
**Information technology — Quality
for learning, education and training
— Fundamentals and reference
framework**

*Technologies de l'information — Qualité pour l'apprentissage,
l'éducation et la formation — Principes fondamentaux et cadre de
référence*



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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

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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 document 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, SC 36, *Information technology for learning, education and training*.

ISO/IEC 40180 cancels and replaces ISO/IEC 19796-1:2005 (initially published under the general title *Information technology — Learning, education and training — Quality management, assurance and metrics*) which has been technically revised.

Introduction

This document provides the fundamentals and the reference framework for quality assurance, quality management and quality improvement in IT-enhanced learning, education and training (called E-Learning). This document primarily consists of the Quality Reference Framework (QRF) for E-Learning. It is a framework to describe, compare and analyse approaches for quality management and quality assurance. These approaches can be mapped to QRF. Therefore, the framework is not a quality management model or guiding management system – it is a framework for the description of quality approaches. It serves to compare different existing standards and to harmonize these towards a common quality model. For a better understanding of the QRF, several annexes show samples of its usage – the annexes are based on the German DIN PAS 1032-1 (Annex B), the French code of practice in E-Learning ([Annex C](#)); and an example of how it can be mapped to other quality systems, such as the Chinese E-Learning Technology Standards (CELTS) ([Annex D](#)).

This document provides the fundamentals for the implementation and adaptation of the general quality standards within the fields of E-Learning, education and training. This includes specific vocabulary as well as the Quality Reference Framework (QRF) with its Process Model and Descriptive Model. It provides sector specific information that may be used to support the better integration of mandatory and voluntary quality approaches at the local, regional, national and transnational levels. Through the application of this document, organizations may continue to improve the quality of their processes, products, services and solutions within the fields of learning, education and training.

This document was carefully developed and revised over a period of more than 10 years to ensure compatibility with ISO 9001 and ISO 14001 standards and facilitate their use by organizations that wish to introduce and improve quality assurance, quality management and quality improvement in learning, education and training together with the implementation of both environmental and quality management systems to benefit themselves and their customers and stakeholders.

Overview of ISO/IEC 40180:

- [Clause 6](#) describes the process-oriented Quality Reference Framework (QRF) for the comparison and analysis of quality approaches.
- [Annex A](#) (informative) provides an introduction and description of the QRF and illustrates its relation to the PDCA Cycle and the IDEAL Reference Model. It further provides answers on key questions in order to provide a clearer understanding of the QRF concept and its use.”
- [Annex B](#) (informative) shows the full German process model (DIN PAS 1032-1) as an example of how the basic model can be extended.
- [Annex C](#) (informative) describes the use of the model describing the “French Code of Practice in E-Learning” (AFNOR Z 76-001) as a second sample of the use of this document.
- [Annex D](#) (informative) describes how other quality approaches can be mapped to QRF. Specifically, the Chinese Model CELTSC is used as an example of the mapping procedure.
- [Annex E](#) (informative) describes the use of the model for specific quality objectives such as metadata quality.

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Information technology — Quality for learning, education and training — Fundamentals and reference framework

1 Scope

This document provides the fundamentals and the reference framework for quality assurance, quality management and quality improvement in IT-enhanced learning, education and training (called E-Learning). It consists mainly of the Quality Reference Framework (QRF) for E-Learning, which is a common and generic framework to describe, specify and understand critical properties, characteristics and metrics of quality. The QRF combines an elaborated and extensive process model with a descriptive model for the processes. This document harmonizes existing approaches, concepts, specifications, terms and definitions related to quality for E-Learning, education and training.

2 Normative references

There are no normative references in this document.

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:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

organization

person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its objectives

[SOURCE: ISO 9000:2015, 3.2.1]

3.2

customer

person or organization who consumes the product (studying and training) directly or indirectly

EXAMPLE Learner, learner's parents, education institutions and potential employer.

3.3

interested party

person or organization that can affect, be affected by, or perceive itself to be affected by a decision or activity of ITLET

EXAMPLE Learner, employee, provider, partner, investor, owner, society.

[SOURCE: ISO 9000:2015, 3.2.3, modified, adapted within ITLET context]

3.4

process

set of interrelated or interacting activities which transforms inputs into outputs

Note 1 to entry: Inputs to a process are generally outputs of other processes.

Note 2 to entry: Processes in an organization are generally planned and carried out under controlled conditions to add value.

Note 3 to entry: A process where the conformity of the resulting product cannot be readily or economically verified is frequently referred to as a “special process”.

3.5

product

output of an organization that can be produced without any transaction taking place between the organization and the customer

Note 1 to entry: Production of a product is achieved without any transaction necessarily taking place between provider and customer, but can often involve this service (3.6) element upon its delivery to the customer.

Note 2 to entry: The dominant element of a product is that it is generally tangible.

Note 3 to entry: Hardware is tangible and its amount is a countable characteristic (e.g. tyres). Processed materials are tangible and their amount is a continuous characteristic (e.g. fuel and soft drinks). Hardware and processed materials are often referred to as goods. Software consists of information regardless of delivery medium (e.g. computer programme, mobile phone app, instruction manual, dictionary content, musical composition copyright, driver's licence).

[SOURCE: ISO 9000:2015, 3.7.6]

3.6

service

output of an organization with at least one activity necessarily performed between the organization and the customer

Note 1 to entry: The dominant elements of a service are generally intangible.

Note 2 to entry: Service often involves activities at the interface with the customer to establish customer requirements as well as upon delivery of the service and can involve a continuing relationship such as banks, accountancies or public organizations, e.g. schools or hospitals.

Note 3 to entry: Provision of a service can involve, for example, the following: — an activity performed on a customer-supplied tangible product (e.g. a car to be repaired); — an activity performed on a customer-supplied intangible product (e.g. the income statement needed to prepare a tax return); — the delivery of an intangible product (e.g. the delivery of information in the context of knowledge transmission); — the creation of ambience for the customer (e.g. in hotels and restaurants);

Note 4 to entry: A service is generally experienced by the customer.

[SOURCE: ISO 9001:2015, 3.7.7]

3.7

quality

degree to which a set of inherent characteristics of an object fulfils requirements

Note 1 to entry: The term “quality” can be used with adjectives such as poor, good or excellent.

Note 2 to entry: “Inherent”, as opposed to “assigned”, means existing in an object.

[SOURCE: ISO 9001:2015, 3.6.2, modified]

3.8

data quality

set of features that concern the collection, analysis, persistence, dissemination, and usage of data

EXAMPLE Relevance, accuracy, timeliness, punctuality, accessibility, clarity, comparability, coherence.

3.9**quality assessment**

measures carried out consistently and systematically in order to insure conformity with the requirements of a defined specification

3.10**quality assurance**

part of quality management focused on providing confidence that quality requirements will be fulfilled

[SOURCE: ISO 9000:2015, 3.3.6]

3.11**quality control**

part of quality management focused on fulfilling quality requirements

[SOURCE: ISO 9000:2015, 3.3.7]

3.12**quality improvement**

part of quality management focused on increasing the ability to fulfil quality requirements

Note 1 to entry: The quality requirements can be related to any aspect such as effectiveness, efficiency or traceability.

[SOURCE: ISO 9000:2015, 3.3.8]

3.13**quality management**

management with regard to quality

Note 1 to entry: Quality management can include establishing quality policies and quality objectives, and processes to achieve these quality objectives through quality planning, quality assurance, quality control, and quality improvement.

Note 2 to entry: [SOURCE ISO 9000:2015, 3.3.4]

3.14**quality objective**

objective related to quality

Note 1 to entry: Quality objectives are generally based on the organization's quality policy.

Note 2 to entry: Quality objectives are generally specified for relevant functions, levels and processes in the organization

Note 3 to entry: [SOURCE ISO 9000:2015, 3.7.2]

3.15**quality planning**

part of quality management focused on setting quality objectives and specifying necessary operational processes and related resources to achieve the quality objectives

Note 1 to entry: Establishing quality plans can be part of quality planning.

[SOURCE: ISO 9000:2015, 3.3.5]

3.16**quality policy**

policy related to quality

Note 1 to entry: Generally the quality policy is consistent with the overall policy of the organization, can be aligned with the organization's vision and mission and provides a framework for the setting of quality objectives.

Note 2 to entry: Quality management principles presented in this International Standard can form a basis for the establishment of a quality policy.

[SOURCE: ISO 9000:2015, 3.5.9]

3.17

total quality management

management approach of an organization, centred on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society

4 Abbreviated terms

QRF	Quality Reference Framework
RQC	Reference Quality Criteria
SCORM	Sharable Content Object Reference Model
W3C	World Wide Web Consortium
IDEAL	Initiating, Diagnosing, Establishing, Acting and Learning model
PDCA	Plan-Do-Check-Act cycle

5 Conformance

A quality description conforms to this document if each process included in a QRF instance corresponds to the appropriate specification in this document and includes all sub-processes. A conforming description may contain descriptions of processes not included in this document. The description may contain additional data elements.

This document can assist users who are implementing ISO 9000, ISO 9001 and can be used with other ISO quality standards, such as ISO 14001.

This document is informed by the concept and philosophy of Total Quality Management and by ISO 9000 and ISO 9001. However, it is not a Management System Standard and does not provide a model to follow when setting up and operating a quality management system like ISO 9001. Instead, it provides guidance and support for the introduction of quality management and improving learning quality.

