SLOVENSKI STANDARD
SIST-TS CEN/TS 17699:2022

01-maj-2022

Smernice za izdelavo strokovnih učnih načrtov IKT v skladu s standardom EN 16234-1 (e-CF)

Guidelines for developing ICT Professional Curricula as scoped by EN16234-1 (e-CF)

Richtlinien für die Entwicklung von Lehrplänen für IKT-Fachkräften nach EN16234-1 (e-CF)

Ta slovenski standard je istoveten z: **CEN/TS 17699:2022**

ICS:

03.100.30	Vodenje ljudi	Management of human resources
35.020	Informacijska tehnika in tehnologija na splošno	Information technology (IT) in general

SIST-TS CEN/TS 17699:2022 **en,fr,de**

TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

CEN/TS 17699

March 2022

ICS 03.100.30; 35.020

English Version

Guidelines for developing ICT Professional Curricula as scoped by EN 16234-1 (e-CF)

Richtlinien für die Entwicklung von Lehrplänen für IKT-Fachkräften nach EN16234-1 (e-CF)

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Ref. No. CEN/TS 17699:2022 E

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European foreword

This document (CEN/TS 17699:2022) has been prepared by Technical Committee CEN/TC 428 “ICT Professionalism and Digital Competences”, the secretariat of which is held by UNI.

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Introduction

To underpin the development of a European Professional ICT workforce there is an imperative to provide education and training fit to meet the requirements of the ICT professional community. Enhanced approaches to address the education of new ICT entrants and for existing practitioner continuous professional development needs are required.

EN 16234-1:2019 e-Competence Framework (e-CF) - A common European Framework for ICT Professionals in all sectors - Part 1: Framework incorporates a common language articulating key ICT competences as required and applied in the ICT professional workplace. It offers a multifaceted background of the required essential knowledge, skills and attitudes applicable to ICT professionals across the breadth of ICT disciplines. It therefore follows that applying EN 16234-1 (e-CF) principles to education provision offers a route map to the realization of a genuinely professional ICT community.

This document is designed to address ICT professionalism through education provision. It guides curriculum and learning programme developers through the process of forming ICT practitioner courses and/or programmes, along a pathway to support the development of a competent, professional European ICT workforce.

This document provides guidance on the design/redesign, development and maintenance of a curriculum or learning programme to achieve alignment or compliance with EN 16234-1:2019 (e-CF). A methodology, deploying the application of educational profiles is provided as a step-by-step approach for verifying programme content alignment with EN 16234-1 (e-CF) articulated competences.

The application of EN 16234-1:2019 (e-CF) and its intrinsic links to CWA 16458:2018 series European ICT Professional Role Profiles and prEN 17748-1 European Foundational Body of the Knowledge for the ICT Profession (ICT BoK), for the purpose of guiding curriculum and learning programme design, has been commissioned as an essential building block to support the vision of a European ICT Professional community.

This document is neutral and directly linked to EN 16234-1:2019 (e-CF) and does not follow the specific interests of a minority of major influencers.

This document is for application by educational institutions, learning programmes and certification providers of all types, public and private, that provide ICT Professional education and training.

This document is informed and framed by the scope of EN 16234-1:2019 (e-CF) and thus covers the entire ICT Professional process lifecycle.

This document provides:

- a methodological approach to linking EN 16234 (e-CF) and related documents with new or existing learning programmes;
- a model relating ICT learning outcomes to EN 16234 (e-CF) related competences;
- an overview of strategic and operational aspects related to the implementation of an e-CF based learning programme;
- a comprehensive overview of ICT professionalism documents and references providing a shared European language for ICT Professional competences, knowledge, skills, attitudes and roles.

This document enhances and complements existing learning programme development and design practice in the following ways:

- It embeds the context of European ICT Professionalism through compatibility with its four cornerstones comprising EN 16234-1 (e-CF), prEN 17748-1 (ICT BoK), FprCEN/TS 17834 (European Professional Ethics Framework for the ICT Profession) and by complementing the guidelines on e-CF performance indicators and common metrics to form the Education and Training cornerstone.

- It facilitates translation of workplace competence needs into an education and learning environment.
- It supports transparency of education and training content through the application of EN 16234-1 (e-CF) common language and therefore influences learning programme currency and quality.

This document is structured by 8 Clauses, as described in Figure 1.

Clauses 1, 2 and 3 describe the scope, the normative references and the relevant terms and definitions used.

