability* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_eligibility	The *ext_eligibility* element is used to support any of the proprietary functions that are required within the *eligibility* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_evaluation	The *ext_evaluation* element is used to support any of the proprietary functions that are required within the *evaluation* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_exrefrecord	The *ext_exrefrecord* element is used to support any of the proprietary functions that are required within the *exrefrecord* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_goal	The *ext_goal* element is used to support any of the proprietary functions that are required within the *goal* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_identification	The *ext_identification* element is used to support any of the proprietary functions that are required within the *identification* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_interest	The *ext_interest* element is used to support any of the proprietary functions that are required within the *interest* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_language	The *ext_language* element is used to support any of the proprietary functions that are required within the *language* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension

features is **fully** guaranteed.

ext_learnerinfo	The *ext_learnerinfo* element is used to support any of the proprietary functions that are required within the *learnerinfo* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_objectives	The *ext_objectives* element is used to support any of the proprietary functions that are required within the *objectives* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_preference	The *ext_preference* element is used to support any of the proprietary functions that are required within the *preference* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_product	The *ext_product* element is used to support any of the proprietary functions that are required within the *product* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_qcl	The *ext_qcl* element is used to support any of the proprietary functions that are required within the *qcl* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_relationship	The *ext_relationship* element is used to support any of the proprietary functions that are required within the *relationship* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_role	The *ext_role* element is used to support any of the proprietary functions that are required within the *role* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_securitykey	The *ext_securitykey* element is used to support any of the proprietary functions that are required within the *securitykey* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_testimonial	The *ext_testimonial* element is used to support any of the proprietary functions that are required within the *testimonial* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
ext_transcript	The *ext_transcript* element is used to support any of the proprietary functions that are required within the *transcript* element. These functions will not be available in any of data objects currently defined. Backwards compatibility of the extension features is **fully** guaranteed.
extnumber	The *extnumber* element is used within the *telephone* and *facsimile* elements. It is used to store the extension number component of the telephony number. This information is entered as a string.
facsimile	The *facsimile* element is used within the *contactinfo* element. This element is used to store the appropriate fax machine number cf. the *telephone* element. The fax number can include the county code and extension number as well as the normal area code and actual number.
fielddata	The *fielddata* element is used by several other elements but it is always

	accompanied by the *fieldlabel* element. It is sued to store the actual information in the filed whose name is defined using the *fieldlabel* element. The data format is undefined i.e. #PCDATA.
fieldlabel	The *fieldlabel* element is used by several other elements but it is always accompanied by the *fielddata* element. It is used to contain the definition of the nature of the information to be stored in the *fielddata* element i.e. it is used to define the name of the field. The field name is defined using the *typename* element.
formname	The *formname* element is used within the *identification* element. It is used to store the formatted name of the learner. Each formatted name is exchanged using its own *formname* element. The data is stored within the *text* element. A formatted name can have any structure and each entry is supplied as a single string. The type of formatted name is defined using the *stdname* element e.g. 'Contact', 'Full', etc.
full	The *full* element is used within the *description* element. This element is used to contain any type of content material. The actual material is stored using the *media* element.
gender	The *gender* element is used within the *demographics* element to store the gender of the learner. It is an empty element and the information is entered through an attribute.
gender	The *gender* attribute is used by the *gender* element. The gender attribute consists of an enumerated list consisting of [M]ale, [F]emale and [N/A]. This attribute is a mandatory part of the *gender* element.
geo	The *geo* element is used within the *address* element which is itself within the *identification* element. It is used to contain the geographical location of the user is terms of latitude (the *lat* element) and longitude (the *lon* element).
goal	The *goal* learner information is one of the eleven core data structures. It consists of the description of the personal objectives and aspirations. These descriptions may also include information for monitoring the progress in achieving those goals. A goal can be defined in terms of sub-goals and each goal is defined within its own data structure.
id	The *id* element is used within the *sourcedid* element. It is used to store the unique identifier of the actual instance of the data instance being supplied. This identifier should be unique with respect to the associated source information however the way this is achieved and policed is beyond the scope of this specification.
identification	The *identification* learner information is one of the eleven core data structures. It contains all of the data for a specific individual or organisation. This includes data such as: names, addresses, contact information, demographic and representative agent.
indexid	The *indexid* element is used within the *referential* element which is within the *contentype* element. It is used to contain the unique identifier assigned to the data structure. This identifier must be unique with respect to the *sourcedid* element assigned to the *learnerinformation* element itself. The *indexid* identifier should be persistent for the same piece of information in whatever *learnerinformation* XML instance it is used.
indnumber	The *indnumber* element is used within the *telephone*, *facsimile*, *pager* and *mobile* elements. It is used to store the specific telephone number component of the corresponding telephony number. The data is entered as a string of up to ten characters.
interest	The *interest* learner information is one of the eleven core data structures. It