This document is informed by the concept and philosophy of Environmental Management and by ISO 14001. However, it is not an Environmental Management System Standard and does not provide a model to follow when setting up and operating an environmental management system like ISO 14001. Instead, it provides guidance and support for introducing and improving quality processes in learning, education and training.

6 The Quality Reference Framework (QRF) for E-Learning

6.1 General

The QRF provides a process model and a descriptive model for the description, comparison and analysis of process-oriented quality approaches. The QRF can be used as a meta-model for approaches of quality management and quality assurance in learning, education and training. This means that no assumptions and prescriptive requirements of the quality approaches are made.

The use scenarios of the QRF can be described as follows:

Scenario 1: Description of a quality approach

- Select a specific quality management or quality assurance approach Q1.
- Identify the processes that are covered within Q1.
- Describe Q1 according to the framework using the description categories.

Scenario 2: Comparison of quality approaches

- Select quality management or quality assurance approaches [Q1..Qn].
- Identify the processes that are covered within [Q1..Qn].
- Describe [Q1..Qn] according to the QRF using the description categories.
- Define a metric to compare [Q1..Qn].
- Perform analysis and comparison.

Scenario 3: Harmonization of quality approaches

- Select quality management or quality assurance approaches [Q1..Qn].
- Identify the processes that are covered within [Q1..Qn].
- Describe [Q1..Qn] according to the QRF using the description categories.
- Define a metric to compare [Q1..Qn].
- Perform analysis and comparison.
- Combine [Q1..Qn] towards a consensus model.

It is important to mention that the QRF process model and its descriptive model shall be used as a general, descriptive reference framework. In a second step, good practice approaches and profiles can be generated – these profiles could contain specific recommendations, guidelines, procedures, or criteria.

NOTE In addition, it is important to underline that the QRF process model and its descriptive model are not prescriptive and do not require or determine a specific sequence of the processes: In fact, in practice, many processes are realized in parallel.

Finally, the QRF process model and its descriptive model can be extended and modified to be adapted to the specific situation, organization, target group and requirements.

6.2 Descriptive model of the QRF

The QRF descriptive model shows the classification and documentation scheme for quality processes (see [Table 1](#)). It is based on CEN CWA 14644. Each process will be described by this scheme.

Table 1 — QRF descriptive model

Attribute	Description	Example
ID	Unique Identifier	ID1234
Category	Main Process	Course development
Process Name	Process name	Method selection
Description	Description of the process	Within this process the didactic concept and methods are evaluated and selected
Relations	Relation to other processes	Before the method selection a target group analysis must be performed; FA.6
Sub-processes/ sub-aspects	Sub-processes/sub-aspects/tasks	Method identification, method alternatives, method prioritization
Objective	Objective of a Process	Adequate selection of one or more didactic concepts
Method	Methodology for this process Reference to guideline/ documents	Method selection shall be based on the target group Methods are selected based on the teachers' experience See Method Guidelines Handbook
Result	Expected result of a process	Method specification Documents
Actors	Responsible/participating actors	Team Didactical Design
Metrics/Criteria	Evaluation and Metrics for this process	Criteria catalogue 3.2.2–3.2.6
Standards	Standards used	ISO 9241, IEEE 1484.12.1:2003 Learning Object Metadata
Annotation/ Example	Further Information, Examples of usage	

The overview of the descriptive model of the QRF is presented in Figure 1.

Please note that the QRF process model and its descriptive model are not prescriptive and are not determining a specific sequence of the processes: In fact and in practice, many processes are realized in parallel. In addition, the QRF process model and its descriptive model can be extended and modified and has to be adapted to the specific situation, organization, target group and requirements.

ID	Category	Process	Description	Relation
Sub-processes/ Sub-aspects				
Objective				
Method				
Result				
Actors				
Metrics/Criteria				
Standards				
Annotation/Example				

Figure 1 — Overview of the QRF descriptive model

6.3 Process model of the QRF

The QRF process model includes the relevant processes within the whole life-cycle of learning, education and training (Table 2). The QRF process model is divided into seven parts called process categories. Sub-processes are included with reference to a classification of processes – examples of the use of classifications are shown in Annexes B and C.

Table 2 — QRF process model

ID	Process Category	Sub-Processes
NA	Needs Analysis	Classification
FA	Framework Analysis	Classification
CD	Conception/Design	Classification
DP	Development/Production	Classification
IM	Implementation	Classification
LP	Learning Process	Classification
EO	Evaluation/Optimization	Classification

In each part, the essential processes are described. For selected processes, examples how the reference model can be used are included; these examples are written in *italics*.

The use of the process model is shown using the classification of processes from DIN PAS 1032-1, listed fully in Annex B.

6.3.1 Overview

The overview of the process model of the QRF is presented in Figure 2.

Please note that the QRF process model and its descriptive model are not prescriptive and are not determining a specific sequence of the processes: In fact and in practice, many processes are realized in parallel. In addition, the QRF process model and its descriptive model can be extended and modified and has to be adapted to the specific situation, organization, target group and requirements.

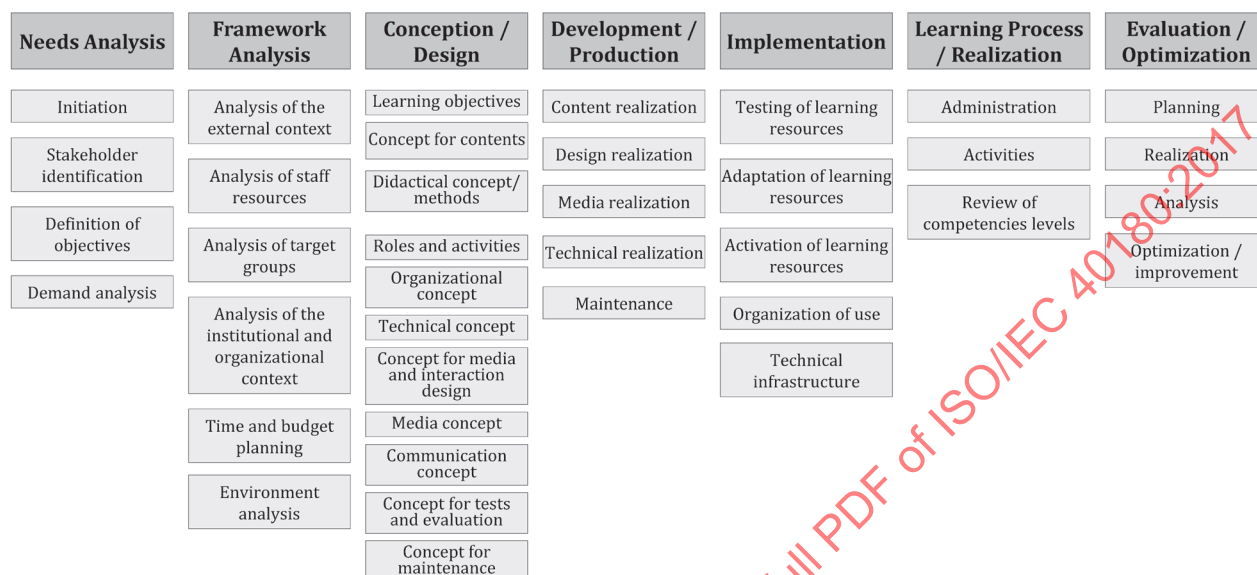


Figure 2 — Overview of the QRF process model

6.3.2 Description

In this section, the process model of the QRF is described including examples for the use of each category of the description scheme (see [Tables 3 to 9](#)).

6.3.2.1 Needs analysis

Table 3 — QRF process model: Needs analysis

ID	Category	Process	Description	Relation
NA		Needs Analysis	Identification and description of requirements, demands, and constraints of an educational project	
Sub-processes/ Sub-aspects		NA.1 Initiation NA.2 Stakeholder identification NA.3 Definition of objectives NA.4 Demand analysis		
Objective		To describe the needs and demands leading to an educational project		
Method		<i>Quality Function Deployment</i>		
Result		Documentation of goals, objectives, needs, and requirements of an educational project		
Actors		<i>Project manager; specialists, learners, sponsors</i>		
Metrics/Criteria		<i>Indicators</i>		
Standards		ISO 9000		
Annotation/Example				

6.3.2.2 Framework analysis

Table 4 — QRF process model: Framework analysis

ID	Category	Process	Description	Relation
FA		Framework Analysis	Identification of the framework and the context of an educational process	NA, CD
Sub-processes/ Sub-aspects		FA.1 Analysis of the external context FA.2 Analysis of staff resources FA.3 Analysis of target groups FA.4 Analysis of the institutional and organizational context FA.5 Time and budget planning FA.6 Environment analysis		
Objective		To describe relevant factors for an educational project		
Method		<i>Methods of empirical social research; methods in legal and economic research and analysis</i>		
Result		Documentation and validation of relevant parameters		
Actors		<i>Project manager; specialists</i>		
Metrics/Criteria		<i>Check for plausibility; consultation of additional experts</i>		
Standards				
Annotation/Example				

