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Information technology for learning, education and training — A reference framework of e-Portfolio information

Techonologies de l'information pour l'apprentissage, l'éducation et la formation — Un cadre de référence pour l'information des e-Portfolios

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Subcommittee JTC1 ISO/IEC SC 36, Information technology for learning, education and training.

This second edition cancels and replaces the first edition (ISO/IEC TS 20013:2015), which has been technically revised.

The main changes compared to the previous edition are as follows:

— note added to the definition of "element" and "item" providing examples of the use of artefacts;

— acknowledgement that the term artefact may be used more broadly in some areas of the world when referring to e-Portfolio components.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

e-Portfolios have been deployed in many contexts that span educational, employment, artistic, and social contexts. Individuals have new opportunities to accumulate, manage and share their credentials digitally (e.g., using badges, micro-credentials, etc.). These digital items can be included in and shared by individuals using e-Portfolios. A key characteristic of these digital artefacts can be verification of the credential by a 3rd party. In learning, education and training (LET), e-Portfolios have demonstrated their potential to enhance the development of learners and to support the work of educators, administrators, and others, through streamlining information management processes, developing learner autonomy and metacognition, and fostering the personal and professional development of individuals. However, this broad implementation has also brought with it issues related to interoperability, accessibility, and usability of both systems and content.

This standard has been developed to support the creation and use of e-Portfolios in LET. It can be used to develop more responsive, flexible and modular systems and services and is intended to support learners, instructors, trainers, e-learning service providers and other stakeholders. As well, it is intended to support a wide range of activities related to e-Portfolio creation and use across various Information Technology for Learning, Education and Training (ITLET) contexts (such as K-12 education, higher education, training, career planning and professional development). With ongoing developments in Information and Communications Technology (ICT), learners have access to an increasing diversity of LET opportunities. Production of educational content and services as a consequence of developments in ICT extends the scope of opportunities for learning, providing potential for learners to experience personalized and adaptive opportunities that also may enhance their learning and improve their abilities. Content and services are delivered to or accessed by learners – as well as produced and managed by them. ITLET systems therefore need to be designed to accommodate this. For example, a common feature of *most* e-Portfolio systems is that their owners not only author the content but also control the selection and presentation of it. In some jurisdictions this key function is seen as integral to personal development planning (PDP).

A key characteristic of e-Portfolio systems for ITLET stakeholders is the data or information that is used for e-Portfolios can provide instructors, trainers, administrators, and employers with an efficient means of appraisal, management, and decision-making. e-Portfolios thus provide an opportunity to monitor the development of an individual's achievements, skills and competencies within and beyond formal education and training contexts. This key characteristic also benefits learners through providing opportunities to reflect on their own learning and career development.

One means of delivering such functionality is via a management system, such as an integrated Learning Management system (LMS) or Human Resource management System (HRMS) that can be used to monitor and organize learners' learning; however, such functionality can also be provided by unbundled applications and services and e-Portfolio system components in a highly distributed manner.

For these reasons, implementing e-Portfolios has the potential to be an efficient method for tracking learning history, documenting activities within LET, supporting peer and self-assessment as well as professional development in the workplace. Consideration of how e-Portfolios may be used within teaching and learning environments has therefore been central to shaping this document.

In order to encourage streamlined management and exchange of participant information and associated data, such as the evidentiary information contained in an e-Portfolio, a standardized approach is necessary. Through the standardization of e-Portfolio system components (that is, IT systems and services that enable e-Portfolios), common underlying structures will provide the potential to share data across and among different applications, thus improving interoperability.

This standard provides a reference framework for the use of e-Portfolios within ITLET contexts where there are requirements for importing, exporting, and aggregating data. The reference framework has been developed with the aim of supporting interoperability and transfer of information among ICT systems and services where data interchange is required for e-Portfolio systems. It is intended to be used by learners, instructors, software developers, implementers, instructional designers, and others within learning, education, and training environments that are supported by information technology.

This standard includes six clauses and two annexes. The first clause provides the scope, exclusions, and aspects not currently addressed. The second clause includes the normative reference. The third clause provides terms and definitions, while the fourth clause provides background information regarding e-Portfolios. The fifth clause describes various types of e-Portfolios used in LET contexts and provides an approach to classifying them. The sixth clause provides details regarding the e-Portfolio reference framework.

