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

*Technologies 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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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

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The committee responsible for this document is ISO/IEC JTC 1, Information technology, Subcommittee SC 36, Information technology for learning, education and training.

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Introduction

e-Portfolios have been deployed in many contexts that span educational, employment, artistic, and social contexts. In education, they 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 Technical Specification has been developed to support the creation and use of e-Portfolios to support learning, education and training. It can be used to develop more responsive, flexible and modular systems and services that will support learners, instructors, e-learning service providers and other stakeholders in their activities related to e-Portfolio creation and use across various ITLET contexts (such as K-12 education, higher education training, career planning and professional development). With on-going developments in ICT learners have access to an increasing diversity of learning, education, and training 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 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 utilized for e-Portfolios can provide instructors, trainers, administrators, and employers with an efficient means of appraisal, management, and decision making. This key characteristic also benefits learners through providing opportunities to reflect on their own learning and career development. 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.

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, unbundled applications and services can also provide such functionality and components of e-Portfolio system functionality can exist 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 learning, education, and training, 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 Technical Specification 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 Technical Specification includes six clauses and two annexes. The first clause provides the scope, exclusions, and aspects not currently addressed. The second and third clauses include the normative references and terms and definitions respectively. The fourth clause provides background information regarding e-Portfolios. The fifth clause describes various types of e-Portfolios used in learning, education, and training contexts and provides an approach to classifying them. The e-Portfolio reference framework

is then detailed in clause six. The annexes include use case information that has been submitted by national bodies ([Annex A](#)) and study cases of e-Portfolio interoperability ([Annex B](#)).

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

1 Scope

This Technical Specification 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 development.

The reference framework identifies content and functional components that support e-Portfolio systems and interoperability issues that need to be addressed in data exchange between these components and interoperability issues that need to be addressed in data exchange between the two component types (content and functional) and among the various categories.

This Technical Specification:

- provides an e-Portfolio reference framework;
- provides descriptions of e-Portfolios in terms of components, categories, and elements;
- provides descriptions of e-Portfolios in terms of component types (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 Technical Specification 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 Technical Specification 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 Terms and definitions

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

2.1

category

types of *components* (2.2)

2.2

component

set of constituent parts that comprises an *e-Portfolio* (2.5)

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 components for e-portfolio information: identification, synopsis, education, career, outcomes, capability, and experience.

Note 3 to entry: A functional component is used to identify and support interoperability and may include “layers” of entities such as business requirements and processes, technical services, and 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.]

2.3

e-learning

learning (2.9) facilitated by information and communications technology

[SOURCE: ISO/IEC 24751-1:2008, 2.18] (standards.iteh.ai)

2.4

element

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

[SOURCE: ISO/IEC 6523-1:1998, 3.3]

Note 1 to entry: A component can contain one or more elements.

Note 2 to entry: An element is part of the e-Portfolio framework and a label to indicate a layer within the e-Portfolio framework. An example is *Career Planning*, which is an element of the category of *Experience*.

2.5

e-Portfolio

collection of digital items aggregated within an *IT system* (2.7) used for a diversity of purposes to support LET and professional development activities through automated and manual means and is used for a diversity of purposes

EXAMPLE An e-Portfolio may be used:

- a) to store personal or professional electronic 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 on-going 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.

2.6**e-Portfolio system**

instance of an *information technology system* (2.7) designed and implemented specifically to support the creation, use, and management of *e-Portfolios* (2.5)

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

2.7**information technology system****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]

2.8**item**

unit of discrete data that comprises an *element* (2.4)

Note 1 to entry: An element can contain one or more items.

Note 2 to entry: An example is a file or a link to a website.

2.9**learning**

acquisition of knowledge, skills or attitudes

[SOURCE: ISO/IEC 2382-36:2013, 36.01.01]

2.10**learning management system****LMS**

software system designed for the purpose of performing administrative and technical support processes associated with *e-learning* (2.3)

[SOURCE: ISO/IEC 2382-36:2013, 36.03.01]

2.11**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.

2.12**reference model**

framework for understanding significant relationships among the entities of some environment, and for the development of consistent standards or specifications supporting that environment; a reference model 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]

3 Symbols and abbreviated terms

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

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 https://standards.iteh.ai/catalog/standards/sist/a3697876-93a3-4965-96b4-29960ebd11fb/iso-iec-ts-20013-2015
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
WIL	Work Integrated Learning

4 e-Portfolios and e-learning

4.1 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 determining 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 responsive to individual 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-electronic) 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 are difficult, (e.g. teaching material);
- maintenance can require a lot of time, effort and costs;
- 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 are 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 dynamically their outcomes related to their competency through 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.