contains the descriptive information and the products of the hobbies and recreational activities of the learner.

interpretscore

The *interpretscore* element is used within the result element to define the context for the associated evaluation scores. Typical uses for this element are to define the maximum or minimum possible scores for the test, etc. The *interpretscore* element contains the *fieldlabel* and *fielddata* elements that are used to define the vocabulary for the fields and the data entry itself respectively.

keyfields

The *keyfields* element is used within the *securitykey* element only. It is used to contain the actual description of the security information using one or more occurences of the element. The content is described using the *fieldlabel* and *fielddata* elements.

language

The *language* element is used within the *accessibility* element. It is used to contain the descriptions of the language proficiencies of the learner. The actual proficiencies are stored within the *proficiency* element. The actual language is defined using the *typename* element.

lat

The *lat* element is used to hold the longitude component of the *geo* element. The latitude is defined by three numbers i.e. degrees (0-89), minutes (0-59) and seconds (0-59), and the corresponding North/South ('N' or 'S') character.

learnerinformation

The *learnerinformation* data structure is the root element and is used to encapsulate the eleven core learner information classes. The control information describing the learner information as a whole is contained within the *contentype* structure - this defines the default values to be applied in general to all of the data objects (the definitions for the data objects themselves take precedence over these global values). The attribute *xml:lang* is used to define the default language of the full data structure.

level

The *level* element is used within the *qcl* element only. It is used to store the level of the associated qualification, certification or licence. The *level* element is recursive and so the grade of the award can be multi-faceted. The actual level is entered using the *text* element.

locality

The *locality* element is used within the *address* element to store the locality part of an address. The locality of an address refers to the immediate geographic area around the street or complex. This could be the parish, the county, etc. The data is entered as a string of up to 128 characters. The attribute *xml:lang* is used to define the language of the associated string entry.

lon

The *lon* element is used to hold the longitude component of the *geo* element. The longitude is defined by three numbers i.e. degrees (0-359), minutes (0-59) and seconds (0-59), and the corresponding East/West ('E' or 'W') character.

long

The *long* element is used within the *description* element. This element is used to contain a long character string (i.e. 256-2048 characters) that is used to characterise the associated description material. The long entry is used in conjunction with the optional *short* and *full* elements. The attribute *xml:lang* is used to define the language of the associated string entry.

media

The *media* element is used within the *objectives* and *full* elements. It is used to store the actual electronic materials e.g. text, video, images, etc. The nature of the content is defined using the *mediamode*, *contentreftype* and *mimetype* attributes. The electronic content can be embedded between the *media* element tags or it can be externally referenced.

mediamode

The mediamode attribute is used by the media element only. It is used to define the type of media that is to be stored. The mediamode attribute entry is required. The enumerated list consists of 'Text', 'Video', 'Audio', 'Image', 'Applet' and

'Application'.