The annexes include use case information that has been submitted by national bodies (Annex A) and study cases of e-Portfolio interoperability (Annex B).

Information technology for learning, education and training — A reference framework of e-Portfolio information

1 Scope

This standard details a reference framework of e-Portfolio implementation that can be used to inform and support development of ITLET systems that meet the requirements of learners, instructors, e-learning service providers and others in contexts such as K-12 education, higher education, training and personal development.

The reference framework identifies content and functional components that support e-Portfolio systems. It addresses interoperability issues required for data exchange between these components and among the various categories.

This standard:

— provides an e-Portfolio reference framework;

— provides descriptions of e-Portfolios in terms of components (content or functional), categories, elements and items;

— identifies commonalities of current implementations of e-Portfolios; and,

— represents the needs of stakeholders (e.g., learners, instructors, etc.).

The scope of this standard does not include:

— in-depth technical review of issues related to adaptability to culture, language, and human functions;

— security techniques related to the protection of privacy information;

— authentication of the identity of an IT or ITLET system user;

— how e-Portfolios might integrate with ITLET systems; and,

— specific requirements of e-Portfolios or e-Portfolio systems to meet jurisdictional domain requirements.

This standard currently does not address:

— aspects of accessibility;

— the elements required of learner and instructor;

— best practices of e-Portfolio use cases in the fields on K-12 education, higher education and training;

— guides to support the use of e-Portfolios in learning, education, and training environments; and,

— detailed technical information regarding specific types of e-portfolios (e.g., learning, teaching, assessment, presentation, personal development, career, course, program, institutional, or other).

It is anticipated that some or all of these requirements may be addressed in future editions of ISO/IEC 20013, or in companion International Standards or Technical Reports.

2 Normative references

The following document is referred to in the text in such a way that some or all of its content constitutes requirements for this document.

ISO/IEC 2382-36:2019, *(E/F), Information technology — Vocabulary — Part 36: Learning, education and training*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
category
type of *component* (3.2)

3.2
component
set of constituent parts that comprises an *e-Portfolio* (3.5)

Note 1 to entry: An e-portfolio component may be either a content component or a functional component.

Note 2 to entry: A content component makes learner information explicit so that it can be matched to resources. The following are content categories for e-Portfolio information: identification, overview, education, career, outcome, capability, and experience.

Note 3 to entry: A functional component is used to identify and support interoperability and may include "layers" of entities.

EXAMPLE Business requirements and processes, technical services, data sources.

[SOURCE: ISO 16175-2:2011, 3.7 Modified: in the definition, “a digital record” has been replaced with “an e-Portfolio”; the 3 Notes to the entry have been added.]

3.3
e-learning
learning (3.9) facilitated by information and communications technology

[SOURCE: ISO/IEC 24751-1:2008, 2.18]

3.4
element
unit of data for which the definition, identification, representation and permissible values are specified by means of a set of attributes

Note 1 to entry: There can be one or more elements in each category within a component.

Note 2 to entry: An element is the label assigned to indicate this layer of the e-Portfolio reference framework.

Note 3 to entry: The term artefact (or digital artefact) is sometimes used as the general term to refer broadly to the digital representation of elements, (e.g., awards and certificates, photographs, etc.) found in several categories, (overview, education and experience). Artefacts may also be assigned unique identifiers to support various e-Portfolio processes (e.g., management and verification).

EXAMPLE 1 A photograph that is selected and uploaded by an individual to their e-Portfolio for identification purposes could be referred to as an artefact that is a user information element within the Identification category.

EXAMPLE 2 An artefact may be associated with an element from the Capability category (such as a skills element linked to a skills framework).

[SOURCE: ISO/IEC 6523-1:1998, 3.3 Modified: in the term, "data element" has been replaced with "element"; in the definition, the three Notes to entry have been added.]

3.5
e-Portfolio
collection of digital items aggregated within an *IT System* (3.7) used for a diversity of purposes to support LET and professional development activities such as assessment, educational or career guidance.

