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European ICT professionals role profiles - Part 2: User guides

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European foreword

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1. Executive overview: European ICT Professional Role Profiles User Guide

This CEN Workshop Agreement (CWA) Part 2 **User Guide explains the basic principles and supports practical application of the European ICT Professional Role Profiles**.

The European ICT Professional Role Profiles make a key contribution to increasing transparency and convergence of the European ICT Skills landscape. Incorporating the competences of the European e-Competence Framework (e-CF, EN 16234-1) as a main component of profile descriptions, the 30 ICT Professional Role Profiles provide a generic set of typical roles performed by ICT Professionals in any organisation, covering the full ICT business process.

Complementary to the e-CF, the European ICT Professional Role Profiles contribute to a shared European reference language for developing, planning and managing ICT Professional needs in a long-term perspective and to maturing the ICT Profession overall.

The European ICT Professional Role Profiles are a flexible tool for ICT professional development and profile construction. They are not intended to represent a rigid standard. The profiles were built as a foundation and inspiration, from an organisational viewpoint, for the flexible creation of more context-specific profiles in a broad variety of areas (e.g. job profiles, curriculum design). Implementing the e-CF competences from a profile construction perspective, the European ICT Professional Role Profiles provide a tool and entry point for e-CF application to individuals and organisations working with the e-CF EN 16234-1 standard.

There are many ways to apply the 30 typical ICT Profiles, that are described in this CEN Workshop Agreement. This User Guide provides pragmatic explanations on how to apply the European ICT Professional Role Profiles from multiple stakeholder perspectives and for a broad range of application purposes, such as, for example, HR planning, recruitment, digital transformation process support, curriculum design and qualifications.

Section 2 of this User Guide explains the underlying concepts and principles of the European ICT Professional Role Profiles which are important to appreciate prior to constructing more context-specific profiles.

Section 3 provides guidance on how to create more specific ICT Profiles in context, leading to the so-called generations 3 of the European ICT Professional Profiles family tree. Founded on consistent observations it is explained in more detail how to adapt the different components of the profiles to meet specific needs.

Section 4 provides ideas and hints from varied perspectives and offers examples to demonstrate how HR and ICT departments, curricula developers, qualification providers and other stakeholders can use the profiles in support of job profile definitions, for assessment and career development, to support an organisational change process including digital transformation and for curriculum design. Additionally, guidance is offered on how to connect the profiles to other frameworks, e.g. ESCO the European Classification of skills, competences and occupations.

The European ICT Professional Role Profiles CWA has been developed, maintained and supported in practical implementation by a large number of European HR and ICT experts in the context of the CEN Workshop ICT Skills. The first version of the profiles was published in 2012. This second release is the outcome of the *European ICT Professional Profiles in action* project carried out in 2017-18.

2. European ICT Professional Role Profiles basic principles

2.1. ICT Professional Role Profiles versus competences and jobs

Jobs, roles and competences are terms commonly used when describing the actions, responsibilities, tasks and skills of people in the workplace. The terminology is often used interchangeably and in common use it requires limited explanation. However, when applying ICT Professional Role Profiles, it is useful to have a clear understanding of how these terms are defined in this CWA.

Competence is based entirely upon the e-CF definition; it is a demonstrated ability to apply knowledge, skills and attitudes to achieving observable results. ***e-CF competences are a key component of ICT Professional Profiles.***

Roles, in this case the European ICT Professional Role Profiles, provide a broad picture of the activities performed by individuals engaged in the multitude of positions that make up the ICT profession. These profiles reflect a collection of typical tasks, competences and responsibilities that are to be fulfilled and each profile is given a common use title for ease of identification. ***ICT Professional Role Profiles are key components of ICT jobs.***

Jobs of ICT professionals are normally described using job descriptions that are more detailed and are specific to an individual and the organisation. They contain personalised information such as terms and conditions of employment, remuneration and organisation cultural values. ***Jobs are detailed descriptions in context.***

The schematic below illustrates these relationships, it shows ***how a job incorporates roles and in turn roles incorporate e-competences.***

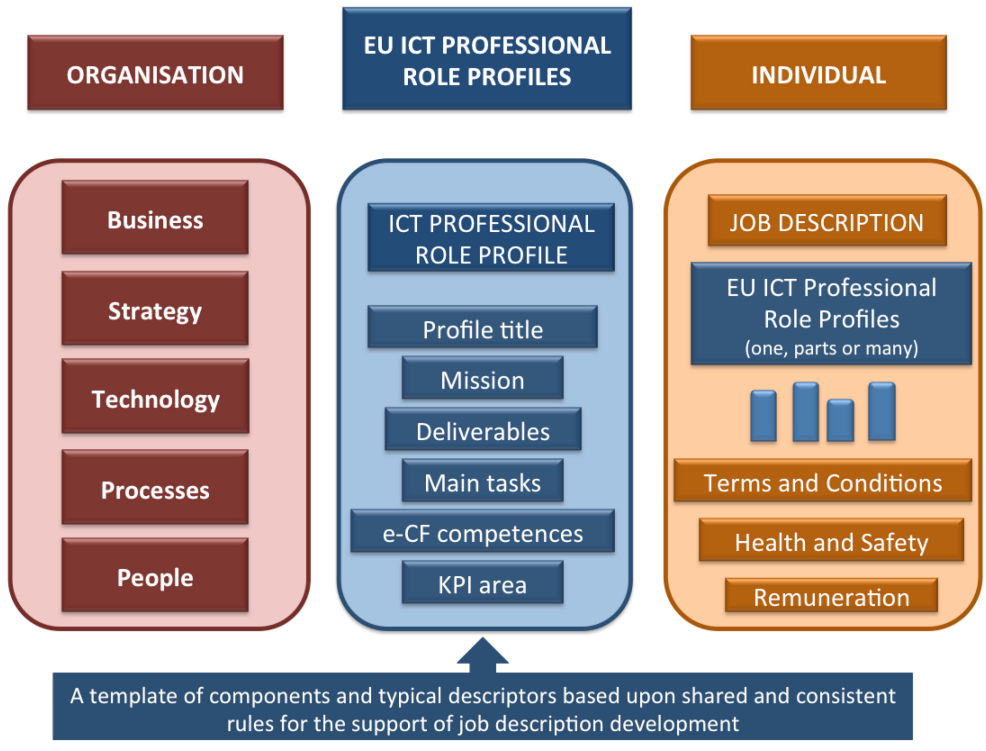


Figure 1: European ICT Professional Role Profiles implementation into the organisation – A job incorporates roles (one, parts of or many) and a role incorporates up to 5 e-Competences.

The function of European ICT Professional Role Profiles is to offer users structure and clarity for designing or identifying and clustering the multitude of activities that are essential to support the digital strategy of an organisation. They are less detailed and less specific than job descriptions and offer a simple but flexible start point. They also represent a European multi-stakeholder shared perspective and provide a common reference language and communication tool to support mutual understanding e.g. both between countries but also within organisations such as between HR and ICT departments.

There are a huge range of different job titles across the ICT profession and they are created for a variety of purposes including attracting new recruits and providing recognition for organisation loyalty through promotion and construction of enhanced job titles. Jobs are unique but a similar title can be used to describe widely different jobs, conversely similar jobs can be described by different titles. This can be confusing and prevent clear understanding between different actors and stakeholders of the job described and its associated tasks and responsibilities.

The European ICT Professional Role Profiles address this lack of clarity by clustering typical and common job role components into a consistent role profile template. These role profiles, built from an organisational perspective, may be adopted and used as a basis for many activities including, personal development, organisation and job family restructuring, curriculum and training course development. The profiles are designed to be consistent in structure but varied in content offering clear differentiation between each profile.

The European ICT Professional Role Profiles can be used in a multitude of environments and in a wide variety of ways, they can be broadly categorised in three application types;

- (A) Taking one or more of the 30 provided profiles (generation 2) with none or some minor changes by the user
- (B) Forming new profiles with greater granularity (generation 3) associated and derived from the 30 provided profiles
- (C) Adopting the structure and format of the professional profiles template but using different content to establish significantly different roles either related or even unrelated to ICT.

2.2. Underlying concepts: e-Competences and Deliverables

The European ICT Profile descriptions are based on two key components:

- **European e-Competence Framework**: for defining ICT Professional Role Profiles a list of e-competences can be identified, each defined by a proficiency level and focusing on the most relevant to provide clear differentiation between the role profiles;
- **Outcomes/ Deliverables**
    - An ICT Professional Role Profile is defined by a list of Deliverables, either in terms of accountable, responsible or in terms of contribution;
    - A Deliverable is a predefined result of a task in a working context;
    - One Deliverable can have only one associated accountable job but may have many contributors;
    - A deliverable may or may not be seen by users, may be intermediate or final, but must always be observable.

Deliverables, together with e-CF competences, are the underpinning innovative elements of the European ICT Professional Profile description approach. To ensure overall understanding of these elements the following two chapters are dedicated to these core ingredients.

2.2.1. The European e-Competence Framework (e-CF)

The European e-Competence Framework (e-CF) standard EN 16234-1 is a main element of the ICT Professional Profiles description template. The framework provides a reference of currently 40 competences as required and applied at the ICT workplace, using a common reference language for competences, skills, knowledge and capability levels that can be understood across Europe and internationally.

Each European ICT Professional Role Profile is specified by four up to five e-Competences from the e-CF. Annex A of CWA Part 1 THE PROFILES provides a one-sight overview matrix of which e-Competences have been assigned as a prerequisite to successful performance of which profile.

The e-CF is the result of 10 years continuous development and commitment by the European ICT sector. As the first sector-specific and workplace oriented implementation of the European Qualifications Framework (EQF), the e-CF was created for application by ICT services in public and private organisations, ICT professionals, managers and HR departments, vocational education, higher education and other training, assessment and accreditation bodies, social partners, professional associations, market analysts and policy makers.

European e-Competence Framework 3.0 overview

Dimension 1 5 e-CF areas (A – E)	Dimension 2 40 e-Competences identified	Dimension 3 e-Competence proficiency levels e-1 to e-5, related to EQF levels 3 – 8				
		e-1	e-2	e-3	e-4	e-5
A. PLAN	A.1. IS and Business Strategy Alignment				■	■
	A.2. Service Level Management			■	■	
	A.3. Business Plan Development			■	■	■
	A.4. Product/Service Planning		■	■	■	
	A.5. Architecture Design			■	■	■
	A.6. Application Design	■	■	■		
	A.7. Technology Trend Monitoring				■	■
	A.8. Sustainable Development			■	■	
	A.9. Innovating				■	■
B. BUILD	B.1. Application Development	■	■	■		
	B.2. Component Integration		■	■	■	
	B.3. Testing	■	■	■	■	
	B.4. Solution Deployment	■	■	■		
	B.5. Documentation Production	■	■	■		
	B.6. Systems Engineering			■	■	
C. RUN	C.1. User Support	■	■	■		
	C.2. Change Support		■	■		
	C.3. Service Delivery	■	■	■		
	C.4. Problem Management		■	■	■	
D. ENABLE	D.1. Information Security Strategy Development				■	■
	D.2. ICT Quality Strategy Development				■	■
	D.3. Education and Training Provision		■	■		
	D.4. Purchasing		■	■	■	
	D.5. Sales Proposal Development		■	■		
	D.6. Channel Management			■	■	
	D.7. Sales Management			■	■	■
	D.8. Contract Management		■	■	■	
	D.9. Personnel Development		■	■	■	
	D.10. Information and Knowledge Management			■	■	■
	D.11. Needs Identification			■	■	■
	D.12. Digital Marketing		■	■	■	
E. MANAGE	E.1. Forecast Development			■	■	
	E.2. Project and Portfolio Management		■	■	■	■
	E.3. Risk Management		■	■	■	
	E.4. Relationship Management			■	■	
	E.5. Process Improvement			■	■	
	E.6. ICT Quality Management		■	■	■	
	E.7. Business Change Management			■	■	■
	E.8. Information Security Management		■	■	■	
	E.9. IS Governance				■	■

Figure 2: European e-Competence Framework (e-CF) 3.0 overview

The European e-Competence Framework is structured in four dimensions. These dimensions reflect different levels of business and human resource planning requirements in addition to work proficiency guidelines and are specified as follows:

Dimension 1: 5 e-Competence areas, derived from the ICT business processes PLAN – BUILD – RUN – ENABLE – MANAGE. Dimension 1 serves as an entry point to navigate through the e-Competences in dimension 2. The competences can be equally mapped against other process description models, e.g. the DASA model for Devops.