mimetype	The *mimetype* attribute is used by the *media* element only. It is used to define the type of material contained within the media element. The mimetype value takes the form as defined in RFC1521 e.g. 'image/gif', 'video/mpeg', etc. Each *media* element must define the associated *mimetype*.
mobile	The *mobile* element is used within the *contactinfo* element. This element is used to store the appropriate mobile telephone number. The telephone number can include the county code as well as the normal area code and the actual number.
name	The *name* element is used within the *identification* element. It is used to store the appropriate name of the learner. Each name is exchanged using its own *name* element. The name is entered through its component parts i.e. using the *partname* element. In general a name will have several parts. The type of name is defined using the *typename* element e.g. 'Contact', 'Full', etc.
nonfieldedstreetaddress	The *nonfieldedstreetaddress* element is used within the *street* element which itself is a part of the *address* element. This is used to store the unformatted name of the street cf. the relationship between the *formname* and *name* elements. The unformatted street entry can include any information in any order and so it must be treated as a single piece of data. This information is entered as a string that can be up to 256 characters long. The attribute *xml:lang* is used to define the language of the associated string entry.
noofattempts	The *noofattempts* element is used within the *evaluation* element which itself is within the *activity* element. It is used to store the number of attempts the learner has made in completing the associated evaluation e.g. a multiple choice question. The data is entered as a integer in the range of 1-99.
objectives	The *objectives* element is the container for the description of the objectives of the evaluation. These objectives are defined with respect to the actor as defined by the *view* attribute. The objectives may or not be included within the evaluation part of the activity information.
organization	The *organization* element is used by several other elements. It is used to store the name of the organisation that is associated with the primary data object e.g. the organisation responsible for awarding the qualification – see the *qcl* element. The type of organisation is defined using the *typename* element and the name is stored within the *description* element.
pager	The *pager* element is used within the *contactinfo* element. This element is used to store the appropriate pager telephony number. The pager number can include the county code as well as the normal area code and the actual number.
partname	The *partname* element is used within the *name* element which itself is a part of the *identification* element. It is used to contain the components of a name i.e. the name is supplied in named parts such as the first name, middle name, last name, etc. Each part is identified using the *typename* element. The name part is entered using the *text* element.
placeofbirth	The *placeofbirth* element is used within the demographics element. It is used to store the place of birth of the learner. The information is entered as a string of up to 128 characters length. The attribute *xml:lang* is used to define the language of the associated string entry.
pobox	The *pobox* element is used within the *address* element within the *identification* element. It is used to store the PO Box number component of the address – if available. The information is entered as a string of up to 32 characters. The *xml:lang* attribute is used to define the language used for the information.
postcode	The *postcode* element is used within the *address* element within the *identification*

	element. It is used to contain the post-code, or zip code, component of the learner's address. The *xml:lang* attribute is used to define the language used for the data.
prefcode	The *prefcode* element is used within the *preference* element. It is used to contain the actual preference. The content format of the element is unformatted i.e. it is defined as #PCDATA. The attribute *xml:lang* is used to define the language of the associated entry.
preference	The *preference* element is used within the *accessibility* element. It is used to store the learner's physical, cognitive and technical preferences. The type of preference is defined using the *typename* element. The actual preference is stored using the *prefcode* element.
priority	The *priority* element is used by several other elements. It is used to store the defined priority, or relative importance, of the event defined within the data object. The data is entered as a string of up to 64 characters length e.g. "Primary", "Secondary", etc. The attribute *xml:lang* is used to define the language of the associated string entry.
privacy	All of the data relevant to the privacy, authenticity and integrity of the learner information is contained within the *privacy* element. The actual privacy etc. mechanism and architectures used to support the learner information are outside of the scope of the specification but they interact with the learner information through these structures. The privacy information is defined for every data object that has an associated *contentype* element. The type of privacy information is defined using the *typename* element.
product	The *product* element is used within the *interest* and *activity* elements. It is used to store the electronic versions of the actual materials produced by the learner. The materials are stored using the *description* element and so explanatory information about the material can also be stored. The appropriate dates can also be stored. The type of product is defined using the *typename* element.
profmode	The *profmode* attribute is used by the *proficiency* element only. It is used to define the nature of the language proficiency i.e. write, read or oral (speaking and comprehending). This is an enumerated list and the attribute must be used.
proficiency	The *proficiency* element is used within the *language* element which is itself within the *accessibility* element. It is used to store the descriptions of the language proficiencies of the learner. The language proficiencies are stored as strings of up to 1024 characters length. The type of proficiency (write, read, oralspeak, oralcomp) is defined using the *profmode* attribute and the type of language is defined using the *xml:lang* attribute.
qcl	The *qcl* learner information is one of the eleven core data structures. It consists of the qualifications, certifications and licenses awarded to the learner i.e. the formally recognised products of their learning and work history. This includes information on the awarding body and may also include electronic copies of the actual documents. Each *qcl* is contained within its own XML instance.
recdata	The *recdata* element is used within the *exrefrecord* element only. It is used to contain information whose format has been defined by the *recformat* element. The optional *uri* attribute is used to define an external file that contains the actual data. The data entry can take any form between the tags.
recformat	The *recformat* element is used within the *exrefrecord* element only. It is used to define the format of the data to be stored within the *recdata* element. The optional *uri* attribute is used to define an external file that contains the actual data. The data entry can take any form between the tags.