EXAMPLE An e-Portfolio should be in digital form, and may be used a) to store personal or professional digital artefacts, b) as a personal or professional journal to support reflective learning; c) as a collation of evidence of learning, experience, and achievement; d) to support lifelong learning and ongoing transitions between education and workplace environments; e) to support collation and integration of informal learning into formal settings; and, (f) to present selected views of content to prospective and existing employers and educators.

3.6
e-Portfolio reference framework
structure for understanding significant relationships among the entities of some environment, and for the development of consistent standards or specifications supporting that environment

Note 1 to entry: A reference framework is based on a small number of unifying concepts and may be used as a basis for education and explaining standards to a non-specialist.

[SOURCE: ISO 14721:2012, 1.7.2 Modified: in the term, "reference model" has been replaced with "e-Portfolio reference framework"; in the definition, the last line has been deleted, and Note 1 to entry has been added]

3.7
e-Portfolio system
instance of an *IT System* (3.7) designed and implemented specifically to support the creation, use, and management of *e-Portfolios* (3.5)

Note 1 to entry: An e-Portfolio system may be coupled (sets of) IT applications and services.

3.8
IT System
set of one or more computers, associated software, peripherals, terminals, human operations, physical processes, information transfer means, that form an autonomous whole, capable of performing information processing and/or information transfer

[SOURCE: ISO/IEC 14662:2010, 3.13]

3.9
item
unit of discrete data that comprises an *element* (3.4)

Note 1 to entry: There can be one or more items in an element.

EXAMPLE 1 A file or a link to a website.

Note 2 to entry: An item is the label assigned to indicate this layer of the e-Portfolio reference framework.

Note 3 to entry: The term artefact (or digital artefact) is sometimes used as the general term to refer broadly to the digital representation of items within elements, (e.g., past projects, awards, certificates). Artefacts may also be assigned unique identifiers to support various e-Portfolio processes (e.g., management and verification).

EXAMPLE 2 An item that is selected by an individual can be associated with a digital representation of a certification, (e.g., digital badge).

3.10
learning
acquisition of knowledge, skills or attitudes

[SOURCE: ISO/IEC 2382-36:2019, 3.1.1]

3.11
learning management system
LMS
software system designed for the purpose of performing administrative and technical support processes associated with *e-learning* (3.3)

[SOURCE: ISO/IEC 2382-36:2019, 3.3.1]

3.12
personal development planning
PDP
process that makes explicit the learning or professional development goals of an individual and proposed strategies for achieving them

Note 1 to entry: e-Portfolios may be used in a variety of ways to support personal development planning, summative assessment, presentation, reflection, and other uses.

4 Symbols and abbreviated terms

The following symbols and abbreviated terms are defined for use within this standard.

ABEEK	Accreditation Board for Engineering Education of Korea
CBE	Calgary Board of Education
ePEARL	electronic Portfolio Encouraging Active Reflective Learning
HRMS	Human Resource management System
ICT	Information and Communications Technology
IEC	International Electrotechnical Commission
IMS	IMS Global Learning Consortium, Incorporated
IPTV	Internet Protocol Television
ISO	International Organization for Standardization
IT	Information Technology
IT System	Information Technology System
ITLET	Information Technology for Learning, Education and Training
LET	Learning, Education and Training
LMS	Learning Management system
LORFOLIO	e-Portfolio offered by Lorraine Region
PC	Personal Computer
PDP	Personal Development Planning

RPL	Recognition of Prior Learning
QCL	Qualifications, Certifications and Licenses
SDEG	Shanghai Distance Education Group
SMEC	Shanghai Municipal Education Commission
SMS	Short Message Service
VET	Vocational educational training
WIL	Work Integrated Learning

5 e-Portfolios and e-learning

5.1 Role of e-Portfolios

The purpose of this Clause is to outline the roles of e-Portfolios, their key characteristics, and their advantages over traditional portfolios.

In the early development of the e-learning industry, the LMS occupied a prominent role as the central ITLET system. Developments since this time provide new opportunities to monitor human-computer interactions during learning, such as tools that build on outcomes-based assessment and evaluation that enable process-centred assessment and evaluation. However, wide adoption of e-learning in education has also brought new challenges for instructors, such as how to measure the effectiveness of e-learning and determine what might constitute authentic assessment. Innovations in practice, as well as technology, have meant that there is an increasing diversity of methods for addressing such issues. Importantly, learners who are engaged in e-learning activities typically have the option to study at their own pace and to access learning materials suitable to their particular situation. To fully support this flexibility, IT and ICT systems need to be adaptable to individual needs and requirements in providing appropriate e-learning services.