6.3.2.3 Conception/Design

Table 5 — QRF process model: Conception/Design

ID	Category	Process Name	Description	Relations
CD		Conception/Design	Conception and Design of an educational process	
Sub-processes / Sub-aspects		CD.1 Learning objectives CD.2 Concept for contents CD.3 Didactical concept/methods CD.4 Roles and activities CD.5 Organizational concept CD.6 Technical concept CD.7 Concept for media and interaction design CD.8 Media concept CD.9 Communication concept CD.10 Concept for tests and evaluation CD.11 Concept for maintenance		
Objective		To plan and design the concepts for an educational process		
Method		<i>Use of Design Guidelines</i>		
Result		To provide a conception and design for educational processes		
Actors		<i>Consultant, Media Designers</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

6.3.2.4 Development/Production

Table 6 — QRF process model: Development/Production

ID	Category	Process	Description	Relation
DP		Development/ Production	Realization of concepts	CD
Sub-processes/ Sub-aspects		DP.1 Content realization DP.2 Design realization DP.3 Media realization DP.4 Technical realization DP.5 Maintenance		
Objective		To realize the conceptions		
Method		<i>Implementation manual</i>		
Result		Educational products and services		
Actor		<i>IT-specialists, authors, developers</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

6.3.2.5 Implementation

Table 7 — QRF process model: Implementation

ID	Category	Process	Description	Relation
IM		Implementation	Description of the implementation of technological components	
Sub-processes/ Sub-aspects		IM.1 Testing of learning resources IM.2 Adaptation of learning resources IM.3 Activation of learning resources IM.4 Organization of use IM.5 Technical infrastructure		
Objective		To implement appropriate technological components being used in the educational process		
Method		<i>Change/configuration/content management</i>		
Result		Learning environment including all learning resources		
Actor		<i>Project manager, IT-manager</i>		
Metrics/Criteria		<i>Testing beta versions and system</i>		
Standards		<i>Software validation, e.g. following IEEE, ISO 9000</i>		
Annotation/Example				

6.3.2.6 Learning process

Table 8 — QRF process model: Learning process

ID	Category	Process	Description	Relation
LP		Learning Process	Realization and use of the learning process	
Sub-processes/ Sub-aspects		LP.1 Administration LP.2 Activities LP.3 Review of competence levels		
Objective		To perform the learning process		
Method		According to the chosen didactical concepts and methods		
Result		Completed process of learning, education and training		
Actor		<i>Learners, trainers, tutors</i>		
Metrics/Criteria		<i>User performance, user satisfaction</i>		
Standards				
Annotation/Example				

6.3.2.7 Evaluation/Optimization

Table 9 — QRF process model: Evaluation/Optimization

ID	Category	Process	Description	Relation
EO		Evaluation/ Optimization	Description of the evaluation methods, principles, and procedures	
Sub-processes/ Sub-aspects		EO.1 Planning EO.2 Realization EO.3 Analysis EO.4 Optimization/Improvement		
Objective		To describe the evaluation of the educational process		
Method		Evaluation methods (<i>Questionnaires, User tracking, user feedback report</i>)		
Result		To perform an evaluation of the educational process; to optimize and improve the educational process		
Actor		<i>Evaluators, learners, teachers</i>		
Metrics/Criteria				
Standards		ISO 9000		
Annotation/Example				

Annex A (informative)

Introduction and use of the QRF

Annex A explains the QRF and its introduction and use.

First, a mapping of the QRF with the PDCA and the IDEAL models is provided.

Second, some key questions are answered in order to provide a clearer understanding of the QRF concept and its use.

[Table A.1](#) provides a mapping of the QRF with the PDCA Cycle [15] and the IDEAL Model [18].

Table A.1 — Mapping of the QRF with the PDCA Cycle and the IDEAL Model

QRF (ISO/IEC 40180)	PDCA Model	IDEAL Model
Needs Analysis Framework Analysis Conception/Design	Plan	Initiate
Development/Production Implementation Learning Process	Do	Do
Evaluation/Optimization	Check	Evaluate
Evaluation/Optimization	Act	Act

[Figure A.1](#) provides an overview of the IDEAL Reference Model.

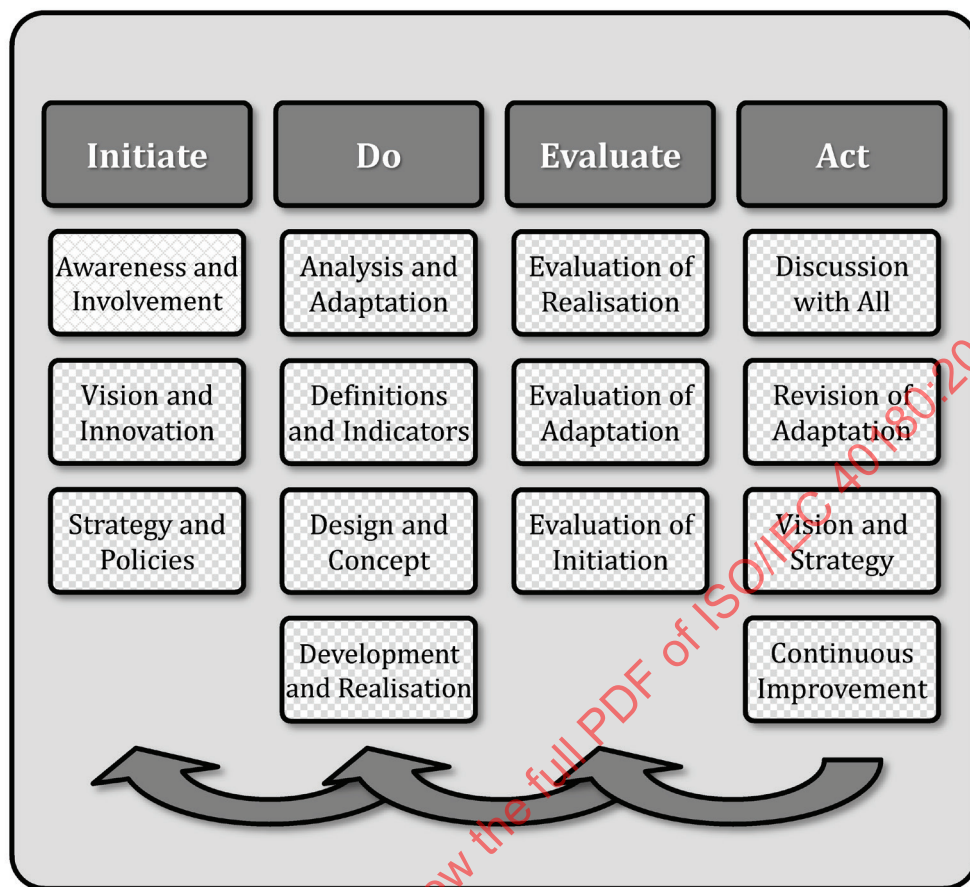


Figure A.1 — Phases of the IDEAL Reference Model [18]

In the following, some key questions are answered (FAQ):

Is QRF customer oriented / does it take individualization into account?

In general, QRF is a framework to describe and compare quality approaches. Therefore, it does not take any position of how “good” quality is achieved. However, it is designed so that guidelines, procedures and requirements are included and clearly specified (see [Table A.2](#)).

Table A.2 — Example of quality guidelines and methods for content selection/design

ID	Category	Process Name	Description	Relations
CD.2	Conception/Design	Concept of the contents	Concept of learning and teaching contents	NA.4 Demand analysis FA.2 Qualifications
Sub-processes/ Sub-aspects		Content selection Content Design		
Objective		1 Learner Demand: The goal is to provide content adapted to the needs and demand of the learner. 2 Adaptation: Each course shall provide different content presentation formats and entry points based on the user experience.		
Method		A prototype of the content shall be provided to a group of learners' representatives. In a consensus process, the contents shall be prioritized and agreed on. For each course, classify groups of learners according to their learning type. Adapt presentation format and methods according to these learning types.		
Result		1 Documentation of planned and agreed contents 2 Periodically, evaluate learning performance of different learners (test groups).		
Actors		Curriculum designer, didactic experts, institution accreditation authority, teacher, learners' representatives		
Metrics/Criteria		The content are measured based on their relevance, importance, exemplarity, ...		
Standards		Higher Education Standards		
Annotation/Example				

Therefore, negotiations and adaptation should be included when using QRF.

How should specific requirements and needs be included?

Specific requirements should be included in the process. Specific issues can be added to the model in specific profiles of the model (see [Table A.3](#)).

Table A.3 — Inclusion of French National Body's document concerning negotiation about "Validation of Experiential Learning" [14]

ID	Category	Process	Description	Relation
FA.2	Framework Analysis	Analysis of staff resources	Description of actors, their qualifications and competences	
Sub-processes/ Sub-aspects		Roles/Functions Competences/formal qualifications of actors Availability of actors		
Objective		1 Description of the roles/functions, competences/formal qualifications and availability of actors and users 2 Evaluate and certify actors' qualifications of prior experimental learning.		
Method		Analyse learner records and certificates. Analyse learners' qualifications through experimental learning: Presenting a portfolio, or explaining to a jury how professional experience lead to acquire knowledge and skills required by the qualification.		
Result		1 Description of roles/functions of staff 2 Description of competences/formal qualifications/qualifications through experimental learning 3 Description of availability of staff		
Actors		Project manager; experts (-> jury), learners		
Metrics/Criteria				
Standards		Project management and documentation guidelines; standards for social research; Law : "Loi sur la Validation des Acquis de l'Expérience"		
Annotation/Example				
NOTE: In order to include the processes of negotiations and individualization, a separate process has been included in the model.				