referential	The referential information is used to uniquely identify the learner information record as a whole (*sourcedid*) and the individual data components (*indexid*) within that record. These enable each piece of information to be identified. The actual identification system is outside the scope of this specification. The referential information is defined for every data object that has an associated *contentype* element.
region	The *region* element is used within the *address* element only. This element is used to contain the region parts of an address e.g. 'Europe', 'South America', etc. An address may or may not contain an associated region part. The attribute *xml:lang* is used to define the language of the associated string entry.
registrationno	The *registrationno* element is used within the *qcl* element only. It is used to store the formal identifier assigned to the qualification, certification or licence by the awarding body. This identifier can be assumed to be unique with respect to the awarding organisation.
relationship	The *relationship* learner information is one of the eleven core data structures. It is a container for the definition of the relations between the other core data structures e.g. 'qcl's and the awarding organisation. This enables the construction of complex relationships between the core data structures. The basic structure is a one-to-one and one-to-many relationships. Many-to-many require the definition of several one-to-many relationships.
representation	The *representation* element is used within the *demographics* element which itself is used within the *identification* element. This element is used to store the materials that can be used to identify the learner e.g. photograph, voice-print, etc. The type of the representation material is defined using the *typename* element.
result	The *result* element is used within the evaluation element to store the scores associated with a particular activity. Each *result* can contain an arbitrarily complex data structure and so any set of scores can be exchanged. The *result* element also contains the *interpretscore* element which is used to describe the context of the scores e.g. maximum possible score, etc.
role	The *role* element is used within the *affiliation* element. It is used to store the roles undertaken by the learner as part of their affilitaion to an organisation. The type of role is defined using the *typename* element. The role informaton can also include the start of the appointment, the status and a description.
securitykey	The *securitykey* learner information is one of the eleven core data structures. It is used to store the descriptions of the passwords, encryption keys, PINs and authentication keys. These keys are used for transactions with the learner. A set of keys can be contained within each *securitykey* structure.
short	The *short* element is used within the *description* element. This element is used to contain a short character string (i.e. less than 80 characters) that is used to characterise the associated description material. The short entry is used in conjunction with the optional *long* and *full* elements but every usage of the description element should have an associated *short* entry. The attribute *xml:lang* is used to define the language of the associated string entry.
source	The *source* element is used within the *sourcedid* element. It is used to store the name/identifier of the organsiation responsible for the creation of the actual instance of the learner information being supplied. This name/identifier should be globally unique however the way this is achieved and policed is beyond the scope of this specification.
sourcedid	The *sourcedid* element is used within the referential element. It is used to assign a globally unique identifier to the associated data object. Each learner should be

allocated a *sourcedid* that should be globally unique – how this is achieved is beyond the scope of this specification. All of the internal referencing mechanisms are defined with respect to the *sourcedid* assigned within the contentype data object associated with the *learnerinformation* element. The sourcedid consists of a *source* element and an *id* element. The *source* defines the organisation responsible for the allocation and/or creation of the identifier and the *id* the unique value with respect to that source. This *sourcedid* is the same as that defined in the IMS Enterprise specification.

