

SS 496 : Part 3 : 2003 (ICS 35.240.99)

## SINGAPORE STANDARD

## **Specification for eLearning framework**

- Part 3 : Learning content packaging





### SS 496 : Part 3 : 2003

(ICS 35.240.99)

#### SINGAPORE STANDARD

## Specification for eLearning framework

- Part 3 : Learning content packaging

All rights reserved. Unless otherwise specified, no part of this Singapore Standard may be reproduced or utilised in any form or by any means, electronic or mechanical, including photocopying and microfilming, without permission in writing from SPRING Singapore at the address below:

Standards SPRING Singapore 1 Fusionopolis Walk, #01-02 South Tower, Solaris Singapore 138628 Email : standards@spring.gov.sg

ISBN 9971-67-953-1

#### SS 496 : Part 3 : 2003

This Singapore Standard was approved by Information Technology Standards Committee on behalf of the Standards Council of Singapore on 23 January 2003.

First published, 2003

The Information Technology Standards Committee appointed by the Standards Council consists of the following members:

|                     |   | Name  | Organisation  |
|---------------------|---|---|---|
| Chairman            | : | Mr Wilson Tan   | Standards Council   |
| Secretaries         | : | Ms Ho Buaey Qui<br>Ms Thay Yean Lan   | Infocomm Development Authority of Singapore<br>Infocomm Development Authority of Singapore  |
| Members             | : | Assoc Prof Chi Chi-Hung<br>Ms Susan Chong<br>Prof Robert Gay<br>Prof Angela Goh<br>Dr Derek Kiong<br>Mr Raymond Lee<br>Dr Low Hwee Boon<br>Mr Alvin Ong | National University of Singapore<br>SPRING Singapore<br>Singapore Computer Society<br>Nanyang Technological University<br>Institute of Systems Science<br>Infocomm Development Authority of Singapore<br>Laboratories for Information Technology<br>Information Technology Management Association |
|                     |   | Mr Wee Tew Lim  | Singapore Information Technology Federation   |
| Co-opted<br>Members | : | Mr Robert Chew<br>Dr Diana Young  | Individual Capacity<br>Association of Small and Medium Enterprises  |
|                     |   |   |   |

The Technical Committee on Learning Standards appointed by the Information Technology Standards Committee and responsible for the preparation of this standard consists of experts from the following organisations:

|           |   | Name   | Organisation  |
|-----------|---|--|---|
| Chairman  | : | Mr Hee Joh Liang   | Popular e-Learning Holdings Pte Ltd   |
| Secretary | : | Mr Lim Kin Chew  | E-Learning Competency Centre  |
| Members   | : | Mr Francesco Della Casa<br>Mr Chan Heng Kee<br>Mr Chan Ping Wah<br>Assoc Prof Cheah Horn Mun<br>Mr Chng Eng Leok<br>Mr Jansen Chua<br>Assoc Prof Koh Thiam Seng<br>Mr Philips Lai<br>Dr Lee Tsao Yuan<br>Mr Samuel Ng Hong Kok<br>Mr Sim Wee Chee<br>Mr Tan Hong Choon<br>Mr Tan Yap Kwang<br>Ms Tham Yi Chuey | Infocomm Development Authority of Singapore<br>Ministry of Manpower<br>National Library Board<br>National Institute of Education<br>Popular e-Learning Holdings Pte Ltd<br>Infocomm Development Authority of Singapore<br>Ministry of Education<br>Sun Microsystems (Singapore) Pte Ltd<br>Skills Development Centre Pte Ltd<br>Institute of Technical Education<br>Ednovation Pte Ltd<br>Institute of Technical Education<br>Ministry of Education |
|           |   | ine main in endoy  |   |

