IMS Compliance Program Policy

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1 Overview

The IMS Compliance Program improves interoperability in the worldwide implementation of IMS Specifications by establishing realistic measures of interoperability and increasing those measures over time as best practice and more rigorous testing capabilities become available. An "IMS Conformant" Logo will be available to organizations whose product(s) successfully pass conformance evaluation criteria. Product developers will provide evidence to support conformance claims based on self testing. IMS may from time to time add reference implementations as mandatory requirements for self-testing and reporting.

The Compliance Program enables consumer and implementer organizations to have more precise discussion of expectations of interoperability. It reduces engineering costs of implementers by providing a means by which ambiguity in the specifications and non-conformant implementations are identified and resolved. The Program simplifies the task of consumers in seeking applications that meet common interoperability requirements. It does so by maintaining a public list of Conformant Products.

The IMS Compliance Program strives to insure interoperability while not precluding innovation. To achieve this goal, the IMS Compliance Program requires the proper handling of extensions, whether they are data elements or interfaces, because extensions are normally used when an implementer wishes to provide functionality beyond what has been commonly agreed and articulated in an IMS Specification.

Certification of individuals or organizations (e.g., Certified Consultant) is not supported at this time.

2 IMS Compliance and Profile Compliance

In some regions and sectors, Governmental or sector-based consortia have adopted IMS Specifications within a "Profile," e.g., the SCORM Profile, the SIF Profile of the IMS Question and Test Specification. A Profile may contain more than IMS Specifications and may introduce specific localizations. In some of those cases, the groups have established certification or compliance programs specific to their profiles, e.g., ADL SCORM Certification. The IMS Compliance Program is **NOT** intended to replace these profile certifications.

The vast majority of the world's education and training communities have no representative organization building profiles for them. They are therefore dependent on general norms of practice employed for better or worse by implementers serving their community. The IMS Compliance Program is a means for creating a baseline for worldwide procurement processes for these under-represented regions and sectors. The IMS Compliance Program is supportive of the establishment of groups that wish to create profiles and certification programs for a particular region or sector. It is anticipated that just as profiling communities benefit and leverage IMS Specifications, that they will likewise use the IMS Compliance Program to their advantage.

3 Terminology

The use of the terms Compliance and Conformance have been chosen based on best practice in the field of software testing and certification as expressed by the British Standards Institute that Companies ***comply*** and products ***conform***. Therefore, companies will apply to the IMS ***Compliance*** Program to receive a ***Conformance*** mark for their product(s).

An ***instance*** is a collection of information that is created in accordance with one or more IMS Specifications. E.g., Learner information record, a content package.

An ***application*** is any executable program that either creates or consumes instances or uses services to communicate with another application(s).

Content is defined as electronic resources designed to educate or train a learner and that supports one or more IMS Specifications.

A ***Content Collection*** is defined as a collection of content that was produced using the same tools and process and therefore should be equivalent from a technical interoperability perspective.

The IMS Compliance Program defines an ***implementer*** as an individual or organization that produces content or applications.

The term ***Compliance Administrator*** refers to the organization that IMS uses to process conformance request applications, do evaluation of conformance evidence, and process related fees.

4 Design of the Program

4.1 Types of Conformant Products

Implementers may receive a conformance mark for applications, content, or a content collection.

4.2 Version-Specific Conformance

Conformance will be evaluated against a specific version of an IMS Specification.

4.3 Conformance Evaluation Methods

The IMS Compliance Program will be based on a range of evaluation methods, as resources permit and as appropriate, ranging from self-testing with implementer assertions of conformance up to 3rd party independent certification. 3rd party independent testing is normally expensive to setup and to operate and will be the exception rather than the rule. If a group representing a particular domain of interest, such as assessment, wishes to organize sufficient resources to develop a general, not a profile-based, test suite for an IMS Specification, then IMS will work with that group to incorporate the test suite into the IMS Compliance Program as appropriate.

For all new specifications, applicants will undertake self-testing, make a public assertion of their product's conformance and provide public evidence to substantiate the claim. IMS will establish minimal sets of recommended evidence in order to insure a reasonable level of due diligence is applied in self testing by implementers. Examples might include log files from validating parsers showing that an instance of data conforms to an IMS Schema; example XML files showing proper preservation of elements in import/export operations; screen captures showing proper interpretation of the semantics of an instance of data.