Dimension 2: A set of reference e-Competences for each area, with a generic description for each competence. 40 competences identified in total provide the European generic reference definitions of the e-CF 3.0.

Dimension 3: Proficiency levels of each e-Competence provide European reference level specifications on e-Competence levels e-1 to e-5, which are related to the EQF levels 3 to 8.

Dimension 4: Samples of knowledge and skills relate to e-Competences in dimension 2. They are provided to add value and context and are not intended to be exhaustive.

Whilst competence definitions are explicitly assigned to dimension 2 and 3 and knowledge and skills samples appear in dimension 4 of the framework, attitude is not made explicit but embedded in all three dimensions.

Dimension 1 e-Competence area	**A. PLAN**				
Dimension 2	**A.1. IS and Business Strategy Alignment**				
e-Competence: Title + generic description	Anticipates long term business requirements and determines the IS model in line with organisation policy. Makes strategic IS policy decisions for the enterprise, including sourcing strategies				
Dimension 3	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
e-Competence proficiency levels (on e-CF levels e-1 to e-5, related to EQF levels 3 to 8)	—	—	—	Provides leadership for the construction and implementation of long term innovative IS solutions.	Provides IS strategic leadership to reach consensus and commitment from the management team of the enterprise.
Dimension 4					
Knowledge examples	Knows/ Aware of/ Familiar with: K1 business strategy concepts K2 trends and implications of ICT internal or external developments for typical organisations K3 the potential and opportunities of relevant business models K4 the business aims and organisational objectives K5 the issues and implications of sourcing models				
Skills examples	Able to: S1 analyse future developments in business process and technology application S2 determine requirements for processes related to ICT services S3 identify and analyse long term user/ customer needs S4 contribute to the development of ICT strategy and policy S5 contribute to the development of the business strategy				

Figure 3: e-Competence Example A.1. IS and Business Strategy Alignment in all four dimensions

Each e-Competence identified for the European ICT Professional Role Profiles is defined at a specific level of e-Competence performance. To support understanding the European e-Competence Framework (e-CF) level table including relationships of e-CF levels is enclosed as Annex A to this User Guide.

Following consultation of CEN member states, the e-CF 3.0 CEN Workshop Agreement (CWA) initially published in 2014 by the CEN ICT Skills Workshop was transformed into a European standard and re-published in 2016 as the European Norm (EN) 16234-1. The e-CF is now maintained by the CEN Technical Committee (TC) 428 which at the start of 2018 commenced an update activity towards version 4.0 to address the latest trends in ICT business and technology and maximise consistent relationships with other frameworks (e.g. SFIA, ESCO).

2.2.2. Deliverables

Deliverables, together with e-CF Competences, form one of the two main components defining the European ICT Professional Role Profiles.

Deliverables describe typical outcomes of a task in a working context. Each ICT Professional Role Profile is defined by a list of Deliverables, either in terms of being accountable (A), responsible (R) or in terms of contribution (C), aligned to the RACI model. In the context of this CWA the three attributes are defined and applied as follows:

- Accountable (A): The individual ultimately answerable for the correct and thorough completion of the deliverable
- Responsible (R): The individual who performs the work to achieve the deliverable
- Contributor (C): The individual who contributes, due to their capability and knowledge

In the first version of the European ICT Professional Role Profiles CWA 52 deliverables were defined with a goal to cover the 36 e-Competences of the European e-Competence Framework version 2.0. User feedback, gathered in the context of the ICT Professional Role Profiles showed how the deliverables, besides contributing to the definition of the ICT Professional Role Profile, are an easy-to-use, standalone tool useful for describing processes and relationships within an organisation. Furthermore, deliverables help to focus the definition of third generation profiles making it easier to identify the competences that characterize the overall profile.

Based upon experience, current ICT profiles users have suggested enrichment of the deliverables list to provide greater granularity and to address current ICT trends such as Digital Transformation, Agile Process and Data Management including Big Data. To satisfy this requirement the number of deliverables has been increased by almost 50% from the original 52 to the current 76.

Competences are needed to conduct a Task which produces one or more Deliverables.

The table below shows the first 20 Deliverables defined by this CWA provided as an example; the complete list of all 77 Deliverables defined with full descriptions can be found in Annex B.

N°	DELIVERABLE	e-CF COMP.	DELIVERABLE DESCRIPTION
1	**Budget Plan**	A.4	A description of the amount of money spent on an organisation's Information Technology systems and services, including compensation for IT professionals and expenses related to the construction and maintenance of enterprise-wide systems and services.
2	**Business Case (Lightweight Business Case)**	A.3	An explanation of why the investment should be made and how the business will see a return on that investment (ROI) at some point in the future. A well-considered business case provides decision makers with the information they need to decide if the investment should proceed.
3	**Business Plan (Strategic Themes)**	A.3	A formal statement of a set of business goals, why they are attainable, and the plan for reaching them. Safe strategic themes provide business context for decision-making within the portfolio and

			influence investments in Value Stream. Strategic Themes provide the enterprise with the differentiators going forward from current state to future state; they help drive innovation and competitive differentiation that is achievable only via effective portfolio solutions.
4	**Business Process Definition**	E.5, E.7	A formal definition and description of related, structured activities that will accomplish a specific organizational goal.
5	**Business Relationship**	D.11, E.4	A relationship established to provide business services.
6	**Business Requirements**	A.1	A description of what a business needs so that it can operate successfully.
7	**Change Management Plan**	E.7	A plan which addresses the impact of change to an organization, easing the transition.
8	**Data Analytics**	D.10	A method of Data, Information and Knowledge management which use data aggregation and data mining to provide insight into the past and answer: "What has happened?" This take the form of reports, dashboards, etc.
9	**Data Collection and Representation**	D.10	The result of a process where specific, structured information are gathered in a systematic fashion, subsequently enabling data analysis to be performed on resulting information
10	**Data Management Plan**	D.10	A plan by which the required data is acquired, validated, stored, protected, and processed, and by which its accessibility, reliability, and timeliness is ensured to satisfy the needs of the data users.
11	**Data Management System**	B.1, D.10	A system designed to define, manipulate, retrieve and manage data in a database.
12	**Data Model**	D.10	A description of data and relations in terms of dependency, consistency and integrity.
13	**Data Protection Policy**	D.10, E.8	A set of principles or rules to guide decisions and achieve optimal outcome(s) in Data protection policy.
14	**Data Selection**	D.10	The result of the process of determining the appropriate data type and source, as well as suitable instruments to collect data
15	**Development Process**	B.6	A process of dividing software development work into distinct phases to improve design, product management, and project management.
16	**Digital Transformation Roadmap**	E.2	A sophisticated project plan that details durations and dependencies of all the initiatives in the Digital Transformation. The roadmap also provides checkpoints for assessing the progress and success of the Digital Transformation down the road.
17	**Digital Transformation Strategy**	A.1	A strategy addressing the changes associated with the integration of digital technologies into an organization. this concept is based on several major pillars: cloud computing, mobility, real-time, the Internet of things, large data and the importance of user's experience and recently the Artificial intelligence.
18	**Documented Code**	B.1	Self-documenting code is ostensibly written using human-readable names, typically consisting of a phrase in a human language which reflects the symbol's meaning. The code must also have a clear and clean structure so that a human reader can easily understand the algorithm used.
19	**Enterprise Architecture**	A.5	An ICT plan which applies architecture principles and practices to guide organizations through the business, information, process, and technology changes necessary to execute their strategies.

Table 1: Deliverables n° 1 – 20: Deliverable title, related e-Competence(s), description.
See Annex B for full list

In the following table RACI responsibilities for each deliverable are shown and are provided as a general reference.

In some organisations, a job profile can be a subset of European ICT Professional Profile Roles or in others there may be a customised profile that can be defined by combining RACI responsibilities of

more than one Role Profile. The table describes the entire set of possibilities and not only those assigned within the Role Profiles descriptions. To enhance readability, deliverables assigned to Role Profiles are highlight by a coloured border and background.

	DELIVERABLES	ACCOUNTABLE	RESPONSIBLE	CONTRIBUTOR	ROLE PROFILES: Account Manager Role	Business Analyst Role	Business Information Manager Role	Chief Information Officer (CIO) Role	Data Administrator Role	Developer Role	Digital Media Specialist Role	Enterprise Architect Role	Digital Consultant Role	ICT Operations Manager Role	Cyber Security Manager Role	Cyber Security Specialist Role	Digital Educator Role	Network Specialist Role	Project Manager Role	Quality Assurance Manager Role	Service Support Role	Service Manager Role	Systems Administrator Role	Systems Analyst Role	Systems Architect Role	Technical Specialist Role	Test Specialist Role	Solution Design Role	Digital Transformation Leader Role	Devops Expert Role	Data Scientist Role	Data Specialist Role	Scrum Master Role	Product Owner Role
1	Budget Plan	10												A																			
2	Business Case (Lightweight Business Case)		2			Ⓡ	A					Ⓡ																						
3	Business Plan (Strategic Themes)			2,3,8		Ⓒ	Ⓒ					Ⓒ																						
4	Business Process Definition			8								Ⓒ																						
5	Business Relationship		1,2,30		Ⓡ	Ⓡ																												Ⓡ
6	Business Requirements	2		9		A							Ⓒ																					
7	Change Management Plan			15															Ⓒ										Ⓡ					
8	Data Analytics		27	28			Ⓡ		Ⓒ																						Ⓡ	Ⓒ		
9	Data Collection and Representation	27																													A			
10	Data Management Plan			27																											Ⓒ			
11	Data Management System	5		27					A																						Ⓒ			
12	Data Model		2,28			Ⓡ	A																									Ⓡ		
13	Data Protection Policy		28	5					Ⓒ																							Ⓡ		
14	Data Selection	27																													A			
15	Development Process		25	20,29																				Ⓒ				Ⓡ				Ⓒ	
16	Digital Transformation Roadmap	25				Ⓒ	Ⓡ					Ⓒ																A					
17	Digital Transformation Strategy		4,25					Ⓡ																				Ⓡ					
18	Documented Code	6								A																								
19	Enterprise Architecture	8										A																						
20	Escalation process			17																	Ⓒ		Ⓒ			Ⓡ								
21	First Level Support		17																		Ⓡ													
22	Hardware Component	20								A														A										
23	HR Development Plan		10											Ⓡ																				
24	ICT Audit Report	16																		A														
25	ICT Department & Budget	4							A																									
26	ICT Governance Policy	4							A					Ⓡ	Ⓡ					Ⓒ														
27	ICT Model			20																				Ⓒ										
28	ICT Quality Policy	28	16																	Ⓡ									Ⓒ			A		
29	ICT Strategy and Implementation	4		2		Ⓒ			A																									
30	Incidents Database			19																	Ⓡ		Ⓒ											
31	Information Security Policy	11		12										A	Ⓒ																			
32	Information Security Risk Assessment		12	14										Ⓡ	Ⓡ			Ⓒ																
33	Information Security Strategy		4,11						Ⓡ					Ⓡ																				
34	Integrated Solution	21,26	17,20	15,23															Ⓒ					Ⓡ	A		Ⓒ			A				
35	Iteration Retrospective	29																															A	
36	Knowledge or Information Base	12	9,11	8								Ⓒ	Ⓡ		Ⓡ	A																		
37	New Solution and Critical Business Process Integration Proposal	9	12,21	8,11,25								Ⓒ	A		Ⓒ	Ⓡ									Ⓡ				Ⓒ					
38	Non Functional Requirements		7								Ⓡ													Ⓡ										
39	Opportunity Memo	9											A																					
40	Production Forecast			1	Ⓒ																													
41	Program Backlog			30																														Ⓒ
42	Project Plan	15		9								Ⓒ	Ⓒ	Ⓡ					A															
43	Project Portfolio	3	4	24			A	Ⓡ																					Ⓒ					
44	Quality Assurance			13,16												Ⓒ			Ⓡ	Ⓒ		Ⓡ												
45	Quality Performance Indicators		16	18																Ⓡ		Ⓒ												
46	Quality Plan			15															Ⓒ	Ⓡ		Ⓒ												
47	Release			26																										Ⓒ				
48	Release Plan	30																																A
49	Risk Management Plan			12											Ⓒ				Ⓡ															
50	Risk Management Policy			10,12,16				Ⓡ						Ⓒ	Ⓒ	Ⓒ				Ⓒ															
51	Sale	1			A																													
52	Sales Forecast			1	Ⓒ																													
53	Second Level Support			17																	Ⓒ													
54	Service Level Agreement		18																			Ⓡ												
55	Services Catalogue		17			Ⓡ							A								Ⓡ													
56	Software Component	20	6							Ⓡ														A										
57	Software Design Description		24	6						Ⓒ																		Ⓡ						
58	Solution Documentation		14,15	22,23														Ⓡ	Ⓡ						Ⓒ	Ⓒ								
59	Solution in Operation	18,24	5,14,19	7					Ⓡ		Ⓒ							Ⓡ			A	Ⓡ						A							
60	Solution Requirement	30																																A
61	Solution Specification	21	3,14	20			Ⓡ											Ⓡ					Ⓒ	A										
62	Solved Incident	22	18	14,17,19														Ⓒ			Ⓒ	Ⓡ	Ⓒ			A								
63	Sprint Planning		29	30																													Ⓡ	Ⓒ
64	Sustainable IT Policy			10										Ⓒ																				
65	Team Backlog	30		29																													Ⓒ	A