sourcetype

The *sourcetype* attribute is used by the *tysource* element to define the nature of the source of the vocabulary. The possible values are: 'imsdefault' (defines the usage of the default IMS LIP vocabulary files whose name does not have to be supplied), 'proprietary' (defines the usage of a proprietary vocabulary file whose name is included as the content of the *tysource* element), 'standard' (defines the usage of an externally agreed standard vocabulary file whose name is included as the content of the *tysource* element) and 'list' in which the comma separated list is presented within the *tysource* element.

statepr

The *statepr* element is used within the *address* element only. This element is used to contain the name of the state/province/county part of the corresponding address. An address may or may not contain the name of the state/province/county. The attribute *xml:lang* is used to define the language of the associated string entry.

status

The *status* element is used within several other elements. It is used to contain the status of a particular data object e.g. the status of an activity, a goal, etc. The actual status is defined using the *typename* element and the associated date for the recording of the storage and a corresponding description is available.

street

The *street* element is used within the *address* element. It is used to contain the details of the street part of the full address. An address may or may not contain information about the street e.g. this may be unnecessary if a PO Box number has given.

streetname

The *streetname* element is used within the *street* element. This element is used to contain the name of the street that forms a part of the full address. An address does not have to contain a street name. The attribute *xml:lang* is used to define the language of the associated string entry.

streetnumber

The *streetnumber* element is used within the *street* element. This element is used to contain the house/residence/office number in the street part of the full address. An address does not have to contain a street number. The attribute *xml:lang* is used to define the language of the associated string entry.

streetprefix

The *streetprefix* element is used within the *street* element. This element is used to contain the prefix part of the street name e.g. 'St'. An address does not have to contain a street prefix. The attribute *xml:lang* is used to define the language of the associated string entry.

streetsuffix

The *streetsuffix* element is used within the *street* element. This element is used to contain the suffix part of the street name e.g. 'SW10'. An address does not have to contain a street prefix. The attribute *xml:lang* is used to define the language of the associated string entry.

streetype

The *streetype* element is used within the *street* element. This element is used to contain the type of street e.g. 'Avenue', 'Road', etc. An address does not have to contain a street type. The attribute *xml:lang* is used to define the language of the associated string entry.

telephone

The *telephone* element is used within the *contactinfo* element. This element is used to store the appropriate telephone number (not including mobile telephone numbers) cf. the *facsimile* element.. The telephone number can include the county

code and extension number as well as the normal area code and actual number.

temporal	This information is used to describe any time-based dependencies of the data. This includes information such as the date of creation, time-stamp and expiry date of the learner information. The date/time descriptions are expected to conform to the ISO8601 standard. The temporal information is defined for every data object that has an associated *contenttype* element.
temporalfield	The *temporalfield* element is used within the *temporal* element only. This element is used to contain the time related definitions that form a part of the content-type meta-data associated with each data object. Each entry is defined using the *fieldlabel* and *fielddata* elements.
testimonial	The *testimonial* element is used within the *activity* element. Throughout their lifetime, a learner will acquire many different testimonials. A testimonial is a statement of support from someone who has direct experience of the achievements and capabilities of the learner. A testimonial may be concerned with any aspect of the learner's activities i.e. work-oriented, educational, recreational, civic, etc. The testimonial can contain any form of electronic content.
text	The *text* element is used to contain text entry data. This information can take the form of a single character or reference to an external text document. Two attributes are used by this element: *xml:lang* is used to define the language of the associated string entry, and *uri* defines the external file name identifier for the text file.
timezone	The *timezone* element is used within the *address* element. This element is used to store the time zone part of the address e.g. Greenwich Meridian Time (GMT), Eastern Daylight Time (EDT), etc. This information is supplied as a string entry and as such the *xml:lang* attribute is used to define the language of the entry.
title	The *title* element is used within the *qcl* element. This element is used to contain the formal title of the associated qualification, certification or license. A *qcl* entry may or may not have its title supplied. The attribute *xml:lang* is used to define the language of the associated string entry.
transcript	The *transcript* learner information is one of the eleven core data structures. It contains the summary record of the academic performance of an individual with respect to a particular institution. The transcript is normally supplied by the body responsible for evaluating of the performance of the individual. Each transcript is held within its own data structure.
tuple	The *tuple* element is used within the relationship element (one of the eleven core data structures). Each tuple is defined as a one-to-one or one-to-many relationship; many-to-many relationships require the definition of many tuples. Each tuple consists of a single source (*tuplesource*) the definition of the relationship (*tuplerelation*) and the one or more destinations (*tupledest*).
tupledest	The *tupledest* element is used within the *tuple* element. It is used to define the destination objects of the one-to-many relationship. The destination is defined either as a *indexid* or a combination of *sourcedid* and *indexid*. There is no requirement for the XML instance to contain the definition of the data objects whose relationship is being defined – the reconciliation of the reference identifiers is to be resolved by the communicating systems.
tuplerelation	The *tuplerelation* element is used within the *tuple* element to define the relationship between the *tuplesource* and the *tupledest* element contents. The actual relationship is defined by either using an agreed vocabulary, using the *vocab* element, or by explicit statement using the *text* element. Only one relationship is defined per tuple.