The eLearning Specification Working Group appointed by the Technical Committee to assist in the preparation of this standard comprises the following members:

|                     |   | Name   | Organisation  |
|---------------------|---|--|---|
| Convenor<br>Members | : | Mr Lim Kin Chew<br>Mr Steven Chan  | E-Learning Competency Centre<br>Ednovation Pte Ltd  |
|                     |   | Mr Chua Chet Shiu<br>Mr Goh Khee Teck                                      | E-Learning Competency Centre<br>E-Learning Competency Centre  |
|                     |   | Mr Eugene Hiew Fook Jin<br>Mr Alfred Hong<br>Ms Kwek Siew Wee              | National University of Singapore<br>Singapore Polytechnic<br>Nanvang Polytechnic                                |
|                     |   | Mr Lau Choo Leng Simon<br>Mr Li Ying Hao                                   | E-Learning Competency Centre<br>Ednovation Pte Ltd  |
|                     |   | Ms Julie Lim Poh Gek<br>Mr Ernie Ong<br>Mr Tan Gek Hua<br>Ms Teng Geok Lin | Nanyang Technological University<br>Institute of Systems Science<br>Temasek Polytechnic<br>Ngee Ann Polytechnic |
|                     |   |  |   |

(blank page)

#### Contents

|      |   | Page |
|------|---|------|
| Fore | word  | 7    |
| _    |   |      |
| SPE  | CIFICATION  |      |
| 1    | Introduction to learning content packaging                                    |      |
| 1.1  | Overview  |      |
| 1.2  | Introduction to learning objects  |      |
| 1.3  | Scope   | 9    |
| 1.4  | Target audience   | 9    |
| 1.5  | Definitions   | 9    |
| 1.6  | Relationship to other documents   | 11   |
| 2    | Introduction to learning objects  | 11   |
| 2.1  | Reliability and interoperability  | 11   |
| 2.2  | Reusable learning objects   | 14   |
| 2.3  | Anatomy of a learning object  | 17   |
| 2.4  | Characteristics of learning objects   | 18   |
| 2.5  | Reuseable learning resources  | 19   |
| 2.6  | Relationship between the learning object model and content packages           | 21   |
| 3    | Conceptual model  | 22   |
| 3.1  | Overall model   | 23   |
| 3.2  | Key elements  | 27   |
| 3.3  | XML Document structure for content packaging                                  | 30   |
| 3.4  | Preparing to ship the content with <manifest> element</manifest>              | 32   |
| 4    | Best practices  | 34   |
| 4.1  | Sub manifest  | 34   |
| 4.2  | <dependency> in <resources></resources></dependency>                          | 37   |
| 4.3  | Multiple <organization> within <organizations></organizations></organization> | 37   |
| 4.4  | Use of extensions   | 39   |

#### ANNEXES

| А | Draft guidelines for developing | g learning content | 41 |
|---|---------------------------------|--------------------|----|
| В | Development resources           |                    | 53 |

## SS 496 : Part 3 : 2003

#### TABLES

Page

| 1   | Description of data objects        | 23 |
|-----|------------------------------------|----|
| A.1 | SCORM components                   | 44 |
| A.2 | Courseware development methodology | 47 |
| A.3 | Bloom's taxonomy                   | 52 |

#### FIGURES

| 1   | E-learning scenario wthout interoperability  |    |
|-----|--|----|
| 2   | E-learning scenario with interoperability  | 8  |
| 3   | Content package concept  | 10 |
| 4   | Manifest elements  | 22 |
| 5   | Merging <organization> from a (sub)Manifest</organization>   | 35 |
| 6   | Merging <organization> from a (sub)Manifest when the referencing <item> has children</item></organization> | 35 |
| A.1 | A typical NETg course structure  | 41 |
| A.2 | The RLO and RIO structure  | 42 |
| A.3 | SmartForce objects   | 43 |

#### Foreword

This Singapore Standard was prepared by the Learning Standards Technical Committee (LSTC) under the direction of the IT Standards Committee. The LSTC is responsible for tracking, developing and promoting standards on learning in Singapore.