	DELIVERABLES	ACCOUNTABLE	RESPONSIBLE	CONTRIBUTOR	ROLE PROFILES: Account Manager Role	Business Analyst Role	Business Information Manager Role	Chief Information Officer (CIO) Role	Data Administrator Role	Developer Role	Digital Media Specialist Role	Enterprise Architect Role	Digital Consultant Role	ICT Operations Manager Role	Cyber Security Manager Role	Cyber Security Specialist Role	Digital Educator Role	Network Specialist Role	Project Manager Role	Quality Assurance Manager Role	Service Support Role	Service Manager Role	Systems Administrator Role	Systems Analyst Role	Systems Architect Role	Technical Specialist Role	Test Specialist Role	Solution Design Role	Digital Transformation Leader Role	Devops Expert Role	Data Scientist Role	Data Specialist Role	Scrum Master Role	Product Owner Role
63	Sprint Planning		29	30																												Ⓡ	©
64	Sustainable IT Policy			10										©																			
65	Team Backlog	30		29																												©	A
66	Technical Proposal		20	1,18	©																©		Ⓡ										
67	Test Plan		23																							Ⓡ							
68	Test Procedure		23	5,6,26					©	©								Ⓡ								Ⓡ			©				
69	Test Result		23															Ⓡ								Ⓡ							
70	Training Course		13														Ⓡ																
71	Training Policy			13													©																
72	Training Program		10	13,29										Ⓡ			©																©	
73	Up-to-date Solution		22																						Ⓡ								
74	User Engagement Evaluation Tools		7								Ⓡ																						
75	User Experience Design		24	6						©																	Ⓡ						
76	Validated Solution	15		23															A							©							

A Accountable
Ⓡ Responsible
© Contributor

Table 2: Deliverables n° 1-76 assigned to the European ICT Professional Role Profiles as Contributors (C), Responsible (R), Accountable (A). *Violet border and yellow background show what is included in ICT Role Profile definition.*

2.3. The European ICT Professional Role Profiles template

The European ICT Professional Role Profiles are constructed consistently to provide a common template. A standard template makes it easier for users to compare different profiles and also provide a fast start to developing new profiles or contributing to designing new job descriptions.

Each profile element is described below.

The template was designed to respond to the questions included in this table, to assist users in communicating the purpose and potential application of the profiles within their organisation.

Question	Template Descriptor	ICT Professional Role Profile Example		
What is the role about?	***Title*** Formed of a few words, the title offers a common name for the role	**DEVELOPER ROLE**		
What is done in this role?	***Summary statement*** Formed of a single sentence, this summary presents a brief, concise description of the role.	Designs and/ or codes components to meet solution specifications.		
Why is this role needed?	***Mission*** Within a maximum of three sentences this element describes the rational and context of the role within the organisation.	Ensures building and implementing of ICT applications. Contributes to low-level design. Writes code to ensure optimum efficiency and functionality and user experience.		
What will it achieve?	***Deliverables*** Sub-divided into accountable (A), responsible (R) and contributor (C) and using a maximum of six deliverables they illustrate the responsibilities associated with the role.	Accountable	Responsible	Contributor
		• Documented code	Software component	• Software Design Description • Test Procedure • User Experience Design
What is done in more detail?	***Main task/s*** Using between six and eight activities the tasks offer an understanding of the actions taken and the end results required of the role.	• Develop and engineer components • Follow user experience guidelines • Aware of and address known security vulnerabilities, applying security by design • Shape documentation • Provide advanced, component technical support • Resolve issues prior to and following testing		
What competences are required?	***e-competences*** Between 4 and 5 competences each defined by a proficiency level provide the overview of the skills, knowledge and attitudes required of the role.	B.1. Application Development		Level 3
		B.2. Component Integration		Level 2
		B.3. Testing		Level 2
		B.5. Documentation Production		Level 3
		C.4. Problem Management		Level 3
Why does this role matter?	***KPI (Key Performance Indicator) area*** Constructed of a simple statement the KPI area is a general, high level, guideline that highlights the contribution of the role to the organisations performance.	Fully functional components		

Table 3: The European ICT Profiles template: Questions, template descriptors, ICT Profile example

The main principle applied to constructing the profiles was to focus on the most essential characteristics that accurately represent the profile and effectively differentiate one profile from another.

2.4. The top of a European ICT Profile Family Tree

In the first version of European ICT Professional Role Profiles the idea of an ICT family tree was introduced. Stakeholder and expert consultation proved that the family tree is still a valid view which can be used to facilitate navigation and demonstrate relationships between profiles.

The profiles may be used for reference or alternatively as a base to develop further profile generations. Structured from now seven main ICT Profile families, the current 30 profiles reflect the top of a European ICT Profile Family Tree. The concept is broadly analogous to a human family where characteristics from one generation pass from one generation to the next but are also combined with new characteristics. In a similar way it is envisaged that the core components of the now 30 generation 2 profiles may be passed down and adapted as needed to user generated profiles with higher granularity.

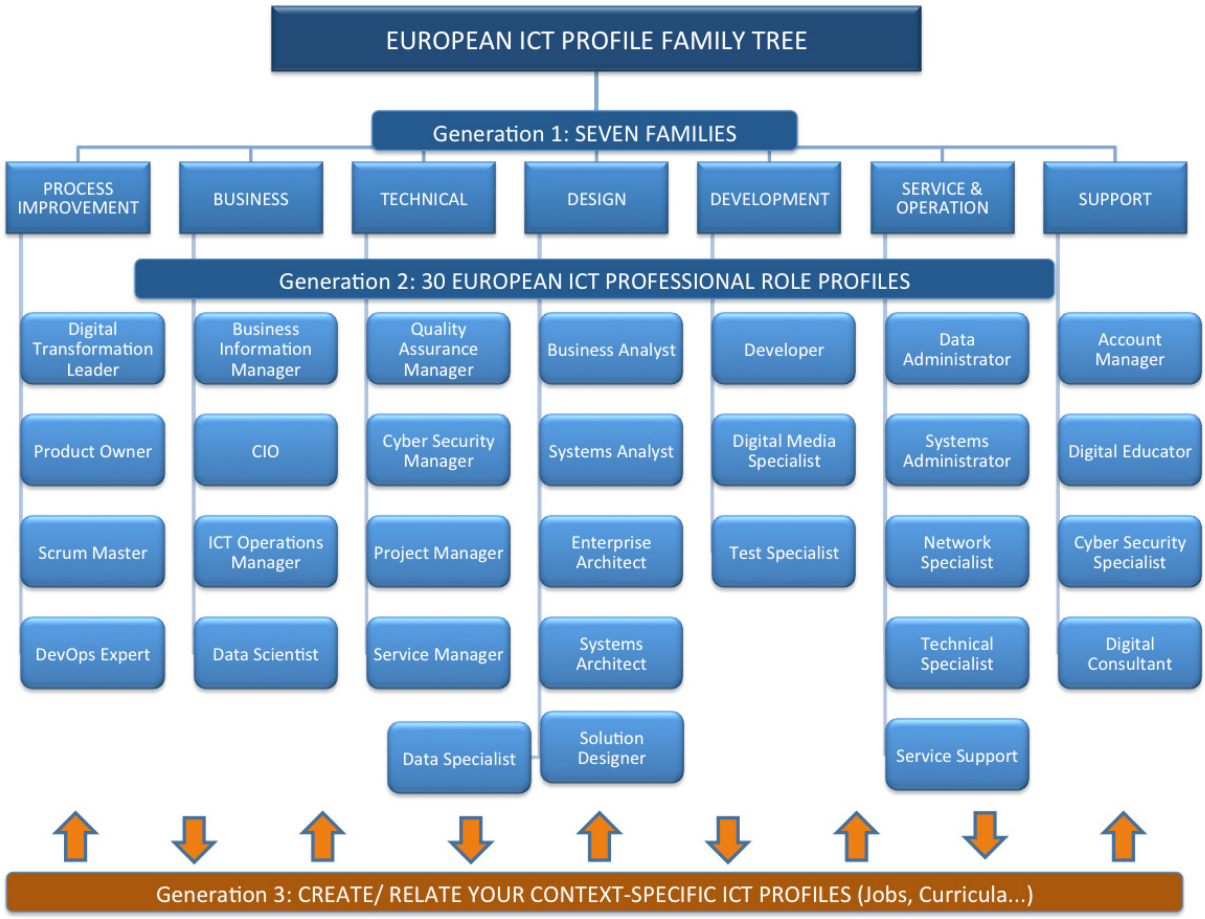


Figure 4: 30 European ICT Professional Role Profiles (generation 2) in seven families (generation 1) at the top of the European ICT Profile Family Tree

To assist the development of user created profiles, the thinking behind the original concept can be extended to incorporate an additional perspective. When viewing a subject from a distance through a camera lens we can make out a silhouette, or an outline of what we are seeing. As we gradually focus the lens we can see progressively and more sharply and can better understand the detail of the subject we are viewing.