The model can be adapted (e.g. including a more detailed process model) using classifications of sub-processes. Examples for the use of sub-processes are given in [Annex B](#).

Annex B (informative)

DIN process model (DIN PAS 1032-1)

[Annex B](#) contains a sample use of QRF. The German DIN process model (DIN PAS 1032-1) including sub-processes is described using QRF.

Needs Analysis (NA)

ID	Category	Process	Description	Relation
NA		Needs Analysis	Identification and description of requirements, demands, and constraints of an educational project	
Sub-processes/ Sub-aspects		NA.1 Initiation NA.2 Stakeholder Identification NA.3 Definition of objectives NA.4 Demand Analysis		
Objective		To describe the needs and demand leading to an educational project		
Method		<i>Quality Function Deployment</i>		
Result		Documentation of goals, objectives, needs, and requirements of an educational project		
Actors		<i>Project manager; specialists, learners, sponsors</i>		
Metrics/Criteria		<i>Indicators</i>		
Standards		ISO 9000		
Annotation/Example				

ID	Category	Process	Description	Relation
NA.1	Needs Analysis	Initiation	Initiation of an educational project; description of necessity or demand for learning/education/training	FA.4
Sub-process(es)/ Sub-aspects		— Identification of demands and requirements — Identification of necessities		
Objective		Description and indication of the processes goals and aims <i>Needs for teaching</i>		
Method		<i>Methods of marketing research and market analysis, trend analysis, need analysis, interviews, balanced scorecard, skill gap analysis; Assessments, work place analysis, Auditing</i>		
Result		Definition and documentation of the needs, necessities, and demands (for learning/education/training)		
Actors		<i>End User</i> <i>Education and training manager</i> <i>Experts in education and training</i>		
Metrics/Criteria		<i>Review of description validity</i>		
Standards		ISO 9000, ANSI/PMI 99-001-2000 5.1 <i>Initiation</i>		
Annotation/Example				

ID	Category	Process	Description	Relation
NA.2	Needs Analysis	Stakeholder Identification	Identification, description and evaluation of the stakeholders groups	
Sub-processes/ Sub-aspects		— Identification of actors — Identification of interested parties — Identification of users		
Objective		Description of all potential stakeholders. Influence and cooperation within the education and training processes. Importance for and on the development, acceptance and market capabilities of the finished products		
Method		<i>Literature analysis, Staff sheets, Curricula, Workshops</i> <i>Examination regulations, business plans</i> <i>Interviews, Guidelines</i>		
Result		Description of all interested parties, their focused objectives, documentation of objectives.		
Actors		<i>Managers</i> <i>Initiator</i>		
Metrics/Criteria		<i>Measurements of acceptance, contracts and applications</i>		
Standards		ANSI 10.1 and ANSI 10.2		
Annotation/Example		Who are the respective actors and interested parties? (learners, pupils, students, educators, teachers, trainers, tutors, managers, enterprises, organizations, examination boards, regulative bodies in education, universities, sponsors, cooperating institutions, clients, relevant social groups).		

ID	Category	Process	Description	Relation
NA.3	Needs Analysis	Definition of Objectives	Description and evaluation of the objectives of relevant stakeholders	CD.x, IM.5, IM.6, LP.1, LP.2, LP.3, LP.4
Sub-processes/ Sub-aspects		— Strategic goals — Tactical goals — Operative goals		
Objective		Identification, description, and evaluation of goals of the stakeholders <i>Transition to a quality system in accordance with ISO 9000</i>		
Method		<i>Questionnaire, Interview, Polls, Workshop.</i>		
Result		Documentation of goals and objectives <i>operational, consistent goal-systems for quality-measurements in accordance with DIN/ISO 9000</i>		
Actors		<i>project or consortia leadership, user, client</i>		
Metrics/Criteria		<i>Achievement of objectives</i>		
Standards		ISO 9000, ISO 14001		
Annotation/Example				

ID	Category	Process	Description	Relation
NA.4	Needs Analysis	Demand Analysis	Specification, description, and evaluation of the demand for qualification	
Sub-processes/ Sub-aspects		— Description of the qualification demand — Justification of demand — Kind of the qualification demand (formal, informal, prescriptive, taxonomy)		
Objective		Specification, description and validation of demand and objectives in an educational project and their operational description		
Method		<i>Document analysis, Interview, Workshop, systematic and methodical formulations</i>		
Result		Requirement specification for project		
Actors		<i>Project manager, user, supplier, sponsor</i>		
Metrics/Criteria		<i>Evaluation by experts, Certification through DIN/ISO 9000</i>		
Standards		ISO 9000, ANSI PMI 99-001-2000a		
Annotation/Example				

Framework Analysis (FA)

ID	Category	Process	Description	Relation
FA		Framework Analysis	Identification of the framework and the context of an educational process	NA, CD
Sub-processes/ Sub-aspects		FA.1 Analysis of the external context FA.2 Analysis of staff resources FA.3 Analysis of target groups FA.4 Analysis of the institutional and organizational context FA.5 Time and budget planning FA.6 Environment analysis		
Objective		To describe relevant factors for an educational project		
Method		<i>Methods of empirical social research; methods in legal and economic research and analysis</i>		
Result		Documentation and validation of relevant parameters		
Actors		<i>Project manager; specialists</i>		
Metrics/Criteria		<i>Check for plausibility; consultation of additional experts</i>		
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
FA.1	Framework Analysis	Analysis of the external context	Identification, description and evaluation of the external context/framework of the educational process	
Sub-processes/ Sub-aspects		— Legal context/conditions — Economic context/conditions — Educational context/conditions — Social context/conditions — Political context/conditions		
Objective		Identification, description and validation of the external context/framework of the educational process		
Method		<i>Methods of empirical social/educational research; consultation of specialists; market analysis</i>		
Result		Identification and documentation of relevant aspects of the external context <i>Legal provisions concerning training intervals in security relevant areas</i> <i>Development of the E-Learning market</i> <i>Structures and processes of the organization within which an educational process is located; organizational culture of learning</i> <i>Structures and constraints due to established curricula etc.</i> Planning for updates of context analysis		
Actors		<i>Project manager; experts (e.g. market researchers, lawyers)</i>		
Metrics/Criteria		<i>Check on plausibility of results; additional expertise</i>		
Standards		<i>Project management and documentation guidelines; standards for social research</i>		
Annotation/Example				

ID	Category	Process	Description	Relation
FA.2	Framework Analysis	Analysis of staff resources	Identification and description of actors, their qualifications and competences, and availability	
Sub-processes/ Sub-aspects		— Roles/functions — Competences/formal qualifications — Availability of actors		
Objective		Identification of the roles/functions, competences/qualifications and availability of actors and users		
Method		<i>Methods of empirical social/educational research (e.g. document analysis); consultation of specialists; staff profile analysis</i>		
Result		— Description of roles/functions of staff — Description of competences/formal qualifications of staff — Description of availability of staff		
Actors		<i>Project manager; Human Resource Expert, learners</i>		
Metrics/Criteria		<i>Categories 2, 3, 4 of RQC</i>		
Standards		<i>Project management and documentation guidelines; standards for social research;</i>		
Annotation/Example				

ID	Category	Process	Description	Relations
FA.3	Framework Analysis	Analysis of target group	Identification and description of the target group	NA.x, CD.x, LP.x, EO.x
Sub-processes/ Sub-aspects		— Socio-cultural and social factors — Individual attribute (age, gender, preferences, etc.) — Motivation — Skills, qualification, competences — Roles and functions		
Objective		Definition of the target group and learner profiles		
Method		<i>Quantitative or qualitative methods of empirical research; Analysis of CVs, certificates, etc.</i>		
Result		Documentation of target group and learner profiles		
Actors		<i>Project manager, Human Resource Manager, learners, teachers</i>		
Criteria/Metrics				
Standards		<i>IEEE LTSC Public and Private Information (PAPI); IMS Learning Information Package (LIP)</i>		
Annotation/Example				

ID	Category	Process	Description	Relation
FA.4	Framework Analysis	Analysis of organizational and institutional context	Identification and description of the organizational and institutional context	
Sub-processes/ Sub-aspects		— Business Model — Organizational structure — Internal context — Learning culture		
Objective		Description of the organizational and institutional context relevant for the educational process		
Method		<i>Document analysis; interviews</i>		
Result		Documentation of the organizational and institutional context		
Actors		<i>Project manager; educational staff</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
FA.5	Framework Analysis	Time and budget planning	Identification and description of financial, contractual, and temporal constraints	<i>NA.4</i>
Sub-processes/ Sub-aspects		— Time — Budget/financial resources — Contractual constraints		
Objective		Description of temporal, budgetary, and contractual constraints		
Method		<i>Models for calculating costs; project planning methods</i>		
Result		— Detailed financial plan — Detailed project schedule — Documentation of contractual requirements		
Actors		<i>Project sponsor; project manager, controller, finance officer</i>		
Metrics/Criteria		<i>Periodical checks and updates, Categories 3 and 4 of RQC</i>		
Standards		<i>Project management and documentation guidelines; principles of budgeting</i>		
Annotation/Example		<i>First Prototype: 31.3.2003; Version 1.0 by 31.12.2003; Usage 2 times per quarter</i> <i>Design of the website: 20000 Euro; Cost-Benefit-Analysis</i>		