Clauses 4 and 5 place the document in its European context. These items are dedicated to ICT professionalism and the education and training system. Clause 4 introduces the European ICT Professionalism Framework with its four building blocks and underlying reference publications. This document is an important contribution for developing ICT Professionalism in Europe and provided as part of a series, all related to this broader ICT Professionalism Framework. Clause 5 highlights the different forms of education to which these ICT curriculum guidelines are relevant. It also relates the European Qualification Framework and the concept of competences to the construct of the e-CF.

Clauses 6, 7 and 8 form the core of the document. They describe the (re)design of a learning programme or curriculum based on EN 16234-1 (e-CF) and related documents. In Clause 6 the concept of educational profiles is introduced, as a structure that enables a competence-oriented learning programme design and development, thus providing a link between competences needed in a professional environment and the learning outcomes of education and training. Clause 7 explains how to use this educational profile in the design or redesign of an ICT curriculum or learning programme. Clause 8 focuses on specific implementation and organization issues, related to the practical realization of an e-CF based ICT-curriculum or learning programme in a concrete context.

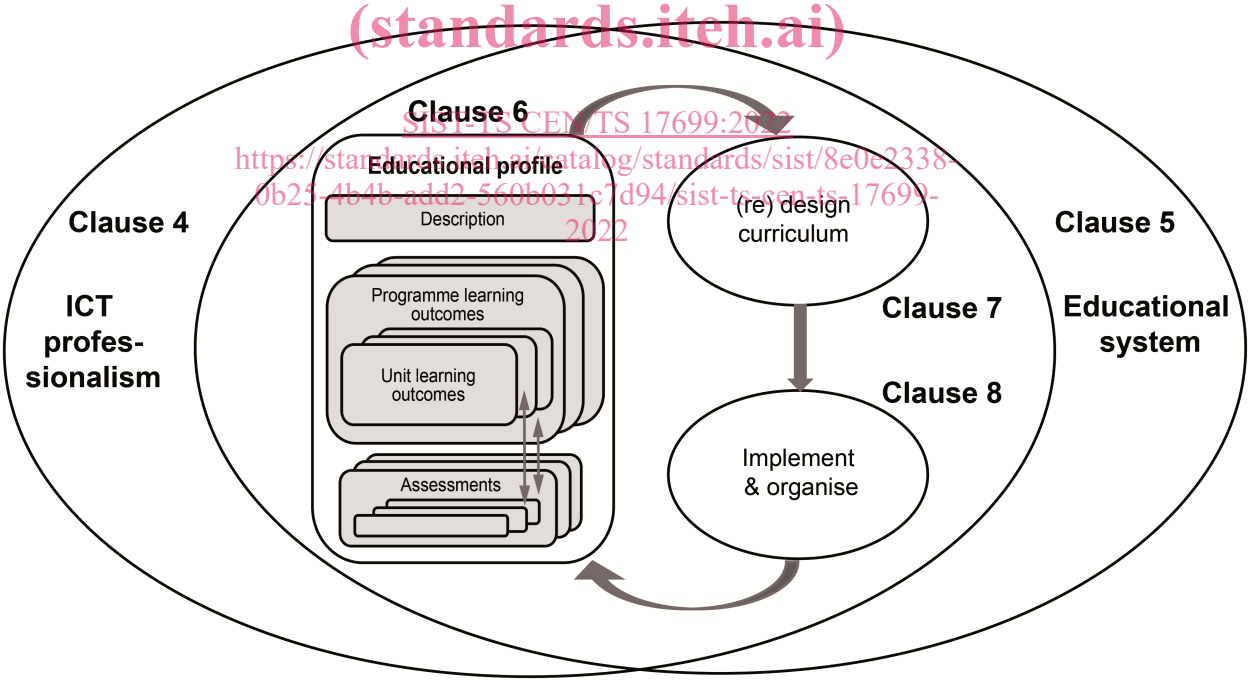

Figure 1 — Navigation aid for Clauses 4 to 8 of this document

1 Scope

This document provides guidance and inspiration on how to design/redesign, develop, maintain, adjust, and compare ICT Professional curricula and learning programmes as scoped by EN 16234-1:2019 and related documents.

EN 16234-1:2019 (e-CF) is the starting guiding point for this document, for a shared European language for ICT professional development. Other framework sources can be used to apply the methodology outlined in this document.

This document is for application by educational institutions, learning programmes and certification providers of all types (public and private), providing ICT Professional education and training including:

- Higher Education (HE);
- Vocational Education and Training (VET);
- Any other educational or training institution or provider in professional ICT, e.g. Continuous Professional Development (CPD).

This document is focused on guiding education providers on how to align curricula and learning programmes with the structure and principles of EN 16234-1 (e-CF) e-Competences and CWA 16458-1 ICT Professional Role Profiles. It applies to all forms of education, supporting educational providers who plan to use a shared European language on knowledge, skills, competences and roles, as ingredients for the successful provision of ICT Professional education and training.