Likewise, the 30 European ICT Profiles provide a distant viewpoint with a clear outline but with inner details that are deliberately generalised and of similar granularity. To customise profiles, users have the option to modify content, inspired by the original and to incorporate detailed granularity to meet specific requirements yet retain the original profile outline.

About Generation 1: Seven ICT Profiles Families

Structuring the currently 30 European ICT Professional Role Profiles by families significantly facilitates navigation and enriches an initially flat structure with orientation guidance. In this way ICT Profiles can be divided into family groups of related profiles.

The family identification reflects **patterns of competence** that are seen as the most helpful arrangement of European ICT Professional Role Profiles for enterprises, human resources department and professionals involved in competence and skills development. The assigned competences of all European ICT Profiles are gathered from the e-Competence Framework. Thus every European ICT Profile is characterised by a set of competences at specific levels that form a typical pattern.

Based on the pattern of competence it is possible to locate each European ICT Profile on a map, built from Dimension 1 of the e-Competence Framework which reflects the five main ICT business processes PLAN, BUILD, RUN, ENABLE and MANAGE:

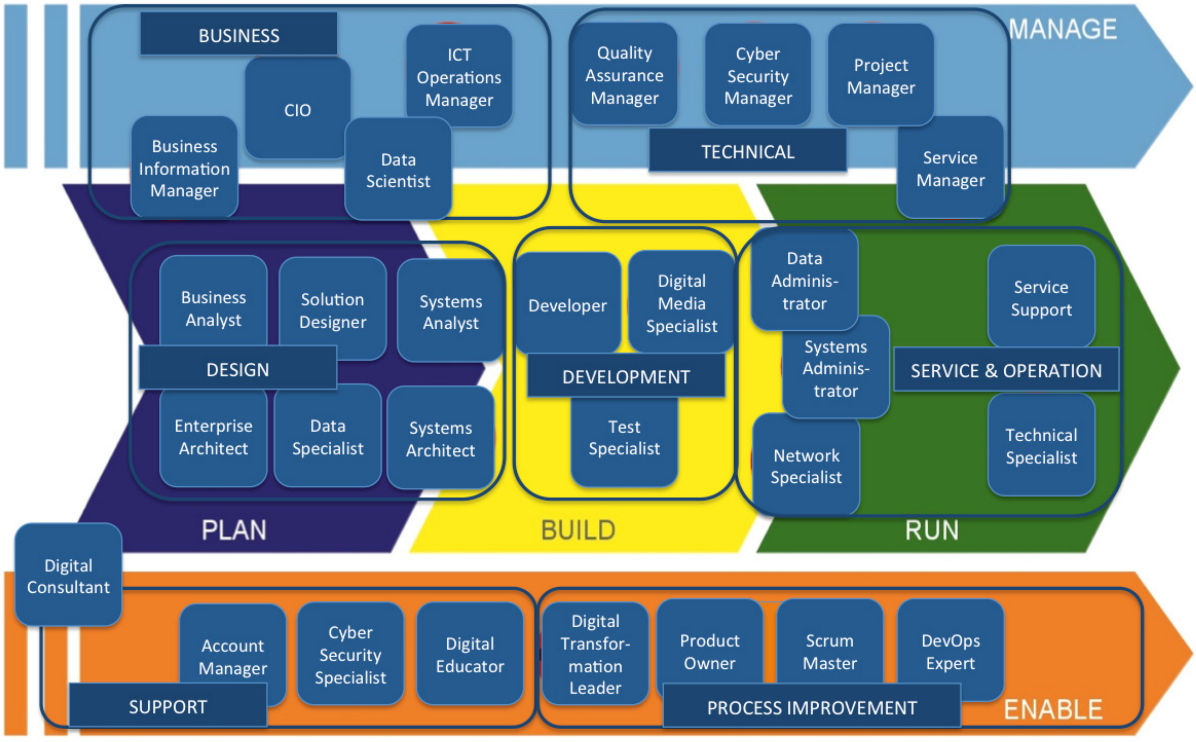


Figure 5: The 30 European ICT Professional Role Profiles structured by seven families and positioned in the five main business processes (e-CF Dimension 1)

However, it should be noted that allocating a profile to a specific family or e-Competence grouping is not an exact science. Dependent upon organisational perspective, some profiles could also be allocated to alternative families. Generation 1 is merely an entry point to the ICT Profiles at Generation 2, facilitating orientation and navigating through the entire structure.

Feedback from e-CF and ICT Profiles applying stakeholders confirmed that the e-CF competences, in dimension 1 structured by the 5 main business processes reflecting the waterfall appraoch, also fit the agile process structures namely an Agile/ DevOps lifecycle. Accordingly, the e-CF is also useful for new agile deliverable identification and related role definitions like DevOps or Digital Transformation Leader.

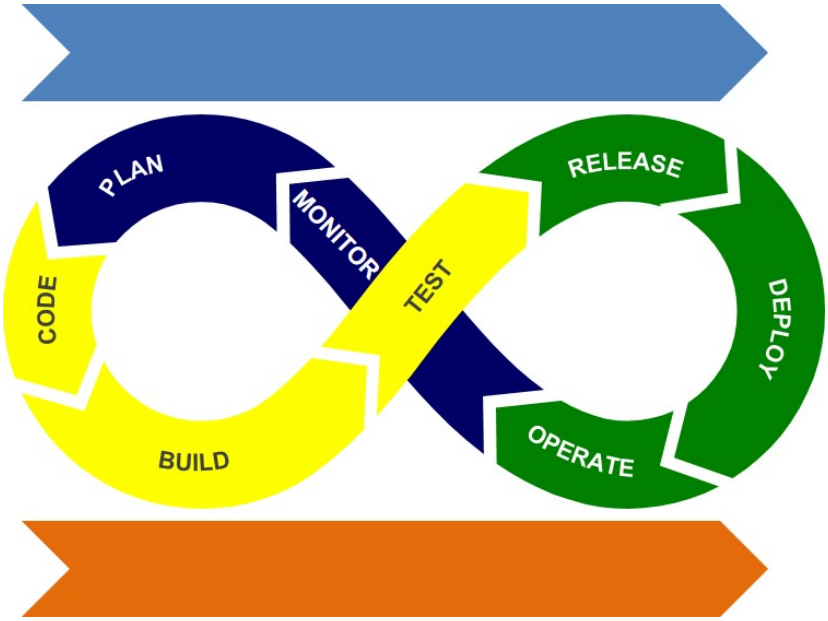


Figure 6: e-CF structure for an Agile/DevOps lifecycle (Source: DIGIFRAME 2018)

2.5. From version 1 to version 2 – update highlights

Since version 1 of The European ICT Professional Profiles CWA there have been rapid advances in organisation processes and consequently the role requirements of ICT Professionals. The changes are numerous and include, significantly, the rise in 'agile' working methods, the impact of data analytics, the importance of digital transformation and greater emphasis on information security. Driven by user experience and feedback across Europe, new and developing workplace trends, have informed the update of existing profiles and the construction of additional new profiles.

- The original, 23 profiles have been updated, based upon ICT Profiles version 1 user experience and feedback and most contain content changes
- Each title has been reviewed to reflect employment trends with the following amendments;
    - ICT Consultant becomes Digital Consultant
    - ICT Security Manager becomes Information Security Manager
    - ICT Specialist becomes Information Security Specialist
    - ICT Trainer becomes Digital Educator
    - Service Desk Agent becomes Service Support
- The original 6 families have been extended to 7 (including a new Process Improvement family)
- Additional structural rules have been applied, such as number of competences and tasks, to provide even more consistent profile descriptions
- Seven new profiles have been added to the portfolio, again influenced by industry changes and feedback from existing and potential users;

- Digital Transformation Leader
- Product Owner
- Scrum Master
- DevOps
- Data Scientist
- Data Specialist
- Solution Designer

These new roles are inspired by innovations in the workplace and are designed to co-exist with the more traditional roles that are still relevant and prevalent across the ICT workforce.

3. Application guide (1): How to create specific ICT Profiles in context

3.1. Some basic observations

For a European set of ICT Professional Role Profiles to add value they must be easily adaptable to the employment environment and their contents must be readily recognisable by ICT professionals. They are not useful if, on the contrary, the employer has to change practices to meet profile descriptions.

The European ICT Profile descriptions are therefore reduced to their core characteristics which clearly differentiate them one from another. Further context-specific elements can be added to the Profiles according to the specific environments in which Profiles are to be integrated. Technology is constantly changing resulting in the introduction of new products and services, often proprietary, which lead to a requirement for ICT professional knowledge update. However, in line with the e-CF, the role profiles are constructed to be supplier neutral and recognise that the underpinning competences and deliverables remain constant, often regardless of the specific technology deployed. For example, different information technology operating systems are not explicitly identified nor are application names.

Flexibility for users, is a founding principle of the development of European ICT Professional Role Profiles; this is reflected in a pragmatic application of the acronyms ICT (Information and Communication Technology) or IS (Information Systems). At Generation 2 of the European ICT Profiles Family Tree, it is too restrictive and possibly inaccurate to be prescriptive about the use of ICT or IS. The default is to use the more general term ICT, except in exceptional circumstances where only IS, is applicable. However, IS or ICT can be applied more specifically within Generation 3 Profiles to accurately focus the profile in context.

The European ICT Professional Role Profiles have therefore been created in a generic and simple way, in order to enable reference and use by all types of ICT organisations, whatever their size and their structure. In consequence, the ICT Profiles provide high level outlines of typical ICT Professional Roles; easy to apply to the next context specific application level, for instance job descriptions.

If you ask one hundred knowledgeable managers to describe a particular job role you will get one hundred different responses.

It follows that, however well formulated; no single European ICT Professional Role Profile will fulfil the needs of every situation. In daily practice, one specific ICT Role Profile may be divided and performed by several people. Conversely one person's job may combine components of several ICT Role Profiles.

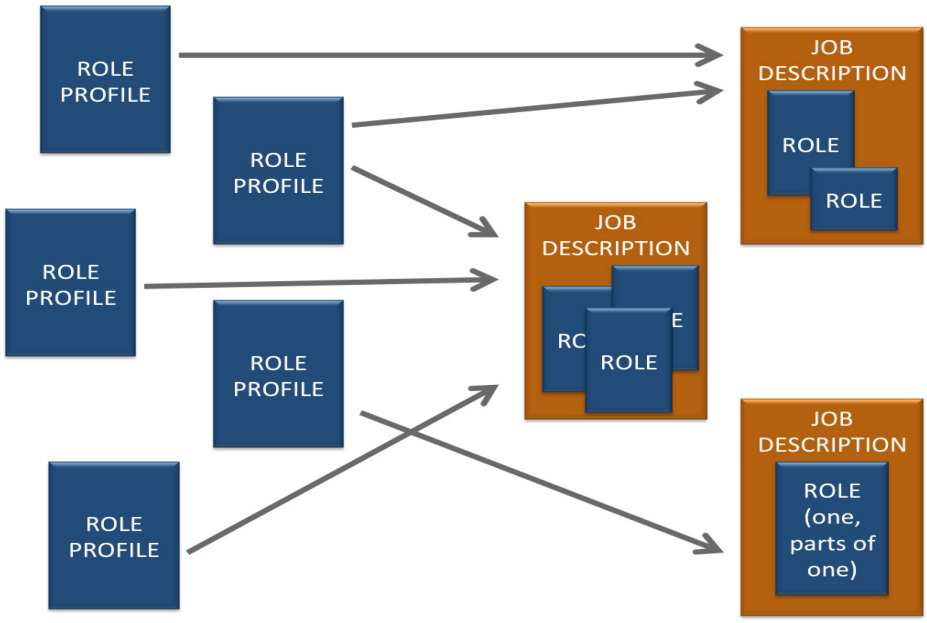


Figure 7: European ICT Professional Role Profiles and job descriptions relationship

To meet this challenge, European ICT Professional Role Profiles provide typical outline descriptions which may be used without modification or more commonly adapted to meet specific user requirements.