4.4 Test Reference Implementations and Data

In order to improve interoperability further, from time to time, IMS may select a ***Test Reference Implementation or Data*** as a mandatory requirement for self testing and claiming conformance to a specific IMS Specification. Test Reference Implementations may be open source or proprietary. Candidates for Test Reference Implementations will be taken from the public (i.e., inside and outside IMS Members) and a selection will be based on public evaluation criteria, including but not limited to:

- Conforms to the specification

- Implements more of the specification than other candidate implementations
- Has more proven interoperability in the market than other implementations
- Implements the specification according to the letter and the spirit of the specification.

A committee of IMS Contributing Member representatives and invited experts, as needed, will select Test Reference Implementations and Data.

Once a Test Reference Implementation or Data is selected, implementers seeking a conformance mark for the applicable Specification will then have to test their product against the Test Reference Implementation or Data.

Products that have already received a successful evaluation for the applicable Specification prior to a Test Reference Implementation or Data being selected will have 12 months after being notified of the selection of the Test Reference Implementation or Data to be re-evaluated.

One of the criteria for a Test Reference Implementation and Data is that it should be readily available to any organization wishing to do self testing.

4.5 Normative Bindings

For data-oriented specifications, the IMS XML binding is the normative (i.e., the required) binding for conformance evaluation.

For behavioral specifications, the binding to be supported is the IMS General Web Services (GWS) type of interface. There will not be a bias towards any particular internal architectural or platform direction.

Should other groups with alternative bindings wish to create their own conformance program they are free to do so. Should a non-GWS binding become widespread in the market, IMS would, upon request, consider adding that to the conformance requirements. However, it should be re-stressed that the objective of the IMS Compliance Program is to address the "Common Need" not to address sector or regional preferences for which a well-defined profile, profile owner, and specific conformance program would be a more appropriate solution.

4.6 Administration

IMS will outsource the administration of the Compliance Program at its discretion.

4.7 How to Apply

See http://www.imsglobal.org/conformance

4.8 Validation of Applicants

The Compliance Administrator will apply best efforts to validate the applicant's authority to represent ownership of the product(s) in question

4.9 Appeals

Implementers who exhaust normal means to resolve issues of product conformance with the Compliance Administrator may appeal their dispute to IMS. IMS will respond at its discretion.

4.10 Duration of Conformance

After notification to the applicant that a product has successfully passed conformance evaluation, the product will be considered Conformant until one or more of the following occur:

- The conformance evaluation criteria change.
- The product is changed and fails to be conformant as defined within the IMS Compliance Program Policy.
- One or more of the IMS Specification(s) for which the product received a positive conformance evaluation is removed by IMS from the IMS Compliance Program.

4.11 Transfer of Conformance

An administrative process will be available for applicants to transfer conformance and trademark licenses as a result of acquisitions or mergers. An administrative process will be available for transferring conformance when a product's name is changed.

4.12 Trademark License and Renewal

Applicants of products that receive a successful conformance evaluation will be required to sign a Trademark License Agreement which will allow the use of the phrase "IMS Conformant" and IMS Conformance Logo for that product. Usage requirements include listing the specific IMS Specifications for which the conformance applies.

The term of the Trademark License is 1 year and may be renewed as long as the product remains conformant as defined in section 4.7.

4.13 Conformance Register

IMS will list conformant products on a publicly-accessible website as long as the product is conformant and no IMS Conformance Trademark license agreement payments are outstanding. .

Inaugural Conformant Products

An Inaugural IMS Conformant Product designation is available for products that meet the following criteria

1. Applicant must submit an intention to apply by 31 July 2005.
2. Applicant must submit an application by 15 September 2005.
3. Product must be conformant.

4.14 Fees

Fees for conformance evaluation services, Trademark License Renewals and retesting will be payable to the Compliance Administrator. An additional fee may be required for conformance evaluation to certain specifications if there are costs incurred by IMS or the Compliance Administrator to host or make a test reference implementation available. The Compliance Administrator may establish additional fee schedules should an applicant require more than normal assistance from the Compliance Administrator in submitting or complying with the IMS Compliance Program Policy.

4.15 Language

English is the official language for use in filling out IMS Compliance Program forms.

5 Conformance Criteria

5.1 Overview

Descriptions of conformance in IMS Specifications developed since 1997 have changed over time due to different approaches taken by individual specification development teams, evolution of best practice within the Web standards field in general, and the introduction of service-oriented specifications. The IMS Compliance Program applies a consistent language to ***ALL*** IMS specifications to aid developers and end user organizations in understanding conformance to IMS Specifications.

IMS specifications contain an information model either in UML (Unified Modeling Language) or in some of the older specifications it is represented in a tabular format. The information models and their associated conformance language within the Specifications are very flexible and support semantic and, in the case of bindings, syntactic interoperability. In order to provide application interoperability (i.e., what information to handle) in complex elearning environments, the IMS Compliance Program describes conformance for data instance and defines conforming behavior for standard operations, including import, export, and service behavior.