ID	Category	Process	Description	Relation
FA.6	Framework Analysis	Environment analysis	Identification and description of the environment of and physical resources for an educational process	
Sub-processes/ Sub-aspects		— Buildings, rooms and furniture — Technical environment (Hardware, Software, Network)		
Objective		Description of the environment relevant for educational purposes		
Method		<i>Document analysis (room plans); inspection;</i>		
Result		— Detailed description of physical resources (number and size of rooms) — Detailed description of technical environment (number and specs of PCs; specs of LAN)		
Actors		<i>Project manager; educational staff, facility manager</i>		
Metrics/Criteria				
Standards		<i>Product information; standards relating to products (e.g. LAN-components)</i>		
Annotation/Example		<i>Training room 10–20 Desktop PCs (Model XYZ), Learning spaces 2–6 people; Network Ethernet 100MBit; Netmeeting 100 Licenses; PC Model XYZ: Pentium IV, Hard disk 8BG, CD-ROM; WLAN-; internal Web-Cam Training budget: 1000 Euro p.a. per employee</i>		

Conception/Design (CD)

ID	Category	Process Name	Description	Relations
CD		Conception/Design	Design and conception of an educational process	
Sub-processes/ Sub-aspects		CD.1 Learning objectives CD.2 Concept for contents CD.3 Didactical concept/methods CD.4 Roles and activities CD.5 Organizational concept CD.6 Technical concept CD.7 Concept for media and interaction design CD.8 Media concept CD.9 Communication concept CD.10 Concept for tests and evaluation CD.11 Concept for maintenance		
Objective		To plan and design the concepts for an educational process		
Method		<i>Use of Design Guidelines</i>		
Result		To provide a conception and design for educational processes		
Actors		<i>Consultant, Media Designers</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

ID	Category	Process Name	Description	Relations
CD.1	Conception/ Design	Learning objectives	Definition and commitment of learning objectives	NA.1, NA.2, FA.x, LP.x
Sub-processes/ Sub-aspects		— Objectives — Competence model		
Objective		Description of learning objectives in relation to target groups resp. sub groups embedded in a model of competences		
Method		<i>Use of the context analysis; discussion and formalization of competence model and objectives</i>		
Result		Documentation and validation of learning objectives and competence model		
Actors		<i>Curricula designer, subject experts, teacher</i>		
Metrics/Criteria		<i>Analysis of experiences, comparison with needs in real practice</i>		
Standards		<i>Reference taxonomies, ontologies</i>		
Annotation/Example				

ID	Category	Process Name	Description	Relations
CD.2	Conception/ Design	Concept for contents	Concept of learning and teaching contents	NA.3, NA.4, FA.3-FA.6, CD.1, CD.3, LP.x
Sub-processes/ Sub-aspects		— Topics/subjects — Volume		
Objective		Representation of the learning and instructional contents		
Method		<i>Describing subjects using semantic networks</i>		
Result		Documentation of planned contents		
Actors		<i>Curricula designer, Subject experts, teacher</i>		
Metrics/Criteria		<i>Expert interviews, Categories 5–8 of RQC</i>		
Standards		<i>National Curriculum Standards</i>		
Annotation/Example				

ID	Category	Process	Description	Relation
CD.3	Conception/ Design	Didactical concept/ methods	Conception of didactic models, concepts, principles of using methods	NA.3, NA.4, NA.5, NA.6 FA, CD.1
Sub-processes/ Sub-aspects		— Learning and pedagogical theories — Didactic models — Curriculum — Learning Scenarios — Methodical concepts — Activities		
Objective		Development of didactic models based on learning and pedagogical theories; selection of adequate methods, activities, settings of work and technologies; designation of objectives and contents relevant for test creation		
Method		<i>Use of instructional design guidelines</i>		
Result		— Documentation of the overall concept of didactics — Selection procedure for didactic models — Description of the selection procedure for methodical concepts — Description of the controlling — Activity schemes		
Actors		<i>Didactic experts, teacher</i>		
Metrics/Criteria		<i>Formatively by permanent experience feedback by teacher and learner</i> <i>Summatively by success control at the end of learning process (Which increase of competences has been achieved?)</i>		
Standards		<i>IMS Learning Design, DIN PAS 1032-2</i>		
Annotation/Example				

ID	Category	Process	Description	Relation
CD.4	Conception/ Design	Roles and activities	Description of roles and their functions in the educational process	NA.2; FA.2; FA.3, FA.4; FA.6; CD.2
Sub-processes/ Sub-aspects		Relevant roles in learning scenarios <i>Curricula responsible, Experts for media didactics, Didactic experts, Content writer, Screenplay writer, Teacher, Learner, Tutor/learning advisor/moderator, Support, Test expert</i>		
Objective		Definition of roles, tasks, responsibilities and rights between the actors		
Method		<i>Actor and workflow modelling</i>		
Result		Documentation and justification of roles and functions		
Actors		<i>Project manager</i>		
Metrics/Criteria		<i>Analysis of experiences</i>		
Standards		<i>IMS Learning Design</i>		
Annotation/Example				

ID	Category	Process	Description	Relation
CD.5	Conception/ Design	Organizational Concept	Concept of general conditions of the organizational concept	
Sub-processes/ Sub-aspects		— Location — Duration, Learning time — Segmentation of learning time		
Objective		<i>Representation of general conditions relevant for the learning process</i>		
Method		Description and justification of the general conditions <i>Data of requirements of areas and technical equipment, data of planned average time, data of planned fixed or freely selectable times, Expert interviews</i>		
Result		Documentation of general conditions		
Actors		<i>Curricula responsible, experts media didactics, Didactic experts</i>		
Metrics/Criteria		<i>Category 2 of RQC</i>		
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
CD.6	Conception/ Design	Technical Concept	Concept of the technological realization	
Sub-processes/ Sub-aspects		— Mandatory technical requirements — Optional technical requirements		
Objective		Representation of the technical concept		
Method		<i>Data of software requirements, definition of interfaces, integration into existing structures</i>		
Result		Documentation of the technical base <i>Functional specifications</i>		
Actors		<i>Technical group, network experts, teacher, support staff</i>		
Metrics/Criteria		<i>Failure Mode and Effects Analysis FMEA</i>		
Standards		<i>Category 1 of RQC, ISO 9241</i>		
Annotation/Example				

ID	Category	Process	Description	Relation
CD.7	Conception/ Design	Concept of media and interaction design	Definition of media and interaction design	NA.3; NA.4; FA,, CD.1; CD.2; CD.4; CD.6
Sub-processes/ Sub-aspects		— Media design — Interaction design		
Objective		Representation of the design concept concerning all relevant fields in consideration of existing templates/guide lines		
Method		<i>Development of screen design and interaction design based on specifications of software ergonomics, Human-Computer Interaction Design/usability and if so of the corporate design of the organization</i>		
Result		Documentation of design principles (<i>design concept, style guide</i>) <i>Design prototype</i>		
Actors		<i>Design experts, Experts media didactics</i>		
Metrics/Criteria		<i>Usability test on the basis of the design prototype</i> <i>Heuristic evaluation</i> <i>Conformity examination respecting existing specifications, ISO 9241</i>		
Standards		ISO 9241, ISO 13407, ISO 14915, W3C-Accessibility-Guidelines, US Section 508		
Annotation/Example				

ID	Category	Process	Description	Relation
CD.8	Conception/ Design	Media concept	Selection of media usage	NA.3; NA.4; NA.5; NA.6; FA.4; FA.5; CD.1; CD.2, CD.5; CD.6
Sub-processes/ Sub-aspects		Selection and use (by media functions) — <i>Presentation and distribution of information</i> — <i>Collecting and filtering of information</i> — <i>Information editing, interaction</i> — <i>Constructive representation of own learning results</i> — <i>Performance support tools, Communication</i>		
Objective		— <i>Specification of required media functions</i> — <i>Selection and design of media usage adequate to target group, learning objectives, learning contents and general conditions</i>		
Method				
Result		Documentation media selection procedure and media usage		
Actors		<i>Expert media didactics, media designer</i>		
Metrics/Criteria		<i>Examination for didactics and methods adequacy and for technical feasibility of selected media usage before implementation process</i>		
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
CD.9	Conception/ Design	Communication concept	Selection and description of planned communication media	NA.3; NA.4; NA.5; NA.6; FA.5; FA.6; CD.1; CD.2
Sub-processes/ Sub-aspects		— Aspects of communication media: — <i>Actors</i> — <i>Medium</i> — <i>Communication objectives</i> — <i>Tools</i> — Tutor/moderator/trainer instruction		
Objective		Integration and description of relevant communication and interaction media		
Method				
Result		Documentation of communication and interaction media according to the relevant aspects <i>Documentation/guideline for tutor/trainer/moderator</i>		
Actors		<i>Curricula responsible, expert media didactics, teacher</i>		
Metrics/Criteria		Examination for didactics and methods adequacy and for technical feasibility of selected communication media before implementation process, <i>Categories 2 and 5 of RQC</i>		
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
CD.10	Conception/ Design	Concepts for tests/ evaluation	Specification of evaluation concept and test procedures	EO.x
Sub-processes/ Sub-aspects		— Test development — Test validation — Test scoring		
Objective		Identification of test procedures for competence/skill levels		
Method		<i>Proving with suitable comparison groups</i> <i>Statistical validation</i>		
Result		Documentation and justification of test procedures for classification, diagnostics, learning success and proficiency/competence level		
Actors		<i>Didactical experts, test expert, teacher</i>		
Metrics/Criteria		<i>Correlation of different test procedures</i> <i>Expert discourse</i> <i>Categories 2, 6, 8 of RQC</i>		
Standards		— <i>National and international professional associations' standards</i> — <i>State/ school performance standard</i>		
Annotation/Example				