4.2 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-Portfolio:** documents individual reflections and presents outcomes that can be used to demonstrate capability.

- presentation e-Portfolio: provides traditional portfolio functions such as enabling users to collate their artefacts to demonstrate achievement and competence.
- personal development e-Portfolio: includes the collection of data and information to support employment and professional development planning.
- learning e-Portfolio: tracks and identifies learning over time.
- informal learning e-Portfolio: allows for the individual 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 an entire course of academic study and document the learners' work completed, skills acquired, and outcomes met possibly as a requirement for graduation.
- institutional e-Portfolios: permits 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 be classified as following:

- learning e-Portfolio: has the primary function of supporting the learner but can also be used by instructors for assessment purposes.
- teaching e-Portfolio: has two purposes; (1) to manage teaching skills in order to reinforce and extend the teacher's competency; and, (2) to evaluate teaching competency.

Finally, regional or industry-specific e-Portfolios are used to support workforce development and lifelong learning in geographical regions and industry verticals.

4.3 Benefits of e-Portfolios

When e-Portfolios are used effectively a wide range of e-learning stakeholders (such as learners, instructors, providers, and school managers, parents, employers) stand to benefit:

Learners may benefit by:

- managing their information related to learning such as progression through a course, learning materials, feedback from instructors, and others;
- receiving advice on learning content from instructors and e-learning systems;
- accessing their portfolio from a variety of digital devices such as PC, Smartphone, and others;
- developing learning plans individually or in collaboration with others; and,
- presenting views of all or parts of their e-Portfolios to potential employers, parents, teachers, workplace assessors, or for entry into further education.

Instructors may benefit by:

- managing their information related to teaching such as teaching materials, career progression, evaluation data, etc;
- providing learning contents and other resources to learners;
- tracking learning progress and activities of their students;

- managing learners’ skill development and competencies; and,
- managing their own skill development or professional development as e-Portfolios.

e-Learning providers who make and offer e-learning services may benefit by:

- developing learning content appropriate to learner needs; and,
- operating e-learning services effectively.

Moreover, other stakeholders may benefit as follows:

- school managers might evaluate their instructors;
- parents can monitor the learning status of their child; and,
- employers can review the competence in a broader context.

By understanding the benefits that e-Portfolios can bring to different stakeholders, implementers of e-Portfolio systems can therefore ensure that sufficient functionality is provided.

5 Reference Framework of e-Portfolio Information

5.1 Introduction

The Reference Framework of e-Portfolio Information consists of a number of different representations and perspectives. The first is a high-level conceptual abstraction of the domains that e-Portfolio systems interface with (Figure 1). The second presents an analysis of common content categories found in e-Portfolio use cases submitted for inclusion into this Technical Specification (Table 1 and Table 2). The third (Figure 2) is an abstract model representing the content category structure of seven essential categories which map directly to the category and element analysis shown in Table 3. Lastly, Figure 3 is a services model of e-Portfolio functional components depicted in three layers (business process, technical services, and data sources).

As outlined in 4.2 above there are different ways of classifying and conceiving of e-Portfolios. Within this Reference Framework two types of components are made explicit – *content* (with structural and semantic dimensions), and *functional* (with systems and technical dimensions). The content component consists of seven (7) categories and their related items (or elements). The functional component represents an e-Portfolio system which includes (1) business processes; (2) technical services “genres”; and, (3) data sources.

The representation of content (in Tables 1, 2, and 3 and Figure 2) feature three levels of structure: categories, elements, and items. This structure represents a set of recorded information that an ITLET system must recognize as part of an e-Portfolio application or service. Elements are items that are specific to each category. There are currently 30 elements mapped to seven categories in Figure 2. Elements can be further itemized into more granular requirements and referred to as “items”. For example, an “identification” element (which falls under the “Profile category”) includes “items” such as name, and contact information.

All representations within this framework can be used to inform the design and implementation of e-Portfolio systems that support e-Portfolios in ITLET contexts. As such, they are not intended to serve as a strict technical reference model that might constrain development or innovation in e-Portfolio systems development.

5.2 Conceptual representation of e-Portfolio information

e-Portfolios and e-Portfolio systems can be represented in a number of different, but equally meaningful ways. For the purposes of this document a number of diagrams, models, and tables are used to present key information. For example, Figure 1 presents a high-level conceptual view of e-Portfolios being an interface between three key stakeholders: the learner; the formal educational organization; and, the