The European ICT Profiles provide a consistent structure and offer a base to facilitate the creation of further and more detailed Profiles.

3.2. Create new – how to adapt the template

For optimum profile assignment and development in a specific environment, carefully check the 30 European ICT Professional Role Profiles. During this exercise, it will be useful to recall some basic aspects of the new profile context:

- Note the size of the organization.
- Take into account company policies, such as make or buy, security, customs/export restrictions, legal issues, HR and ethics.

Complete the template as illustrated below to adapt the relevant European ICT Professional Role Profiles for reference to local specific needs. This leads to a new Generation 3 ICT Profile, e.g. a job profile corresponding to the needs of your specific environment. To allocate your local Profiles to the European ICT family and to adapt the template appropriately several actions are relevant:

1. Select best fit ICT Profile/s (One/ Part of one/ Set of several)
2. Adapt (Title/ Summary Statement/ Mission)
3. Keep or Add (Deliverables/ Tasks/ Competences/ Align Proficiency Levels)
4. Apply the appropriate use of the acronyms, IS and ICT, as applying to your context
5. Add missing items according to your organizational needs, (e.g. Experiences (Tools, Methods)/ Attitudes/ Qualification/ Certification(s)/ Accreditation(s)/ Reporting line

The following template provides the necessary practical support and instructions for profiles adaptation.

PROFILE TITLE ***Reuse or define***	**Gives a commonly used name to a profile.** Before starting check that there is strong distinction between new proposed profile with the 2nd generation profiles. If not use existing title and modify remainder of profile. If significantly different create a new title that does not conflict or completely overlap with existing.
SUMMARY STATEMENT ***Adapt***	**Indicates the main purpose of the profile.** The purpose is to present a brief, concise understanding of the new specified ICT Profile. It should be understandable by ICT professionals, ICT managers, Human Resource personnel and education and training institutions. The structure should consist of a short sentence (up to approximately 15 words). It should not repeat the entire ICT Profile name. It should provide a statement of the job's main activity. *Note:* Ensure that the statement discriminates between other profiles.
MISSION ***Adapt***	**Describes the rationale of the profile.** The purpose is to specify the designated job role defined in the ICT Profile. It should provide the performance context of the job within an organisational structure. The following verbs *may be* used within the description or at least for structuring the thinking about how to express the mission: Guarantees, Ensures, Contributes
DELIVERABLES ***Keep or add***	**Illuminates the ICT Profiles and explains relevance including the perspective from a non-ICT point of view.** Also add the dimension of responsible following the RACI model. Select only the most important deliverables*, which help to illustrate the ICT Profile, e.g. not more than 6 in total (A,R,C together, not all three aspects have to be necessarily covered) * see list of deliverables in table X *Note:* A cross check may be useful to ensure deliverables do not overlap. Also it may help to identify the existence of an existing profile that could be used rather than creating a new one.

Accountable (A)	**Responsible (R)**	**Contributor (C)**
…	…	…

MAIN TASKS ***Keep or add***	**A list of typical tasks to be performed by the profile.** A task is an action taken to achieve a result within a broadly defined context. Tasks may be associated with deadlines, resources, goals, specifications and/or the expected results; however this depends upon the context of the task and they may be omitted, however the action must always be described. A task is defined by a short description using a verb and the objective or goal of the action. List no more than ten. Each task should contribute in defining a Profile.
e-CF COMPETENCES ***Keep or add***	**A list of necessary competences (from the e-CF) to carry out the mission**. Level assignment is important. Must include 4 to 5 competences. SELECTION CRITERIA: A competence is a consequence of the above-derived Profile definition and helps to separate profiles one from another.
SKILLS/ KNOWLEDGE ***Not part of gen. 2***	**A list of necessary knowledge and skills.** Some examples for inspiration are provided in European e-Competence Framewo Dimension 4.
Key Performance Indicators (KPIs) ***Derive from KPI area***	**Must relate to the key deliverables in order to measure them.** In all 30 ICT Profiles KPI areas are provided, reflecting a long-term point of view of good role performance. The KPI areas give an inspiration to enable development of

	specific KPI's for specific job descriptions. Such KPI measurements can be more short-term oriented. To facilitate KPI definition, see also section 3.3. The meaningful KPI's have to be identified in each context by the following rules: • Use KPI's examples which are strictly connected to the profile domain • Use KPI's examples which are strictly connected to the KPI area • Use KPI's examples which inspire a simple mode to measure them (bad examples: ease in navigation, user satisfaction)
QUALIFICATION/ CERTIFICATIONS ***Not part of gen. 2***	
ATTITUDES (non ICT) ***Not part of gen. 2***	**Up to 5.**
RELATIONSHIPS/ REPORTING LINE ***Not part of gen. 2***	**Reports to… Interacts with…**

Table 4: The European ICT Profile Template supporting context-specific adaptation of the profiles at Generation 3

The grey shadowed items are not part of European ICT Professional Role Profile definitions. They provide examples for inspiration on how the generic European ICT Profiles can be augmented at Generation 3, with more context specific descriptions and elements, in order to fit to the needs of a specific situation

3.3. Identify key performance indicators (KPI's)

KPI's (Key Performance Indicators) are normally regarded as organisational measurements that meet the criteria of being specific, measurable, achievable, time based and relevant to the success of the organisation.

Given the nature of European ICT Professional Role Profiles that are generic by design, it is not feasible to assign a specific KPI to a role. However, it is still valuable to understand how a role typically contributes to an organisations success. To add this extra dimension, the term KPI area has been adopted which represents a generic indicator that aligns with the overall granularity of professional profiles. KPI areas are not prescriptive; they provide inspiration for further specification and the construction of a traditional KPI.

If the European ICT Professional Role Profiles (generation 2) are used as the basis for more granular and context-specific profiles (generation 3), the KPI areas may assist in focusing upon the specific KPIs relevant to the role and the organisation.

KPIs can be an important and useful measurement but it is necessary to be aware that they are narrow and focused on one performance outcome, consequently care must be taken to avoid misuse causing unintended negative effects. A logical connection to tasks and deliverables is also important.

Three examples of specific KPI's are provided below:

KPI area for inspiration (from EU ICT Professional Role Profile)	KPI examples (definition in context)
Sales quota achievement (from Account Manager Role)	A sales volume target, sale revenue target or profit target …

Project scope achievement (from Project Manager Role)	Project completed on time …
Customer satisfaction achievement (from Product Owner Role)	Customer satisfaction survey outcome expressed as a percentage compared to a target. …

Table 5: Deriving context-specific KPI's from European ICT Role Profile KPI area – some examples

4. Application guide (2): Adopt the profiles from multiple perspectives

4.1. Job profiles definition (create generation 3)

In general, the European ICT Professional Role Profiles defined in this CWA are a start point and not a predefined solution for organisations that plan to define their job descriptions.

Smaller organisations without access to a set of ICT professional roles describing the occupations of their team can use the European ICT Professional Role Profiles as an excellent starting point. In more complex organisations existing detailed roles often require amendment and the European Professional Profiles provide inspiration and pragmatic content to commence a customisation of existing roles.

It is possible to adapt the European Professional Role Profiles in many ways according to the needs of the organisation; some examples are listed below:

- Adopt a European ICT Professional Role with limited customisation to derive a Job Profile
- Combine two or more ICT Role Profiles (or parts thereof) into one Job Profile
- Divide an ICT Role Profile into multiple Job Profiles to define, for example, different levels of responsibility and seniority.
- Create a new Job Profile derived from a Role Profile by integrating it with details that represent specific needs of the organisation.

A variety of examples from European ICT Professional Role Profiles user feedback demonstrated that, in addition to the intrinsic usefulness of the role profiles, it was extremely valuable to have a reference template available to guide the definition of new or amended Job Profiles of an organisation.

Summary Statement, Mission, Deliverables, Main Tasks, e-Competences and KPI Area are the attributes chosen to make the Role Profile definition meaningful; they describe in general terms process, outcome, competences and performance measures, giving a complete overview of the role.

The resulting templates have proved to be a useful tool for supporting the definition of Job Profiles making it an easier and more focused approach for the creation of organisation specific ICT professional roles.

In practice, each template component may be customised or re-written to reflect organisational characteristics.

Some example are:

- Adapt or rewrite the mission to describe the role of the Profile in the organisation
- Update deliverables to represent outcome responsibilities
- Adapt or rewrite main tasks to make them coherent with organisational processes

- Update competences to define profile capabilities required by the organisation
- Detail the KPI to match the organisations performance measures

Modifying in this way maintains a common language in profile descriptions, making it easier to support relationships between different stakeholders, for example, making customer supplier relationships more effective.

For more illustration and detail see:

Case study	Title	Country	Viewpoint
E	EDISON Data Science Career Framework	European level	Staff Recruitment
I	Enhancing skills development in public IT service companies	Italy	ICT Professionals and Managers
J	Supporting organisational change	The Netherlands	HR and ICT Managers
K	Supporting cultural change	Spain	ICT Professionals and Managers

4.2. Use in assessment and career

The European ICT Professional Role Profiles together with the European e-Competence Framework (e-CF) , may be used to implement an effective competence assessment process for ICT people.

Defining and implementing an internal competence assessment process enables verification of an organisation's existing roles and aids identification of competence gaps.

The result of the assessment can be used to improve accuracy of different processes:

- In training, the competence gap analysis can be used to design accurate training paths that can, for example, develop the proficiency levels required to meet organisation requirements.
- In the development of an organization the result of the assessment can be used to guide the design of the organization itself, allocating resources optimally and identifying the competence shortcomings to inform the recruitment process.
- In career development, the outcome of individual assessments can be used to identify optimal career development paths of the ICT professional, benefiting the employee and the organisation

To make an assessment process accurate and effective a working tool can be developed integrating the e-CF competences and the organisation Job Profiles; they can be derived starting from the 30 Role Profiles described in this CWA.

To enable greater accuracy in competence measurement , further development of e–CF dimension 4 is recommended with the aim of increasing granularity.

For more illustration and detail see:

Case study	Title	Country	Viewpoint
H	Career and Assessment Tool	Ireland	ICT Professionals and Managers
I	Enhancing skills development in Public IT Service Companies	Italy	ICT Professionals and Managers

4.3. Implementation of profiles as an organisational change process

The implementation of the European ICT Professional Role Profiles in complex organisations typically involves supporting the definition of job descriptions. Job descriptions need to be continuously aligned with all relevant elements of the organisation: organisational structure, processes, technologies, tools.

Job Descriptions contain the definition of competences, skills, duties and responsibilities that are connected to a specific job in a specific organisation, with given processes, technologies and tools. They describe the "expectations" of the organisation from a specific job and are crucial in several processes:

- Hiring
- Training
- Performance Management
- Career Path Definition and, more generally, internal mobility (succession plan, business continuity, etc.)

But almost every change in organisation, processes, technology or tools leads to the need to align existing job roles and job descriptions. In the ICT field, changes are much faster than in other sectors, and may be disruptive owing to the implications on processes, tools, changing competences and even business models. In this scenario, where there is a strong need to align job description because of organisational change, ICT role profiles can be used as a starting point, a communication tool and as a guide to develop new or revise job profile descriptions quickly.