ID	Category	Process	Description	Relation
CD.11	Conception/ Design	Concepts for maintenance	Conception for maintenance and updates of learning scenarios	LP.5
Sub-processes/ Sub-aspects		— Didactical / methodological updates (<i>adaptation of learning methods</i>) — Content updates — Technical maintenance		
Objective		To ensure the appropriateness of the concepts		
Method		<i>Maintenance plans, interviews, trend analysis</i>		
Result		Documentation and justification of maintenance and update concepts		
Actors		<i>Didactical experts, test expert, teacher</i>		
Metrics/Criteria		<i>Correlation of different test procedures</i> <i>Expert discourse</i> <i>Categories 2, 6, 8 of RQC</i>		
Standards		ISO 9001		
Annotation/Example				

Development/Production (DP)

ID	Category	Process	Description	Relation
DP		Development/ production	Realization of concepts	CD
Sub-processes/ Sub-aspects		DP.1 Content realization DP.2 Design realization DP.3 Media realization DP.4 Technical realization DP.5 Maintenance		
Objective		To realize the conceptions		
Method		<i>Implementation manual</i>		
Result		Educational products and services		
Actor		<i>IT-specialists, authors, developers</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
DP.1	Development/ Production	Content realization	Realization of teaching/learning contents	CD.2
Sub-processes/ Sub-aspects		Topics/Subjects		
Objective		Representation of teaching/learning contents		
Method		<i>Expert/learner interview, desktop research</i>		
Result		Representation of planned contents <i>Process plan, Curriculum</i> <i>Production of script/realization</i>		
Actor		<i>Teacher, expert, scriptwriter, programmer</i>		
Metrics/Criteria		<i>Prototype evaluation, peer-review</i>		
Standards		<i>Guideline for scriptwriters</i> <i>General education theories/taxonomies</i>		
Annotation/Example				

ID	Category	Process	Description	Relation
DP.2	Development/ Production	Design realization	Realization of screen and interaction design	CD.7
Sub-processes/ Sub-aspects		— Media design — Interaction design		
Objective		Realization of design concept for all relevant fields in consideration of existing patterns/guidelines		
Method				
Result		Templates for media/interaction design		
Actor		<i>Designer, illustrator</i>		
Metrics/Criteria		<i>Verification of conformity with regards to existing patterns, acceptance of screen design by client</i> <i>Category 7 of RQC</i>		
Standards		<i>Principles of interface design and usability, standards for software ergonomics (ISO 9241)</i>		
Annotation/Example		The realization of the interaction design implies design of control interaction, e.g. functions, navigation, menus, buttons, but also of didactical interactions, e.g. exercises, talks, opportunities of exploration Existing conditions could be, for example, a style guide or corporate identity or corporate design conditions and have to be taken into consideration accordingly.		

ID	Category	Process	Description	Relation
DP.3	Development/ Production	Media realization	Production of the relevant and chosen media / media resources	CD.8
Sub-processes/ Sub-aspects		<i>Audio, video, graphics, animations, photos</i>		
Objective		Production of required media		
Method		Production of media on the basis of defined criteria <i>Guidelines for appropriate/available formats and available software</i> <i>Data security</i>		
Result		Completed media products		
Actor		<i>Designers, illustrators, film-maker, photographers, speakers</i>		
Metrics/Criteria		<i>Screenplay conformity test, correctness test</i>		
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
DP.4	Development/ Production	Technical realization	Realization of technical concept	CD.6
Sub-processes/ Sub-aspects				
Objective		Realization of technical concept		
Method		<i>Java / Flash programming using programming/documentation guidelines</i>		
Result		— <i>Documented development of application/coding</i> — <i>Code review</i>		
Actor		<i>Designer, Programmer</i>		
Metrics/Criteria				
Standards		<i>General software-engineering standards, SCORM, XML</i>		
Annotation/Example				

ID	Category	Process	Description	Relations
DP.5	Development/ Production	Maintenance	Maintenance of learning scenarios	EO.x
Sub-processes/ Sub-aspects		— Content maintenance — Technical maintenance		
Objective		Provision of recent solutions, realization of maintenance concepts		
Method		<i>Interviews, trend analysis</i>		
Result		<i>Up-to-date learning scenarios</i>		
Actors		<i>Programmer, content experts, evaluators</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

Implementation (IM)

ID	Category	Process	Description	Relation
IM		Implementation	Description of the implementation of technological components	
Sub-processes/ Sub-aspects		IM.1 Testing of learning resources IM.2 Adaptation of learning resources IM.3 Activation of learning resources IM.4 Organization of use IM.5 Technical infrastructure		
Objective		To implement appropriate technological components being used in the educational process		
Method		<i>Change/configuration/content management</i>		
Result				
Actor		<i>Project manager, IT-manager</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

ID	Category	Process Name	Description	Relations
IM.1	Implementation	Testing of learning resources	Testing and validation of technical components of the educational process	DP.2, DP.3
Sub-processes/ Sub-aspects		— Testing in development environment — Delivery — Testing in productive environment		
Objective		Achievement of a system status, which is qualified for final release by correct function and high usability.		
Method		<i>Module Design Test, Functional Test, Challenge Test, Module Integration Test (alpha test), Installation Test, User Acceptance Test (beta test), Test Implementation, pre-production environment, Performance Test (Pilot phase)</i>		
Result		Documented test results and change requests A qualified software and documentation with correct function and high usability.		
Actors		<i>Developers of E-Learning systems, Project Manager, Documentation Specialists, IT technicians, test persons of the target group, where applicable independent test institutions</i>		
Metrics/Criteria		<i>Test results are reviewed by a Change Control Board, which sets priorities for changes. Usually at least the Chief Developer and the Project Manager are members of the CCB (see DP.2) and where applicable a user representative.</i>		
Standards		IEEE Software Validation		
Annotation/Example				

ID	Category	Process Name	Description	Relations
IM.2	Implementation	Adaptation of learning resources	Description of configuration management, adaptation, and documentation control	DP.x, LP.1
Sub-processes/ Sub-aspects		— Configuration Management — Adaptation and change of resources — Documentation		
Objective		Securing that all change requests (see DP.1) for a defined system are done in an effective and controlled manner		
Method		<i>Configuration Management consists of documented program version control of frozen code, hardware and network configuration, document version control and authorized personnel.</i> <i>Changes in program code, graphical design, in the system design or the didactical approach is done in a controlled manner.</i> <i>All quality documents like requirements, specifications, test plans and results and the project documentation are created, reviewed, approved, changed, archived and changed in a controlled manner.</i> <i>A Design Review Summary Report gives an overview of processed changes.</i> <i>For an increased efficiency a Documentation Management database should be used.</i>		
Result		— Configuration Management Plan, Change Control Plan, Documentation Control Plan and processed Change Request Forms and a Design Review Summary Report. — All change requests are either processed or on hold resp. omitted, in agreement with the customer. — Updated system version		
Actors		<i>Developer, screen designer, project manager, customer</i>		
Metrics/Criteria		<i>Evaluation of Configuration and Change Control System by the Change Control Board (see DP.1)</i>		
Standards		<i>IEEE Software Validation</i>		
Annotation/Example		<i>XML based DMS, Visual SourceSafe, CC database</i>		

ID	Category	Process Name	Description	Relations
IM.3	Implementation	Activation of learning resources	Learning products have to be approved by the customer/provider before they can go into operation. This process describes the staging and deployment of the product.	DP.6
Sub-processes/ Sub-aspects		— Provision — Registration — Release — Activation		
Objective		— Supply of customers/providers with the necessary technical equipment and learning material — Authorized Access to the learning platform (test modus) and transition of the product into the production environment		
Method		<i>Staging: Deployment, System Administration, Installation, configuration and test of base components of the production environment</i> <i>Registration: licences, users, courses, etc.</i> <i>Release: user acceptance test, handout of product documentation, formal sign-off</i>		
Result		Learning environment and learning materials are supplied to the customer, access to the learning platform is granted		
Actors		Supplier, provider, third party vendors, learner, system administrator, user		
Metrics/Criteria				
Standards				
Annotation/Example				

ID	Category	Process Name	Description	Relations
IM.4	Implementation	Organization of Use	Providing the organizational requirements for the operation of the learning scenario	FA.2, FA.4
Sub-processes/ Sub-aspects		— Organizational structure — Qualification of the administration personal — Technical competence and pre-knowledge of users — Support		
Objective		Providing the operational requirements		
Method				
Result		Implementation of the organizational framework		
Actors		<i>Project Manager, IT Manager, representative of the legal and finance department</i>		
Metrics / Criteria				
Standards				
Annotation/Example				