In education and training contexts, e-Portfolios have typically been used as contained environments that stimulate thinking about learning goals, monitor progress toward achieving those goals, and provide an interactive platform to give and receive advice about learning. These processes are sometimes referred to as Personal Development Planning (PDP), particularly when the learning or professional development goals and proposed strategies for achieving them are made explicit. Thus, e-Portfolios typically contain data sets such as a learner's learning history, learning goals, educational activities, outcomes, and related achievements. PDP and learning-based e-Portfolios also typically include evidence of reflection by the e-Portfolio owner. Millis, in Zubizarreta (2009, p. xx), also suggests that "portfolios are highly motivating, because portfolios get learners into a rich and deep knowledge base focused on their own learning experiences. Collaboration with others deepens these individual experiences by allowing probing questions, socially constructed knowledge, and alternative viewpoints".

Despite these opportunities to assist and enhance learning experiences, traditional (non-digital) portfolios can be seen to have a number of weaknesses:

— data are not durable, may be lost or not easily re-discoverable;

— managing overlapping data is difficult (e.g., teaching material);

— maintenance can cost a lot of time and effort;

— effective use in learning and teaching contexts is typically limited to evidence of achievement; and,

— integrating multiple file types, such as video/audio files, images, and others, is not easily managed.

These weaknesses of traditional portfolios can mostly be overcome by using ICT, although the durability of data is also dependent upon information management practices. e-Portfolios provide a platform

for supporting learners and instructors to increase educational effectiveness. By using e-Portfolios, instructors/learners can manage teaching and learning resources and processes, monitor activities and learning status while also enabling feedback for improving learning outcomes.

Three key characteristics of e-Portfolios that overcome limitations of traditional portfolios are:

— **flexibility** in modification, management, and portability. Users can modify their e-Portfolio conveniently and easily. Users also can manage their personal information and easily export this information to other systems and file formats as required.

— **multiple data types** can be managed. Users can show their outcomes dynamically related to their competency using multimedia files such as audio, video, graphics, images, and others. This capability lends itself to creativity of expression.

— **opportunities to integrate** with other IT systems and the ability to have access anywhere through the use of network technologies.

These characteristics of e-Portfolios facilitate their use in many different situations and contexts, not just in the support of learners. As elaborated below, there are also different types of e–Portfolios.

5.2 Classifying e-Portfolios

This reference framework for e-Portfolio information has been developed to support different types of e-Portfolios that may be used to support learning, teaching, and other LET activities. One approach, is for e-Portfolios to be classified into different types, according to purpose, function, and target audience, as advocated by Stefani, et al. (2007, pp. 13-14):

— **assessment e-Portfolios**: document individual reflections and present outcomes that can be used to demonstrate capability.

— **presentation e-Portfolios**: provide traditional portfolio functions such as enabling users to collate their artefacts to demonstrate achievement and competence.

— **personal development e-Portfolios**: include the collection of data and information to support employment and professional development planning.

— **learning e-Portfolios**: track and identify learning over time.

— **informal learning e-Portfolios**: allow for individuals to assemble content, evidence and reflections related to informal and personal learning activities not necessarily related to any formal education or training.

e-Portfolios also can be classified depending on the context in which they are applied (Zubizarreta, 2009):

— **course e-Portfolios**: are specific to a particular course and typically contain information assembled by the student documenting achievement and reflections on achievement of outcomes. In addition, course portfolios are often used for course assessments in part or in whole.

— **program e-Portfolios**: are specific to a defined field of academic study and document the learner's work completed, skills acquired, and outcomes met possibly as a requirement for graduation.

— **institutional e-Portfolios**: permit the sharing and assessment of institutional goals and objectives and progress, as well as providing information for re-accreditation, if necessary.

For specific learning and teaching contexts, e-Portfolios can have different functions and purposes, such as:

— **learning e-Portfolios**: have the primary function of supporting the learner but can also be used by instructors for assessment purposes.