5.2 Terminology

The use of the words indicating conformance requirements, such as Must, May, and Shall, are used in this appendix according to RFC #2119 http://www.faqs.org/rfcs/rfc2119.html.

5.3 Conformance of an Instance

A conforming ***instance***, such as a data record or a piece of content, is a collection of information that

- Must validate to an IMS XML binding,
- Must expresses extensions, if any, according to the extension mechanism defined in the binding definition (i.e., Schema),
- Must not make use of extension mechanisms to represent information that could have been represented without it,
- Must conform to the semantic definitions defined within the relevant information model,
- Must contain all mandatory elements defined within the relevant information model, and
- Must contain one or more elements as defined within the information model.

5.4 Conformance of an Application

5.4.1 Import and Export of Data Instances

Import
An application that imports an instance must interpret the semantics of the information according to the semantics as defined within the relevant IMS information model(s).

Export
An application that exports an instance must create a conforming instance. If the instance was originally imported, then any extensions present during importing must be preserved unless modified or removed through user intervention or by the design of the tool itself. E.g., a Meta-data editing application that imports a content meta-data must export all the same meta-data elements unless altered by the user of the tool.

5.4.2 Service Conformance

Summary
See the IMS General Web Services Guidelines available at www.imsglobal.org/gws for background information.

Service conformance within the IMS Compliance Program assumes a requester/provider messaging model with the following requirements.

- Data
  - Requester may send extensions.
  - Provider may ignore extensions.
  - Provider may return a set of data containing extensions.
  - Requester may ignore extensions returned by the provider.
- Transport
  - Extensions must be on a new port.
  - Provider may provide service extensions.
  - Provider must support all mandatory services on a port.
- Error Handling
  - Must support "codemajor" error reporting.

Service Requester Conformance
The 'Service Requester' may invoke the defined behavior, using the 'Request' message and may process the corresponding 'Response' message from the 'Service Provider'. Upon receipt of the appropriate trigger the consumer must issue the 'Request' message such that:

- The 'Request' message must contain all of the required parameters, arranged appropriately in the message;
- 'Request' messages may be composed from any of the elements (mandatory and all optional), as defined by the appropriate data model XSD.

Upon receipt of the corresponding 'Response' message the 'Service Requester' must:

- Process the corresponding 'Response' messages as defined by the binding definition to be used to support the information model;
- Be capable of parsing the received XML data against the corresponding XSD. Only the mandated elements within the information model must be supported;
- Pass the returned status codes back to the process responsible for invoking the behavior.

Service Provider Conformance
Upon receipt of the 'Request' message the 'Service Provider' must:

- Process the set of 'Request' messages that can be received as defined by the binding definition to be used to support the information model;
- Accurately implement the processing behavior invoked by the request. The completion of this processing must result in the reporting of the appropriate status information;
- Construct the appropriate 'Response' messages as defined by the binding definition to be used to support the information model;
- Return the appropriate status code. The status code 'Unsupported' must not be returned;

- It must maintain the persistence of the data objects once they have been created until they are deleted. All elements (mandatory and all optional), as defined by the appropriate data model XSD.

Status/Error Codes & Exception Handling

When a service is developed and the SOAP messages' binding created, then each operation must return status information. This status information provides contextual information about the completed success or otherwise of the operation. There are two types of status information that are available to the end-Applications:

- Transaction business – these are the status reports that reflect the business logic of the transactions being exchanged by the end-Applications. This status information must be contained within the message header under a specially defined data structure. The status information contained herein is also used to contain any error codes i.e. error reporting is handled as a subset of status information reporting;

- SOAP fault– this is the SOAP fault codes that are reported by the SOAP messaging infrastructure and which are carried in the SOAP message headers. A two-tier fault message code is available with the top-level being a non-extensible enumerated list.

The status information is detailed in three sub-structures of the 'StatusInfo' data structure:

- CodeMajor – this is a fixed enumerated list. This is used in conjunction with the 'severity'. The list of codes is: 'Success', 'Processing', 'Failure', 'Unsupported';

- Severity – this is a fixed enumerated list. This is used in conjunction with the 'codeMajor'. The list of codes is: 'Status', 'Warning', 'Error';

- CodeMinor – this is a detailed report code structure that is used to identify specific causes of failure. A set of specific codes are defined for each transaction

The interpretation of the 'CodeMajor/Severity' matrix is shown in the following table.