The guidelines, provided by this document, include formal, non-formal and industry developed education and training through the provision of high-level, consistent recommendations and guidance for ICT curriculum or learning programme design by any education provider.

In this document, a distinction is made between a learning programme and a curriculum. The term “curriculum” is strongly associated with formal educational institutions and degrees, the term “learning programme” indicates a broader, more encompassing concept, also incorporating training and other learning programmes, not restricted to only “curricula”. As the proposed methodology in this document relates to both curricula and learning programmes, the term ‘learning programme’ is used throughout the text. If the term ‘curriculum’ is used, then that narrower meaning is explicitly applicable in that situation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 16234-1:2019, *e-Competence Framework (e-CF) - A common European Framework for ICT Professionals in all sectors - Part 1: Framework*

prEN 17748-1, *Foundational Body of Knowledge for the ICT Profession (ICT BoK) - Part 1: Body of Knowledge*

CWA 16458:2018 (all parts), *European ICT professional role profiles*

3 Terms and definitions

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

3.1
Information and Communication Technology
ICT
<technical> digital computers and internet (communication) systems, including software, hardware, and networks

[SOURCE: EN 16234-1:2019, definition 3.1]

3.2
Information and Communication Technology
ICT
<economic and political> cross sector of enterprises, including manufacturers, product suppliers or service providers relating to the ICT field

[SOURCE: EN 16234-1:2019, definition 3.2]

3.3
ICT professional
person having the competence to plan, build, run, enable and/or manage ICT and having a professional ICT qualification and/or ICT occupational experience; they include both employees of ICT companies and ICT employees of organizations in all other sectors; they are all in the scope of this document

[SOURCE: EN 16234-1:2019, definition 3.3]

3.4
competence
demonstrated ability to apply knowledge, skills, and attitudes for achieving observable results

[SOURCE: EN 16234-1:2019, definition 3.5]

3.5
knowledge
<within a competence> body of facts which can be applied in a field of work or study (know what to do)

[SOURCE: EN 16234-1:2019, definition 3.6]

3.6
knowledge
<general> theoretical or practical understanding and awareness of phenomena such as facts, terminology, concepts, models or theories

[SOURCE: EN 17748-1:—[1], definition 3.6]

Note 1 to entry: Knowledge as defined in EN 16234-1 (e-CF) is rooted in the competence and work-based focus of the ICT professional competence. Building on this for the educational and training sector a revised definition of knowledge is included to incorporate the more theoretical aspects of knowledge which are covered in education and to emphasize the importance of understanding.

[1] Under preparation. Stage at the time of publication: prEN 17748-1:2021.

3.7
common knowledge
knowledge shared by all ICT professionals

[SOURCE: EN 17748-1:—[1], definition 3.7]

3.8
base knowledge
knowledge required for a particular area of ICT expertise as represented by CWA 16458-1

[SOURCE: EN 17748-1:—[1], definition 3.8]

3.9
specialised knowledge
detailed knowledge required at a high level of proficiency for an area of ICT expertise as represented by CWA 16458-1

[SOURCE: EN 17748-1:—[1], definition 3.9]

3.10
body of knowledge
structured set of facts, terminology, concepts, models, and theories which represent the accepted and agreed upon core knowledge base required by a particular profession with the aim of fostering professional cohesion and encouraging a shared vision

[SOURCE: EN 17748-1:—[1], definition 3.15]

3.11
skill
ability to carry out managerial or technical activities and tasks, and this may be cognitive or practical (know how to do it)

[SOURCE: EN 16234-1:2019, definition 3.7]

3.12
attitude
representing the human element of an e-competence and reflecting the way a person integrates knowledge and skills and applies them in a contextually appropriate manner

[SOURCE: EN 16234-1:2019, definition 3.8]

3.13
transversal aspects
cross-cutting topics that are relevant to all competences defined by EN 16234-1 (e-CF); each transversal aspect is provided by a title and a generic description that may be applied, dependent upon context by, 'being aware of' or 'behaving proactively' with regard to the transversal aspect description; awareness and proactivity influence attitude linking with knowledge and skills as applied in the definition of competence in EN 16234-1

[SOURCE: EN 16234-1:2019, definition 3.9]

3.14
transversal knowledge
knowledge that is coupled to one of the transversal aspects as distinguished in EN 16234-1 “e-CF”: T1 Accessibility, T2 Ethics, T3 ICT legal issues, T4 Privacy, T5 Security, T6 Sustainability and T7 Usability

[SOURCE: EN 17748-1:—[1], definition 3.19]

3.15
behavioural skills
interactive skills used to successfully engage with situations in the workplace, they may refer to work quality, social interaction or emotion

EXAMPLES Communication, empathy, attention to detail and integrity.