ID	Category	Process Name	Description	Relations
IM.5	Implementation	Technical Infrastructure	Providing the organizational requirements for the operation of the learning scenario	NA.4, FA.1, FA.5, DP.3, DP.4, IM.1
Sub-processes/ Sub-aspects		— Infrastructure components — Data security — Documentation — Support		
Objective		Providing the organizational requirements for the operation of the learning scenario		
Method		— <i>Challenge testing, disaster simulation</i> — <i>Troubleshooting guidelines for technical problem solution and workarounds</i>		
Result		Providing tested infrastructure — <i>Technical configuration summary report</i> — <i>Technical training records</i> — <i>Disaster recovery plan</i> — <i>Completed technical checklists</i> — <i>Vendor audits, Summary Report reviewed by the Change Control Board</i>		
Actors		<i>Supplier, third party vendors, onsite system administrators</i>		
Metrics/Criteria				
Standards		ISO 9241		
Annotation/Example				

Learning Process/Realization (LP)

ID	Category	Process	Description	Relation
LP		Learning Process	Realization and use of the learning process	
Sub-processes/ Sub-aspects		LP.1 Administration LP.2 Activities LP.3 Review of competence levels		
Objective		To perform the learning process		
Method				
Result		Completed process of learning, education and training.		
Actor		<i>Learners, trainers, tutors</i>		
Metrics/Criteria		<i>User performance, user satisfaction</i>		
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
LP.1	Learning Process	Administration	Description of the administrative requirements and conditions of the learning process	FA; CD; IM
Sub-processes/ Sub-aspects		— Information — Consultation of learners — Educational Planning/qualification requirement analysis — Technical support — Registration — Billing/Accounting — Complaint management — Contract — Certification — Transparency — Organizational context, situational context, social context		
Objective		To specify and provide administrative functions according to the needs of the stakeholder of the learning process		
Method		Using the organizational, economic and technological operational concepts		
Result		Realization and documentation of administrative processes		
Actor		<i>Administrator, project management</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
LP.2	Learning Process	Activities	Description of the learning, support, and transfer activities	CD, LP.1, LP.3
Sub-processes/ Sub-aspects		— Learning activities — Support activities — Transfer activities		
Objective		Initiation of individual learning processes through learning/support/transfer activities		
Method		Using the learning scenario conception		
Result		Documentation of the observable learning progression and learning activities		
Actor				
Metrics/Criteria		Category 6 of RQC		
Standards		DIN PAS 1032-2, IMS Learning Design		
Annotation/Example				

ID	Category	Process	Description	Relations
LP.3	Learning Process	Review of Competence Level	Activities to determine the competence level	CD.9
Sub-processes/ Sub-aspects		— Procedures — Performance/Phases — Certificate/Degrees/Reports		
Objective		Measurement and Appraisal of Learning progression/Increase in Competence/Knowledge acquisition		
Method		Pretest, Performance monitoring, final exam, transfer review		
Result		Documentation of learning performance		
Actor		HR responsible, teacher		
Metrics/Criteria				
Standards				
Annotation/Example				

Evaluation/Optimization (EO)

ID	Category	Process	Description	Relation
EO		Evaluation/ Optimization	Description of the evaluation methods, principles, and procedures	
Sub-processes/ Sub-aspects		EO.1 Planning EO.2 Realization EO.3 Analysis EO.4 Optimization/Improvement		
Objective		To describe the evaluation of the educational process		
Method		Evaluation methods (<i>Questionnaires, User tracking, user feedback report</i>)		
Result		To perform an evaluation of the educational process; to optimize and improve the educational process		
Actor		<i>Evaluators, learners, teachers</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
EO.1	Evaluation/ Optimization	Evaluation planning	Description of evaluation planning	<i>all categories</i>
Sub-processes/ Sub-aspects		— Goals of an evaluation — Approach to evaluation — Time frame — Selection of and number of evaluators involved — Definition of parameters and criteria — Selection of methods and instruments		
Objective		Development of a plan for evaluating results both in terms of didactic and economic criteria;		
Methods				
Result		Detailed plan of the evaluation		
Actor		<i>Internal/External evaluators, project manager;</i>		
Metrics/Criteria				
Standards				
Annotation/Example		<i>Evaluation activities are possible on different levels (cf. Kirkpatrick, Schenkel, Phillips): Product – reaction – learning (individual and organizational) – behaviour and processes – business results – ROI/ROE</i>		

ID	Category	Process	Description	Relation
EO.2	Evaluation/ Optimization	Realization	Realization of the evaluation	<i>all categories</i>
Sub-processes/ Sub-aspects		— Organization of evaluation activities — Sampling and sample		
Objective		To obtain data in order to pass judgment on the results achieved and the relationship of results to resources that were required		
Methods		Using the evaluation plan		
Result		— Documentation of the realization of evaluation activities — Documentation of the data obtained		
Actor				
Metrics/Criteria				
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
EO.3	Evaluation/ Optimization	Data Analysis	Description of the data analysis	<i>all categories</i>
Sub-processes/ Sub-aspects		— Summary — Analysis — Interpretation — Recommendation		
Objective		To obtain insights/understanding as to the methods, tools and resources applied with respect to costs, results, usability;		
Methods		<i>Statistical analysis</i>		
Result		Description and justification of — analysis of results and interpretation — summary of analysis and interpretation — recommendations		
Actor		<i>Project manager, evaluator, external consultants</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
EO.4	Evaluation/ Optimization	Optimization/ Improvement	Description of the adaptation and optimization of products and processes	<i>all categories</i>
Sub-processes/ Sub-aspects		— Preventive measures — Corrective measures		
Goal		Maintaining/increasing the efficiency and effectiveness of products and processes on the basis of experiences and recommendations		
Methods				
Results		Documentation and justification of measures for improvement taken — <i>maintenance/improvement of the efficiency and effectiveness of products and processes</i> — <i>preventive measures: adaptation to changed circumstances</i> — <i>corrective measures: implementation of recommendations based on evaluation</i>		
Actors		<i>Project manager, evaluators, designer, teacher, programmer</i>		
Metrics/Criteria				
Standards				
Annotation/Example		— <i>The work group is discussing a differentiation of two processes: preventive and corrective measures; these will be different with respect to input and methods;</i> — <i>Taking into account circumstances, for example with respect to the organization, staff, (technical) resources etc.;</i> — <i>The results of evaluation activities serve as input for improvement of planning and implementation in future projects („lessons learned“)</i>		

Annex C (informative)

French code of practice in E-Learning (AFNOR Z76-001)

The French code of practice in E-Learning shows how the model can be used with different process models. The processes from the French model can be mapped to the QRF (see [Table C.1](#) and [Figure C.1](#)).

Table C.1 — Mapping the processes of the French model to the QRF

ID	Process	Sub-process(es)	QRF ID	QRF Process
AN	Analysis	AN1: Strategic analysis/context of demand AN2: Needs and resources analysis/feasibility of demand	NA FA	Needs Analysis Framework Analysis
DC	Design/ Construction	DC1: Design of learning system and its environment DC2: Design of learning resources and material	CD	Conception/Design
IN	Instrumentation	IN1: Choice of material and of technologies IN2: Implementation of material and technologies IN3: Definition of maintenance strategies IN4: Definition of updating strategies	DP IM	Development/Production Implementation
RE	Realization	RE1: Negotiation/prescription RE2: Coaching/Tutoring RE3: Learning RE4: Collaboration RE5: Assessment	LP	Learning Process
EV	Evaluation	EV1: Planning who, what, when, how EV2: Data collection and analysis EV3: Recommendations for improvement	EO	Evaluation/Optimization

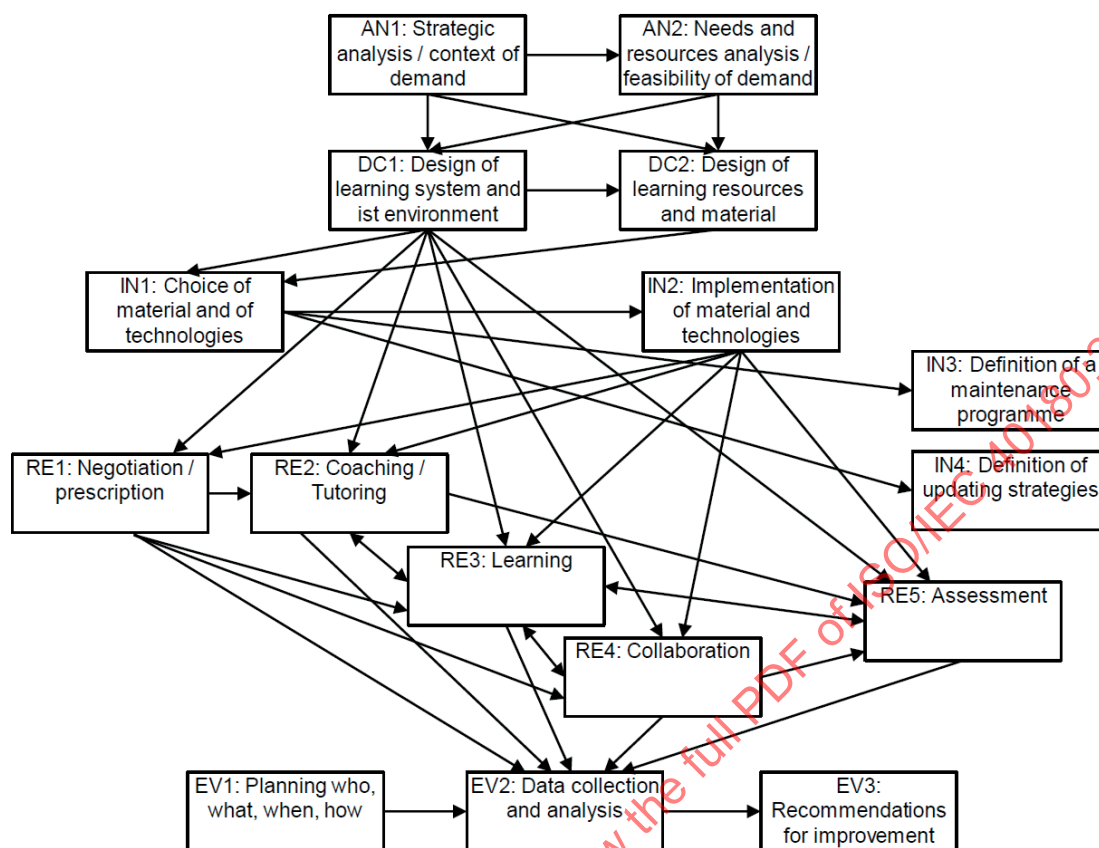


Figure C.1 — Links between sub-processes in the French model

Analysis (AN)