Interpretation of the 'CodeMajor/Severity' matrix.

Severity	CodeMajor			
	Success	**Processing**	**Failure**	**Unsupported**
Status	All the request has been completed successfully.	The request is being processed by the target i.e., the request has been received and acknowledged by the target communications handler.	The request has failed. The associated CodeMinor information contains the more detailed reason for the failure of the request.	Target does not support the requested operation.
Warning	Some of the request has been completed successfully e.g., partial storage of the data structure sent.	The request is being processed (this does not imply reception by the target communications handler) but it has not yet been acknowledged as received by the target.	Not permitted.	Not permitted.

Error	Not permitted.	An error has been detected in the immediate transmission communications handler, i.e., the message has not left the end-system.	The request has failed but it was issued from the local communications handler. Detailed failure reports could be included.	Target does not recognize the requested operation, i.e., it is an unknown service extension.

6 Conformance Evidence Requirements

The following evidence of conformance must be submitted along with a proper IMS Compliance Program Application in order that a product may be evaluated for conformance.

6.1 Content Collection

Applicants that seek conformance for a Content Collection should, in addition to submitting an example of content for evaluation, must submit a written statement that is the applicant's claim that its content authoring process for the content collection consistently produces content that conforms to the specifications in its IMS Compliance Program application.

The statement can be a simple declarative statement or can be accompanied by additional details and evidence supporting the claim. Developers should keep in mind that the statement will be made public and should accordingly balance providing sufficient information to give potential adopters confidence in the claim while protecting whatever degree of proprietary information about the development process as desired. Details might include: a high level description of the tools and technology used and the absence of human intervention or other variable inputs into the final process of generating the content for distribution. E.g., content designers and developers might use a repository of design templates and assets and then automatically generate the content, thereby avoiding or significantly reducing the possibility of an error being introduced by a manual step.

6.2 General Evidence of Conformance

All products submitted for conformance evaluation must supply the evidence described in this section as applicable.

6.2.1 Instance Conformance Evidence

For products that are not executable applications, such as content or data records conforming to an IMS Specification(s), provide the following evidence of conformance.

Mandatory Evidence

Log files or screen captures from a 3rd party validating parser, which show that an applicant's instance validates against the applicable IMS schema(s).

6.2.2 Application Conformance Evidence

Importing of Data Instances

For applications that import IMS data instances, applicants must provide evidence that it supports the semantics defined for the data elements in the applicable IMS information model(s).

Mandatory Evidence
Evidence of support for semantics as defined within the information model(s) of the specification(s), e.g., screen captures and related xml instance file that show that an element is used appropriately within the application.

Exporting of Data Instances

Mandatory Evidence
1. Semantics - Supports the semantics as defined within applicable IMS information model(s). (See "Importing of Data Instances" in this section.)
2. Validation - The instance validates against applicable IMS XML Schema(s). (See Section 4.A)
3. Preservation - If the instance was originally imported, then the exported instance must include all the information present during import that conformed to the applicable IMS XML Schema(s) and extension mechanisms, with the exception of purposeful changes made through the use of the application. E.g., a meta-data editing application

   Example: before import and after export lists of representative data instances

6.2.3 Service Behavior Evidence
Newer IMS Specifications may contain service definitions, such as executable runtime interfaces. Content or tools might make use of these service interfaces. If the content or an application is to pass conformance evaluation, then evidence is required that the service interfaces have been implemented correctly according to the applicable information model and Web Service binding.

Mandatory Evidence
1. Interfaces – Provide reports using the latest, freely available WS-I monitoring tool at http://www.ws-i.org/deliverables/workinggroup.aspx?wg=testingtools showing that the proper interfaces are called and responded to correctly.
2. Error and status – Provide evidence such as error codes generated by the product that conform to the requirements in Section 5.4.2 of the IMS Compliance Program Description.

6.2.4 Optional Evidence
Organizations are encouraged to provide supplementary evidence of conformance, such as descriptions of proven interoperability in stakeholder settings between multiple applications that claim conformance to the IMS specification(s).

6.3 Requirements of Specific Specifications

If an IMS Specification is not listed in this section, then there are currently no additional requirements for evidence of compliance.

6.3.1 IMS QTI V2
This IMS QTI v2 specification requires that a conformance features list be submitted. See Section 5 of the "IMS Question and Test Interoperability Conformance Guide Version 2.0 Final Specification" and include this file with your application.

6.3.2 IMS Learning Design
The Learning Design specification describes 3 levels of interoperability. The IMS Compliance Program requires evidence of conformance to level A. You may support higher levels, and conformant products will be listed with the claimed level of conformance.