tuplesource	The *tuplesource* element is used within the *tuple* element. It is used to define the source object of the one-to-many relationship. The source is defined either as an *indexid* or a combination of *sourcedid* and *indexid*. There is no requirement for the XML instance to contain the definition of the data objects whose relationship is being defined – the reconciliation of the reference identifiers is to be resolved by the communicating systems.
typename	The *typename* element is used to support the extension of the default vocabularies used for the typing of the various data objects. Extensions to these vocabularies are supported through external reference to the corresponding file or through explicit statement of the typing.
tysource	The *tysource* element is used, when necessary, within the *typename* element. It is used to provide the vocabulary itself. The *tysource* element makes use of the *sourcetype* attribute to define if the associated entry is to be interpreted as a URI (external vocabulary reference) or text (the list of supported vocabulary itself).
tyvalue	The *tyvalue* element is used to define the selected entry within the available vocabulary. The *xml:lang* attribute is used define the language of the entry. The content of the *vvalue* element must be from the supplied vocabulary if the *tysource* element has been used in association with the *tyvalue* element.
uid	The *uid* element (referring to user identifier) is used within the *demographics* element. A learner may or may not provide a user identifier. A typical user identifier is a social security number, identity card number, etc. The information is supplied as a string entry.
units	The *units* element is used within the *activity* element. It is used to contain quantitative information associated with the value of the activity. This could include the credits for a course, a module, etc. The structure and vocabulary of the units are contained within the information held in the element itself.
unitsfield	The *unitsfield* element is used within the *units* element. Each unit is defined within its own *unitsfield* element and contains the definition of the field (using an appropriate vocabulary) and the data value itself. A combination of the *fieldlabel* and *fielddata* elements is used.
uri	The *uri* attribute is used by elements, such as *vsource*, to define the external reference file. This approach is used to define the external references or to provide links to media content such as images. The *uri* is defined as a string enclosed in quotation marks – the full directory path must be included.
view	The *view* attribute, applied to the *objectives* element, is used to define the 'actors' permitted to see the associated objectives. The supported actors are All (used to indicate access to all), Administrating Authority, Administrator, Assessor, Author, Candidate, Invigilator/Proctor, Psychometrician, Scorer and Tutor.
web	The *web* element is a part of the *contactinfo* element. It is used to store the web address of the learner. Multiple web addresses require the usage of multiple *contactinfo* instances. The information is supplied as string and should take the form of an 'http' reference as defined by W3C.
xml:lang	The *xml:lang* attribute is used wherever the language of the entry text can be varied. This attribute is used to define the language of the associated text. The format of the attribute shows that it is one of the core attributes provided by XML itself.

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