The European ICT Professional Role Profiles take into consideration new market trends and processes but at the same time are defined at a granularity level that is low and generic enough to keep them relevant over several years. In consequence, organisations engaged in change can benefit from using these standardised role profiles for the identification of skill requirements to be developed in house or alternatively to be sourced from the labour market.

The chart below gives an approximate orientation of the positioning of each European ICT Professional Role Profile and the influence it exerts on the different aspects of organisation, business, technology and people.

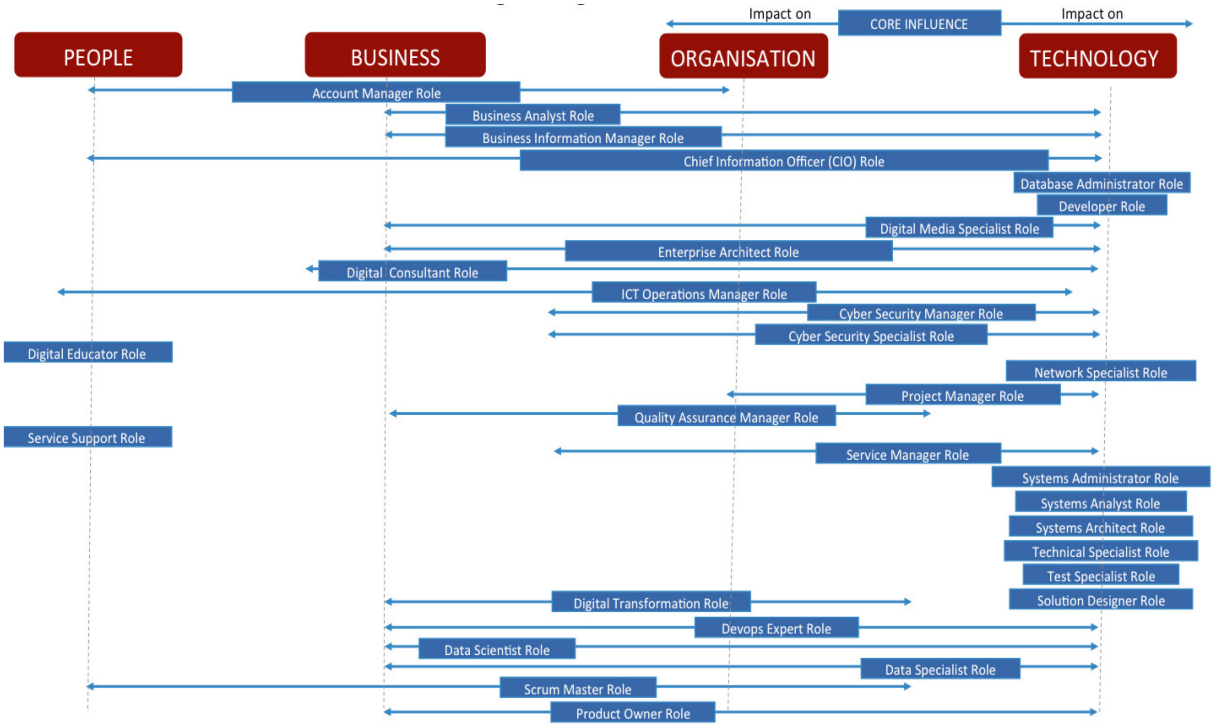


Figure 8: European ICT Professional Role Profile performance influencing the organisational process

For more illustration and detail see:

Case study	Title	Country	Viewpoint
F	Combining frameworks/ supporting organisational change	France	HR and ICT Managers
J	Supporting organisational Change	The Netherlands	HR and ICT Managers
K	Supporting cultural Change	Spain	ICT Professionals and Managers

4.4. Curriculum design

In the context of qualification development and curriculum design, the European ICT Professional Role Profiles can be used as

- A communication tool between employers and educators which improves consultation process and outcomes
- A starting point for more detailed Role Profiles and curricula design in specialised fields (e.g. ICT Security, Data and Big Data)

The European ICT Professional Role Profiles have proved to be very useful in the process of curricula design. One of the key challenges of effective curricula design is managing how different stakeholders communicate and cooperate to design curricula that meet both educational and employer objectives. The ICT Profiles and the e-CF can provide a useful shared language and starting point so that discussions between these stakeholders are quickly focused on useful content rather than constantly re-explaining the foundations of the debate. Different stakeholders have different perspectives, terminologies and ways of thinking about ICT knowledge, skills and competence. The ICT Profiles can be used to provide a bridge or communication tool to facilitate this process.

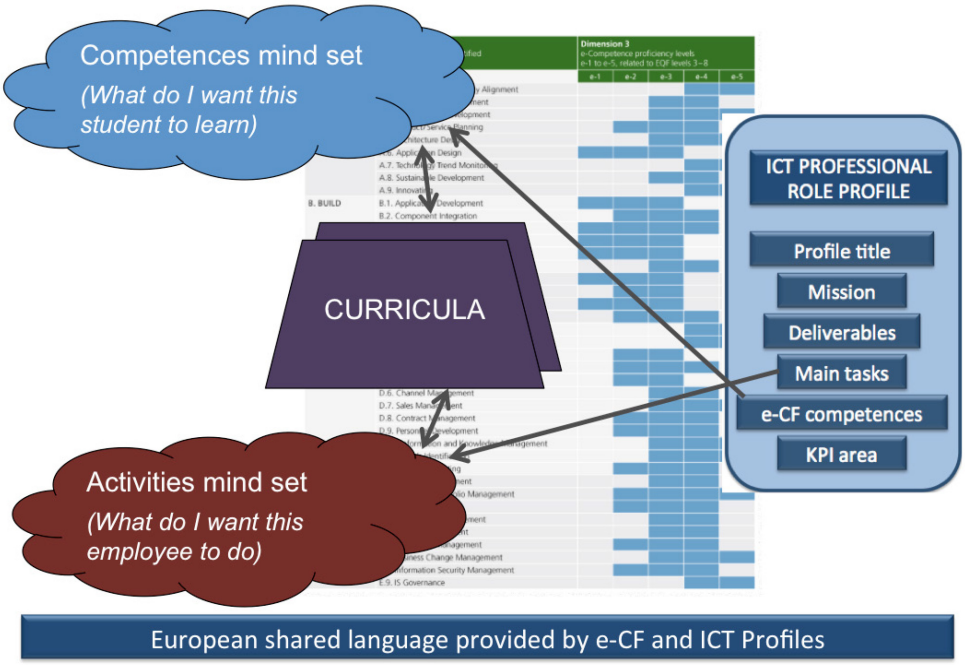


Figure 9: European ICT Professional Role Profiles and e-CF providing a shared language between employers, curricula developers and educators

The European e-Competence Framework provides a structured way to describe and explain knowledge, skills and competences. This is useful but ICT Professional Role Profiles add a crucial step by providing informative examples of which competences are needed for which activities. This means that the employer can easily start with the activities or tasks that need to be done and work back to what competences or skills can be included in the curricula by educators. This has been shown to significantly speed up the agreement on curricula design between employers and educators.

This means that in terms of updating curricula for new or changed activities in the workplace a structure is in place to inform that debate. For example, when analysing the educational needs of a specific job, an aligned European ICT Professional Role Profile may be adopted to form a common vision of the role and its associated educational requirements. The competences within a profile provide guidance on skills and knowledge items that can be developed to inform curricula design and desired learning outcomes.

For more illustration and detail see:

Case study	Title	Country	Viewpoint
A	Occupations Standards Development	Estonia	Policy Makers and Employers
B	ICT Security Professional Certification	The Netherlands	Education and Training
D	Internet Practitioner skills development	Europe	Education and Training

4.5. Use in connection to other frameworks – examples

The European e-Competence Framework (e-CF) is embedded as a major component of the European ICT Professional Role Profiles description. Further inter-relationships and consistency with other relevant ICT frameworks currently in place are important and add value to each. The following sub-chapters provide three examples on how the ICT Profiles are connected or can be related to other frameworks beyond the e-CF standard.

4.5.1. European classification of occupations: ESCO

ESCO is an important European Commission sponsored EU-initiative that provides a common classification language designed to connect people to jobs. It can be used to support job matching, job searching, career management and labour market analysis. ESCO is designed to improve communication between the education and training sector and the European labour market. It is provided in 26 languages and encompasses 2942 occupations and 13485 skills to cover jobs across the entire European employment field. Structured in three data pillars, ESCO interrelates *Occupations*, *Skills* and *Qualifications.* The system includes over 100 ICT related occupations.

The scope of ESCO includes ICT occupations and naturally it differs from the European ICT Professional Role Profiles in the level of granularity as a result of the different scope of the two structures. However, as these models coexist in similar employment environments a consistent and understandable relationship to each other is very useful. The most logical point of connection is between the *Profile title* of an ICT Professional Role Profile and the *Occupation titles* assigned by the ESCO Occupation pillar.

Taking into account the differences between each structure, the occupation table within ESCO identifying over 100 ICT occupations is used as a reference point to connect to the 30 European ICT Professional Role Profiles, see the full connecting table in Annex C1.

Additionally, European ICT Professional Profile users may wish to understand how each profile can be related to an ESCO defined Occupation and for this purpose a further table is provided in Annex C2.

For ease of reference an example relationship map between ESCO Occupation titles and ICT Professional Profiles in both directions is provided below. It is important to note that the relationship between the two structures does not represent an equivalence, it offers a best fit approximation that readers may wish to investigate.

MAPPING EUROPEAN ICT PROFESSIONAL ROLE PROFILES TO ESCO OCCUPATION TITLES	
European ICT Professional Role Profile Title	**ESCO Occupation Title**
Business Analyst Role	ICT business analyst
Business Information Manager Role	ICT business analysis manager
Developer Role	ICT application developer
MAPPING ESCO OCCUPATION TITLES TO THE EUROPEAN ICT PROFESSIONAL ROLE PROFILES	
ESCO Occupation Title	**European ICT Professional Role Profile Title**
ICT system administrator	Systems Administrator Role
ICT network administrator	Network Specialist Role
IT auditor	Quality Assurance Manager Role

Table 6: Mapping European ICT Professional Role Profile Titles to the relevant ESCO Occupations Titles and vice versa – example. For full relationship overview see Annex C1 and C2.

In this way both structures do not only relate to each other but each adds value to the other.

4.5.2. The European Framework for ICT Professionalism

The European ICT Professional Role Profiles take place within the context of the wider e-Skills landscape and there are many related concepts, projects and initiatives which inform and are informed by the ICT Profiles.

Similar to the e-CF, the European ICT Professional Role Profiles contribute to increasing transparency and maturing the ICT Profession in Europe in the whole. They fit into the broader concept of ICT Professionalism composed of four main building blocks: competences; bodies of knowledge; professional ethics; education and training.

Figure 10: The four main building blocks of ICT Professionalism

In ICT Professional practice all four building blocks are closely interrelated and in the past years a number of concepts and tools have been developed to mature the ICT Profession delivered through a number of projects. The below figure shows the main elements, concepts and tools available at the European level and their interrelationships. The projects that developed these tools and frameworks are listed in Annex A of CWA Part 3, the methodology documentation.