[SOURCE: EN 16234-1:2019, definition 3.10]

3.16
behavioural knowledge
non-technical knowledge in support of behavioural skills concerning successful engagement in workplace situations which may refer to work quality, social interaction, or emotions; examples include, communication, collaboration and problem solving

[SOURCE: EN 17748-1:—[1], definition 3.21]

3.17
proficiency level
level indicating the degree of mastery that allows a person to meet requirements in the performance of a competence

Note 1 to entry: Proficiency levels in the e-CF are characterized by a combination of levels of influence within a community, context complexity, autonomy, and typical behaviour expressed by examples of action verbs. EN 16234-1 (e-CF) incorporates proficiency levels e-1 through to e-5.

[SOURCE: EN 16234-1:2019, definition 3.11]

3.18
educational profile
structure that provides a link between competences needed in a professional environment and learning outcomes of education and training

3.19
learning level
level indicating a grading and may be represented by a formal qualification; they generally derive from an education system or indicate a grading in a taxonomy of intellectual or learning behaviours (like memorising, applying, interpreting) and have a relationship with proficiency levels but are to be distinguished from these

[SOURCE: EN 16234-1:2019, definition 3.12]

3.20
learning context
general, overall context in which the learner performs his/her learning activities; it is composed of elements that influence learning activities of learners in general or of an individual learner, such as national and international regulations and cultural, social, and economic factors

3.21
learning environment
any environment that allows a person to learn in providing certain conditions or procedures to do so; this can be an educational institute, a training facility or a workplace, as well as a face-to-face, hybrid or a virtual environment

3.22
learning programme
coherent set of learning activities with the aim of providing learners with certain knowledge, skills or behaviour over a certain period of time

3.23
degree programme
type of learning programme resulting in a formal degree, such as a bachelor or a master programme

3.24
curriculum
type of learning programme, based on a predefined selection and organization of content, offered in a certain way by an educational institution, such as a school, college, or university

3.25
learning process
transformative process of acquiring new understanding, knowledge, skills, behaviours, values, attitudes, and preferences

3.26
learner
person who acquires knowledge, skills or behaviour, and by internalizing this informing his/her future thinking and behaviour

3.27
student
person who is learning at an educational institution, such as a school, college, or university

3.28
learning path
specific route that reflects a person's subsequent learning activities undertaken in a specific learning environment throughout his/her life, career, or study

3.29
learning unit
elements of which a learning programme is composed of, e.g. a course, a module, an assignment

3.30
learning activity
activity specifically designed or arranged in a way to support learning

3.31
learning situation
specific set of circumstances specifically designed or arranged in a way to enable a learner to perform learning activities

3.32
learning objective
statement of the teacher's or instructor's purpose for creating and teaching a specific learning unit or a learning activity

3.33
learning outcome
statement of what a person knows, understands, and is able to do on completion of a learning process

[SOURCE: EQF]

3.34
programme learning outcome
statement that describes what a person knows, understands, and is able to do on completion of a learning programme

[SOURCE: adapted from ECTS User's guide]

3.35
deliverable
tangible or intangible result of a process of development, meant to be provided to another person

3.36
assessment
act of judging or deciding the amount, value, quality, or importance of something

3.37
summative assessment
assessment that indicates whether a learner has acquired the learning outcomes to an adequate level, usually resulting in a reward such as credits, a certificate, or a diploma

3.38
formative assessment
assessment that provides insight into the learner's progress and serves as an opportunity to give directions on further development

4 ICT Curriculum guidelines in context of European ICT Professionalism

This document, although a stand-alone document, is part of a broader picture that supports the vision for a European ICT Professional workforce. By adopting this document, educational providers will be able to create or adapt existing learning programme in alignment with EN 16234-1 (e-CF). By adopting the common language articulated in EN 16234-1 (e-CF), learning programmes will naturally embrace the concept of competence. Furthermore, a communication bridge is established between education providers, employers and ICT professionals, enabling all parties to engage in a shared mission to enhance ICT professional capability and advance the establishment of digital leadership.

In the above context, this document is a key element of the four building blocks that are required for the establishment of an ICT European profession:

- ICT professional Competences applied at the workplace as articulated by EN 16234-1:2019 (e-CF) and its closely interrelated CWA 16458:2018 series ICT Professional Role Profiles,

- ICT professional knowledge as articulated by Bodies of Knowledge and the European Foundational Body of Knowledge for the ICT Profession (ICT BoK),