This is Part 3 of the Singapore eLearning Framework (SeLF). Part 3 is all about how learning content can be developed in a granular manner and then packaged into a consistent and coherent unit so that it can be exported to different learning management systems (LMS) or learning and content management system (LCMS) without making any change to the content itself.

In preparing this standard, reference was made to prevailing international best practices customised for use in Singapore. The LSTC has the privilege of working with practitioners from various companies and institutions of higher learning. In addition, the Working Group members had tested the specifications that we have put up and found that they work well across various LMSs and LCMSs. This Part 3 is unique in that on top of the technical details in packaging learning content, the difficulty in understanding learning objects and developing them had also been addressed.

This standard is expected to gain the widespread acceptance by the practitioners in the eLearning industry in Singapore. However, as specifications are still evolving, this standard will be reviewed and revised regularly. The LTSC will be responsible for incorporating new elements or features in this specification on Learning Content Packaging.

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. SPRING Singapore shall not be held responsible for identifying any or all of such patent rights.

#### NOTE

- Singapore Standards are subject to periodic review to keep abreast of technological changes and new technical developments. The revisions of Singapore Standards are announced through the issue of either amendment slips or revised editions.
- Compliance with a Singapore Standard does not exempt users from legal obligations.

# Specification for eLearning framework – Part 3: Learning content packaging

#### 1 Introduction to learning content packaging

#### 1.1 Overview

The intent of learning content packaging specification is to create a portable means of bundling material associated with learning content. It enables this content to be moved from one system to another and to be installed on a system even if that system is not the original system that created the learning content. Essentially, many content providers know that without a pervasive set of eLearning specifications like learning content packaging specification, they would have to keep converting their content in order to suit the particular eLearning environment of the learner. Therein lies the issue of interoperability of the eLearning content. As illustrated in Figure 1, Content A will have to be modified every time the user organisation decides to change their learning management system. Contrasting this with Figure 2, the advantages and value in adopting eLearning specifications are evident, especially those relating to meta-data, content packaging and question and test. The scenario as depicted in Figure 2 is the desirable one as Content A can be used by different learning management systems without the need to do any content conversion.



#### LMS - Learning Management System

By using this learning content packaging specification, the user will be able to find the relevant content for his study. There is enough meta-data information in the specification, which will allow this to happen. The user will be able to use this specification to move contents from one location to another. Contents that are developed according to this specification will be able to interoperate in different learning management systems (LMSs) or learning and content management systems (LCMSs).

#### 1.2 Introduction to learning objects

Before this standard deals with the details of content packaging, it is important for implementers and practitioners to understand what constitutes learning content and how content is defined.

Learning objects are small 'chunks' of instruction delivered online.

It first came about sometime in 1994 as a result of the influence of the object-oriented programming paradigm in computer science. Since then, it has gained much momentum. A list of the different learning object models is given in Annex A.

For the working definition (from the pedagogical point of view), David Wiley's definition was adopted:

"A learning object is any digital resource which can be reused for learning."

Two important elements in learning objects are **interoperability** and **reusability**. These 2 elements will be discussed more in Clause 2.

#### 1.3 Scope

Learning content packaging specification is one of the components in the Singapore e-Learning framework. This specification only deals with the description and structure of online learning materials and the definition of some particular content types. For example, this specification will not indicate pedagogical details such as how one might achieve a particular learning outcome, nor will it advise developers in particular implementation details such as how to properly play an .avi file on a Macintosh.

#### 1.4 Target audience

The following is a list of the target users of this specification:

- a) Education technologist;
- b) Courseware developer;
- c) Learning assessment system developer;
- d) Instructional designer;
- e) System integrator;
- f) eLearning specialist;
- g) eLearning programmer;
- h) Learning management system specialist;
- i) Knowledge management system specialist;
- j) Education service provider;
- k) eBook developer;
- I) Cataloguer.

This list is not an exhaustive one. It gives an indication of the type of people who will be interested in using this specification.