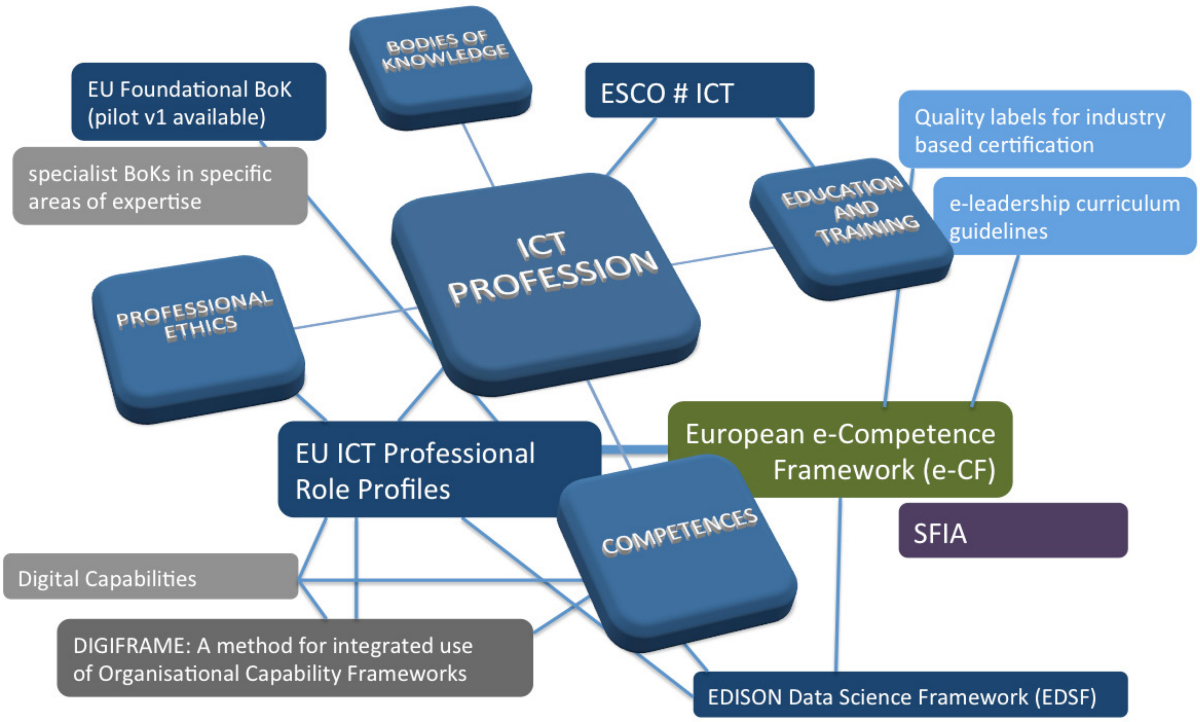


Figure 11: The four main building blocks of ICT Professionalism supported and inter-conneted by European standards, references and tools

One important current development in this context is work to support the integration of an organisational capability approach (what organisations need to succeed) and the individual competence approach (what competences and skills people need to succeed).

The European ICT Professional Role Profiles are a starting point to address this important issue as they can be used on an organisational level to plan structure and staffing (what roles are needed by the organisation) and also at an individual level to identify the competences and skills needed to effectively contribute to these requirements in a particular job. The project *Digital Organisations Frameworks and ICT Professionalism* (DIGIFRAME) aims to enable the effective integration of individual competences and organisational capabilities through developing a reference framework inked to e-CF and ICT Profiles providing users with a method/ guide to use organisational frameworks (like Agile, CMMI, ITIL, TOGAF, etc.) in parallel.

4.5.3. A national job profile framework: CIGREF

The inbuilt flexibility of European ICT Professional Role Profiles enables them to be combined with other frameworks. The ICT Profiles can therefore also be used to enable the implementation of the European e-Competence Framework alongside the French Large ICT User Companies' Club "CIGREF" job profiles nomenclature.

The CIGREF nomenclature covers the scope of ICT activities and contains nine families and 48 job profiles which are the result of an agreed definition over 140 members in cross industrial sectors.

The European ICT Professional Role Profiles provide a good practical standard to benchmark the CIGREF job definitions and to give ICT managers the tools for mapping, prioritising and contextualising the e-competences and their maturity level for each ICT team and create organisation specific job profiles.

For more illustration and detail see:

Case study	Title	Country	Viewpoint
E	EDISON Data Science Career Framework	European level	Staff Procurement
F	Combining frameworks / Supporting organisational change	France	HR Managers

4.6. A common reference language for policy making and market survey

The European ICT Professional Role Profiles provide a common reference set of typical roles performed by ICT Professionals from an organisational perspective, covering the full ICT business process.

The 30 typical Profiles provide a useful tool for the support of sector associations, policy makers and market surveyors. In this context, the relationship to ESCO is of particular interest as both frameworks look at the similar concepts but from two different perspectives (ESCO – occupation of the individual / European ICT Professional Role Profiles – typical roles within an organisation) - and consequently at different levels of granularity.

European ICT Professional Role Profiles can be useful for supply and demand data studies that are carried out at national, European and international levels. These profiles can be used to provide a shared agreed definition to facilitate the collection of reliable and comparable data on the ICT job market and the supply and demand for different ICT Professionals and related competences.

The European ICT Professional Role Profiles and template can also be used for policy-driven generation 3 developments.

For more illustration and detail see:

Case study	Title	Country	Viewpoint
G	National Standards Development	Italy	Policy Makers

5. Application guide (3): Transfer the template to other sectors

As stated previously in section 1.1, the European ICT Professional Role Profiles offer a template that is of generic value and can in principle be applied to any sector.

ICT occupations coexist alongside the many jobs that exist in organisations across Europe. Although the technical knowledge and skills of an ICT professional role maybe exclusive to the ICT profession the key job elements can be identified within any role.

Referring to the template described in section 1.3. each topic may be addressed and converted to the ‘language of the sector’ to form the basis of a profile that will inevitably contain different content but formatted in an easy to understand structure.

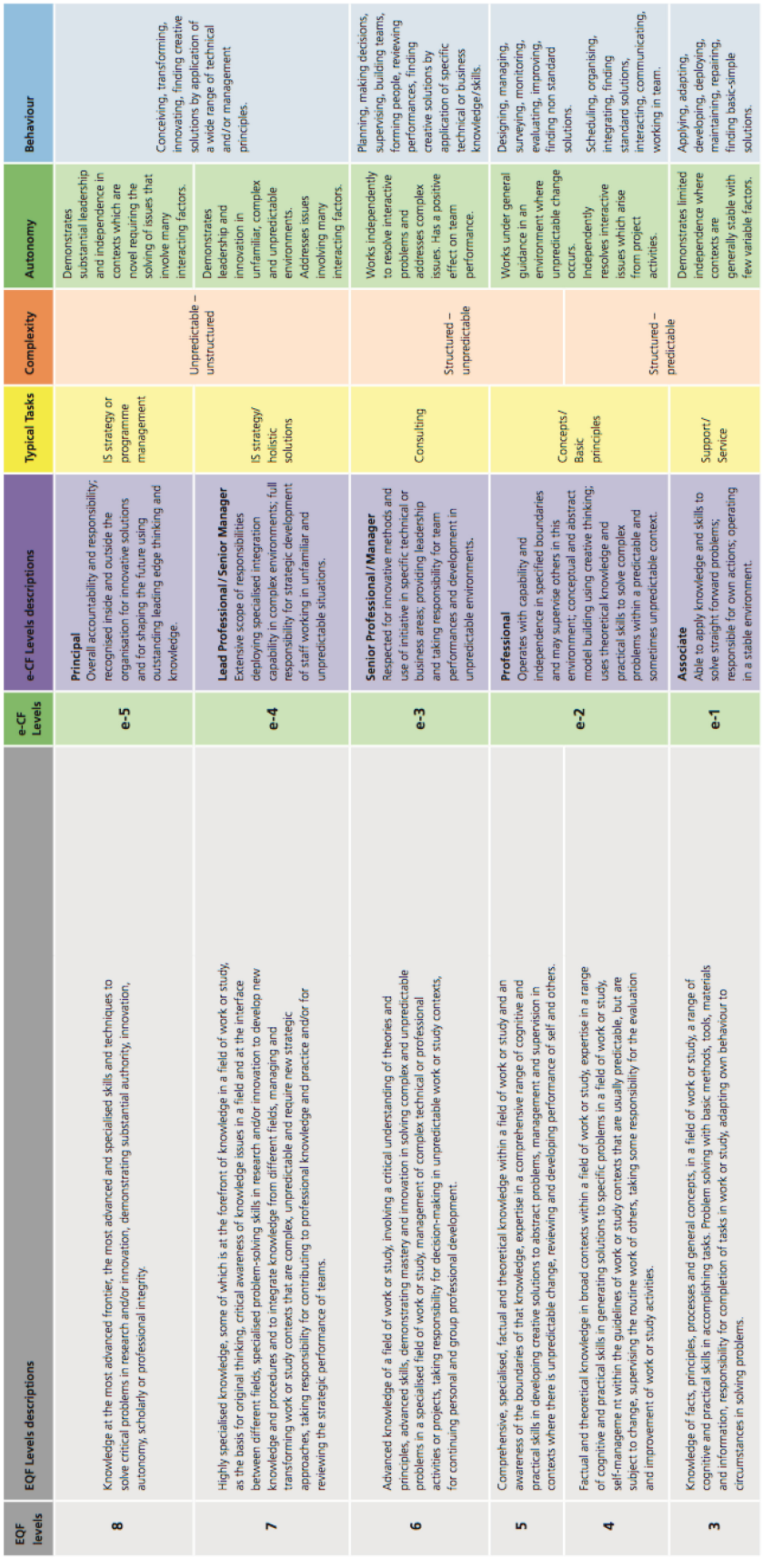
Sharing the same format beyond sectors will contribute to increased transparency across organisations, countries and sectors. It also supports the creation of ‘dual thinker’ profiles combining more ICT-specific roles with business and specific knowledge from other fields.

6. Glossary – terms and definitions

TERM	DEFINITION	SOURCE/ EXAMPLE
competence	Demonstrated ability to apply knowledge, skills and attitudes to achieve observable results Competences form part of the Role Profiles. *Source: EN 16234-1 e-CF*	Competences defined by EN 16234-1 European e-Competence Framework (e-CF)
job description	A detailed description of what a person does so that the particular job holder can have no doubt of their tasks, duties and responsibilities and generally who they report to. It contains precise information about competences, skills and knowledge required as well as practical information about health and safety and remuneration. Job Descriptions are not included in the ICT Role Profiles but they can be developed from the Profiles, such as generation 3 level profiles.	An example may be job description developed from a generation 3 profile.
knowledge	Body of facts, principles, theories and practices that is related to a field of work or study. An employee needs to know the relevant selection of these to successfully perform in their job. Sample or indicative knowledge example are included in the Role Profiles based on the e-CF.	knowledge examples provided by EN 16234-1 European e-Competence Framework (e-CF)
role	A role derives from an organisational need to get something done. It is an organisational requirement that can be met by assigning employees to carry out all or part of the tasks required to ensure that role is carried out. One person or team may have multiple roles. In terms of the ICT Role Profiles it is often the case that an actual job carried out by an employee would consist of parts of a number of the Role Profiles. *Source: ITSM Academy*	Example is the role of risk management. This can be implemented by a range of different employees with varying degrees of responsibility and types of tasks at different levels within the organisation
role profile	An outline or general document which demonstrates clearly the relationship between specific activities/tasks in a role and the individual skills, competences and knowledge required to undertake them.	Creative Leadership – Talent Management European ICT Professional Role Profiles CWA
skill	The ability to use know-how and expertise to complete tasks and solve problems.	Skills examples provided by EN 16234-1 European e-Competence Framework (e-CF)

ANNEX A: EQF and e-CF level table

Source: EN 16234-1 European e-Comeptence Framework e-CF 3.0. In addition to the concepts explicitely elaborated for the e-CF, the table contains description elements of 1) The European Qualifications Framework for Lifelong Learning (EQF), April 2008, and 2) The PROCOM Framework, of which generic job titles have been reproduced by kind permission of e-Skills UK.