ID	Category	Process	Description	Relation
AN		Analysis	In the analysis phase, the context, the needs, requirements, demands, and constraints for the development of an E-Learning system are identified and defined.	
Sub-processes/ Sub-aspects		AN1: Strategic analysis/context of demand AN2: Needs and resources analysis/feasibility of demand		
Objective		To describe the context and the reasons (the needs and demand) for the development of an E-Learning system; the resources available and the constraints for its implementation		
Method		<i>Methods for field research in social and economic sciences, Strategic Analysis, Needs Analysis</i>		
Result		Description of the context, the added value produced and the needs and demand which are met by the development of an E-Learning system		
Actors		<i>Project manager; specialists</i>		
Metrics/Criteria				
Standards		<i>Project Management Standards, National Standards AFNOR X50 — 749, 750, 756 and 760</i>		
Annotation/Example				

ID	Category	Process	Description	Relation
AN1	Analysis	Strategic Analysis/ Context of demand	Identification and description of stakeholders and competitors, elicitation of the added value for E-Learning, identification of potential partnerships	AN2, DC1, DC2
Sub-processes/ Sub-aspects		Identification and description of actors Identification and description of stakeholders and interests Elicitation of the added value Identification and description of Interested parties		
Objective		To have a clear vision of all stakeholders and of their interests, of the potential market, of the potential partners		
Method		<i>Methods of market research and market analysis, trend analysis, need analysis, interviews, literature review, balanced scorecard...</i>		
Result		Description of interested parties and competitors, justification of the added value for E-Learning		
Actors		<i>Project manager, user groups, education and training managers, experts in education and training</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
AN2	Analysis	Needs and resources analysis	Identification and description of needs, resources and constraints; evaluation of the feasibility of an E-Learning solution to meet the demand	AN1, DC1, DC2
Sub-processes/ Sub-aspects		Definition of the scope of the project Identification and description of the educational/training needs Plan of the project taking into account resources, constraints, potential partnerships Cost/benefits analysis Preparation of decision making		
Objective		To prepare the decision by identifying the demand, the training needs, the resources available and required, the constraints, the costs and timeframe of the project, the benefits of the project		
Method		<i>Needs analysis, project planning methodologies, cost-analysis methodologies, cost-benefit analysis...</i>		
Result		Definition of the project and its objectives, feasibility study, provisional budget and schedule,		
Actors		<i>Project manager and experts in needs analysis, costing and cost benefit analysis</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

Design/Construction (DC)

ID	Category	Process Name	Description	Relations
DC		Design/Construction	In the Design and Construction phase, the E-Learning system and its environment including the learning resources (material, support and tutoring...) are defined and designed	
Sub-processes/ Sub-aspects		DC1: Design of the learning system and of its environment DC2: Design of the learning resources and material		
Objective		To define and design the E-Learning system, its human and technical environment, including technologies and the learning resources (material and human resources)		
Method		<i>Use of Design Guidelines</i>		
Result		The architecture of the E-Learning system, its environment and the resources needed		
Actors		<i>Project manager, consultant or E-Learning specialists, subject matter experts</i>		
Metrics/Criteria				
Standards		This Code of practice (AFNOR Z 76-001)		
Annotation/Example				

ID	Category	Process Name	Description	Relations
DC1	Design/ Construction	Design of the learning system and of its environment	Definition of the architecture of the learning system and of the learning environment in order to meet the identified needs	AN1, AN2, DC2, IN1, RE1, RE2, RE3, RE4, RE5
Sub-processes/ Sub-aspects		Choosing the type of architecture according to a preferred typology Overall specifications of the system and its environment according to needs and constraints Design of the system in terms of learning activities, organization, roles of actors, support facilities, assessments, registration, tracking... Planning quality assurance		
Objective		To define the learning situations in order to meet the learning needs; to specify how they are organized, when and where they take place; how they are supported, how they are administrated...		
Method		<i>Learning design methodologies, Educational modelling languages...</i>		
Result		The detailed organization of the learning system, of the learning environment and of support facilities		
Actors		<i>E-Learning course designers, specialists in distance education</i>		
Metrics/Criteria				
Standards		<i>Reference taxonomies or typologies, Instruction Design Methodologies (ex: IMS Learning Design (LD), DIN PAS 1032-2, ...)</i>		
Annotation/Example				

ID	Category	Process Name	Description	Relations
DC2	Design/ Construction	Design of the learning resources and material	Specification and design of learning resources needed to meet the needs within the specified architecture	AN1, AN2, DC1, IN1
Sub-processes/ Sub-aspects		Organizing resources according to training paths Design and specification of learning resources and support, including use of existing resources... Design of specific material after having checked material available "off-the-shelf" Preparing delivery of newly created material		
Objective		To specify and design resources required by the learning system, taking into account the type of support required and material existing on the market		
Method		<i>Learning resources design methodologies, learning material evaluation methodologies, usability heuristics...</i>		
Result		Specification of a consistent set of learning resources, including existing evaluated material		
Actors		<i>Learning resource designers, subject matter experts, teachers, usability specialists, media specialists</i>		
Metrics/Criteria				
Standards		Usability standards		
Annotation/Example				

Instrumentation (IN)

ID	Category	Process	Description	Relation
IN		Instrumentation	In the instrumentation phase, material, tools and technologies are chosen and implemented, and the maintenance and updating strategies are defined	
Sub-processes/ Sub-aspects		IN1: Choice of material and technologies IN2: Implementation of material and technologies IN3: Definition of a maintenance programme IN4: Definition of updating strategies		
Objective		To choose and implement appropriate technological components being used in the educational system, and to define strategies for maintenance and updating of these components		
Method				
Result				
Actors		<i>Project manager, implementers, IT-specialists</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

ID	Category	Process	Description	Relation
IN1	Instrumentation	Choice of material and technologies	Preparation of decisions concerning the technical components of the learning system: off-the-shelf learning material, tools and technologies.	DC1, DC2, IN2, IN3, IN4
Sub-processes/ Sub-aspects		Definition of a set of criteria to select material, tools, technologies... Collection of information about uses from other users, internet forums, ... Preparing the decision about the dilemma: make or buy?		
Objective		To prepare the decisions about technological choices for decision makers		
Method				
Result		Information about advantages and disadvantages of various solutions, a set of criteria and arguments to support the decisions		
Actor		Project manager, consultants, other users		
Metrics/Criteria				
Standards				
Annotation/Example				

ID	Category	Process Name	Description	Relations
IN2	Instrumentation	Implementation of material and technologies	According to the chosen alternative (make or buy), sub-processes are different: buying and installing equipment, software or material in one case; deciding to use or not Open Source software, developing and testing software tools and material before installing it in the other.	IN1, RE1, RE2, RE3, RE4, RE5
Sub-processes/ Sub-aspects		Buying equipment, software and learning material Use of Open Source software Developing and testing tailor-made material and software tools Installing the equipment, software, material		
Objective		To buy or develop the technical components of the system, and to install them		
Method		In case of tailor-made software, use of Software development methodologies is highly recommended		
Result		Operational technological components of the learning system		
Actors		Project Manager, Software Developers, Documentation Specialists, IT technicians, Media specialist, test persons of the target group...		
Metrics/Criteria				
Standards		W3C recommendations, AICC, SCORM, Metadata models (IEEE 1484.12.1:2003 Learning Object Metadata)		
Annotation/Example				

ID	Category	Process Name	Description	Relations
IN3	Instrumentation	Definition of a maintenance programme	The definition of a maintenance programme is part of the implementation process	IN1
Sub-processes/ Sub-aspects		Choosing between prevention and repair Definition of a maintenance programme		
Objective		To define a maintenance programme		
Method				
Result		A Maintenance programme		
Actors		<i>Project manager, IT specialists</i>		
Metrics/Criteria				
Standards				
Annotation/Example				

ID	Category	Process Name	Description	Relations
IN4	Instrumentation	Definition of updating strategies	Definition of updating strategies is also part of the implementation process	IN1
Sub-processes/ Sub-aspects		Monitor technological changes and evolution of uses or changes in users practices Organizing technological watch		
Objective		To be able to anticipate technological obsolescence by watching the evolutions and planning systematic updating		
Method				
Result		An updating plan for technological components		
Actors		<i>Project manager, IT specialists</i>		
Metrics/Criteria				
Standards				
Annotation/Example				