EQF levels	EQF Levels descriptions	e-CF Levels	e-CF Levels descriptions	Typical Tasks	Complexity	Autonomy	Behaviour
8	Knowledge at the most advanced frontier, the most advanced and specialised skills and techniques to solve critical problems in research and/or innovation, demonstrating substantial authority, innovation, autonomy, scholarly or professional integrity.	e-5	**Principal** Overall accountability and responsibility; recognised inside and outside the organisation for innovative solutions and for shaping the future using outstanding leading edge thinking and knowledge.	IS strategy or programme management	Unpredictable – unstructured	Demonstrates substantial leadership and independence in contexts which are novel requiring the solving of issues that involve many interacting factors.	Conceiving, transforming, innovating, finding creative solutions by application of a wide range of technical and/or management principles.
7	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking, critical awareness of knowledge issues in a field and at the interface between different fields, specialised problem-solving skills in research and/or innovation to develop new knowledge and procedures and to integrate knowledge from different fields, managing and transforming work or study contexts that are complex, unpredictable and require new strategic approaches, taking responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams.	e-4	**Lead Professional / Senior Manager** Extensive scope of responsibilities deploying specialised integration capability in complex environments; full responsibility for strategic development of staff working in unfamiliar and unpredictable situations.	IS strategy/ holistic solutions	Unpredictable – unstructured	Demonstrates leadership and innovation in unfamiliar, complex and unpredictable environments. Addresses issues involving many interacting factors.	
6	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles, advanced skills, demonstrating mastery and innovation in solving complex and unpredictable problems in a specialised field of work or study, management of complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts, for continuing personal and group professional development.	e-3	**Senior Professional / Manager** Respected for innovative methods and use of initiative in specific technical or business areas; providing leadership and taking responsibility for team performances and development in unpredictable environments.	Consulting	Structured – unpredictable	Works independently to resolve interactive problems and addresses complex issues. Has a positive effect on team performance.	Planning, making decisions, supervising, building teams, forming people, reviewing performances, finding creative solutions by application of specific technical or business knowledge/skills.
5	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge, expertise in a comprehensive range of cognitive and practical skills in developing creative solutions to abstract problems, management and supervision in contexts where there is unpredictable change, reviewing and developing performance of self and others.	e-2	**Professional** Operates with capability and independence in specified boundaries and may supervise others in this environment; conceptual and abstract model building using creative thinking; uses theoretical knowledge and practical skills to solve complex problems within a predictable and sometimes unpredictable context.	Concepts/ Basic principles	Structured – predictable	Works under general guidance in an environment where unpredictable change occurs. Independently resolves interactive issues which arise from project activities.	Designing, managing, surveying, monitoring, evaluating, improving, finding non standard solutions. Scheduling, organising, integrating, finding standard solutions, interacting, communicating, working in team.
4	Factual and theoretical knowledge in broad contexts within a field of work or study, expertise in a range of cognitive and practical skills in generating solutions to specific problems in a field of work or study, self-manageme nt within the guidelines of work or study contexts that are usually predictable, but are subject to change, supervising the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities.						
3	Knowledge of facts, principles, processes and general concepts, in a field of work or study, a range of cognitive and practical skills in accomplishing tasks. Problem solving with basic methods, tools, materials and information, responsibility for completion of tasks in work or study, adapting own behaviour to circumstances in solving problems.	e-1	**Associate** Able to apply knowledge and skills to solve straight forward problems; responsible for own actions; operating in a stable environment.	Support/ Service		Demonstrates limited independence where contexts are generally stable with few variable factors.	Applying, adapting, developing, deploying, maintaining, repairing, finding basic-simple solutions.

ANNEX B: Deliverables and descriptions full list

DELIVERABLES	PLAN	BUILD	RUN	ENABLE	MANGE	e-COMPETENCES	DELIVERABLE DESCRIPTION
1. Budget Plan	■					A.4	A description of the amount of money spent on an organization's Information Technology systems and services, including compensation for IT professionals and expenses related to the construction and maintenance of enterprise-wide systems and services.
2. Business Case (Lightweight Business Case)	■					A.3	An explanation of why the investment should be made and how the business will see a return on that investment (ROI) at some point in the future. A well-considered business case provides decision makers with the information they need to decide if the investment should proceed.
3. Business Plan (Strategic Themes)	■					A.3	A formal statement of a set of business goals, why they are attainable, and the plan for reaching them.SAFe strategic themes provide business context for decision-making within the portfolio and influence investments in Value Stream. Strategic Themes provide the enterprise with the differentiators going forward from current state to future state; they help drive innovation and competitive differentiation that is achievable only via effective portfolio solutions.
4. Business Process Definition					■	E.5,E.7	A formal definition and description of related, structured activities that will accomplish a specific organizational goal
5. Business Relationship				■	■	D.11, E.4	A relationship established to provide business services
6. Business Requirements	■					A.1	A description of what a business needs so that it can operate successfully
7. Change Management Plan					■	E.7	A plan which addresses the impact of change to an organization, easing the transition.
8. Data Analytics				■		D.10	A method of Data, Information and Knowledge management which use data aggregation and data mining to provide insight into the past and answer: “What has happened?” This take the form of reports, dashboards, etc.
9. Data Collection and Representation				■		D.10	The result of a process where specific, structured information are gathered in a systematic fashion, subsequently enabling data analysis to be performed on resulting information
10. Data Management Plan				■		D.10	A plan by which the required data is acquired, validated, stored, protected, and processed, and by which its accessibility, reliability, and timeliness is ensured to satisfy the needs of the data users.
11. Data Management System		■		■		B.1, D.10	A system designed to define, manipulate, retrieve and manage data in a database.
12. Data Model				■		D.10	A description of data and relations in terms of dependency, consistency and integrity
13. Data Protection Policy				■	■	D.10, E.8	A set of principles or rules to guide decisions and achieve optimal outcome(s) in Data protection policy
14. Data Selection				■		D.10	The result of the process of determining the appropriate data type and source, as well as suitable instruments to collect data
15. Development Process		■				B.6	A process of dividing software development work into distinct phases to improve design, product management, and project management.
16. Digital Transformation Roadmap					■	E.2	A sophisticated project plan that details durations and dependencies of all the initiatives in the Digital Transformation. The roadmap also provides checkpoints for assessing the progress and success of the Digital Transformation down the road.

17. Digital Transformation Strategy	■					A.1	A strategy addressing the changes associated with the integration of digital technologies into an organization. this concept is based on several major pillars: cloud computing, mobility, real-time, the Internet of things, large data and the importance of user's experience and recently the Artificial intelligence
18. Documented Code		■				B.1	Self-documenting code is ostensibly written using human-readable names, typically consisting of a phrase in a human language which reflects the symbol's meaning. The code must also have a clear and clean structure so that a human reader can easily understand the algorithm used.
19. Enterprise Architecture	■					A.5	An IT plan which applies architecture principles and practices to guide organizations through the business, information, process, and technology changes necessary to execute their strategies.
20. Escalation Process			■			C.3	A process which defines what to do, in terms of , for example, who to inform and what will then happen, when a problem reaches a defined level of difficulty or scale.
21. First Level Support			■			C.1,C.3	A service to support customers to identify system, network and application problems and advising on the solution; where required activate 2nd and 3rd level for specialist support
22. Hardware Component		■				B.1	A physical artefact of a technology. (Does a hardware component really needs a description?)
23. HR Development Plan				■		D.9	A systematic process of matching the interests,skills and talents of employees/staff/personnel with organisational goals
24. ICT Audit Report					■	E.6	An examination and evaluation of an organization's information technology infrastructure, policies and operations.The evaluation of obtained evidence determines if the information systems are safeguarding assets, maintaining data integrity, and operating effectively to achieve the organization's goals or objectives.
25. ICT Department & Budget	■					A.1	The organisation, processes, human resources,infrastructure and budget needed to implement IS Strategy
26. ICT Governance Policy					■	E.9	A principle or rule to guide decisions and achieve optimal outcome(s) in ICT Governance policy
27. ICT Model	■					A.1	A description of user functions and services provided by an information system
28. ICT Quality Policy				■	■	D.2,E.6	A set of principles/ rules to guide decisions to achieve optimal IT outcome(s) in term of quality
29. ICT Strategy and Implementation	■					A.1	A comprehensive plan that information technology management professionals use to guide their organizations; it covers technology management, cost management, human capital management, hardware and software management, vendor management, risk management and all other considerations in the enterprise IT environment.
30. Incidents Database			■			C.3	A Database in which are registered incidents information, current resolution status, and solutions to manage them
31. Information Security Policy				■	■	D.1,E.8	A set of principles/rules to guide decisions and achieve optimal outcome(s) in Information Security
32. Information Security Risk Assessment					■	E.8	An identification, monitoring and analysis of vulnerabilities and data privacy issues and how to manage them; an effective plan of prioritized solutions based on specific goals, schedule, and budget
33. Information Security Risk Treatment Plan					■	E.3	A document that provides a summary of each of the identified risks, the responses that have been designed for each risk, the parties responsible for those risks and the target date for applying the risk treatment.
34. Information Security Strategy				■		D.1	A description of the goals and strategy for Information Security policies,activities and processes
35. Integrated Solution		■				B.2	A solution in which all components and sub-systems are integrated and tested
36. Iteration Retrospective		■				B.6	A regular meeting where Agile Team members discuss the results of the Iteration, review their practices, and identify ways to improve.
37. Knowledge or Information Base				■		D.10	An organized repository of knowledge consisting of concepts, data, objectives, requirements, rules, and specifications.

38. New Solution and Critical Business Process Integration Proposal	■					A.7	A document which illustrates goals, benefits and strategy for introducing new ICT technology or re-engineering/ integrating business critical processes
39. Non Functional Requirements	■					A.5, A.6	A description of attributes such as security, reliability, maintainability, scalability, and usability which are not core to the specific function but necessary for effective software
40. Opportunity Memo				■		D.11	A Study that permits to assess the relevance of the project with regard to the users' demand aligned to the objectives of the organization, and to decide whether it is viable or not. This study specifies the issues, scope, context of the project and end users
41. Production Forecast					■	E.1	A projection of achievable/ likely production volumes, based on market needs, historical sales data and current production capacity
42. Program Backlog	■			■		A.6, D.11	A prioritized list of Features that have been analyzed and are intended to address user needs and deliver business benefits for a single Agile Release Train (ART)
43. Project Plan	■				■	A.4. E.2	A formal, approved document used to guide both project execution and project control
44. Project Portfolio					■	E.2	A set of documents (or a formal approved document to match above OR delete formal and approved as they may not ALWAYS apply?) for analyzing and collectively managing a group of current or proposed projects
45. Quality Assurance					■	E.6	A method for the systematic monitoring and evaluation of the various aspects of a project or service to maximize the probability that the appropriate standards of quality are being attained by the production process.
46. Quality Performance Indicators					■	E.6	A set of indicators measuring how quality policy is implemented on IS projects and ICT solutions in operation
47. Quality Plan	■				■	A.4,E .6	A definition of the activities which will deliver solutions achieving customer's quality expectations on the basis of the quality standards.
48. Release		■				B.4	A result of activities including Solution verification and validation, documentation, and supporting activities to make a solution availabke.
49. Release Plan	■					A.4	A plan of activities including Solution verification and validation, documentation, and supporting activities to make a solution available
50. Risk Management Policy					■	E.3	A set of principles/ rules to guide decisions and achieve optimal outcome(s) in Risk Management
51. Sale				■		D.7	A contract involving transfer of the possession and ownership (title) of a good or property, in exchange for money or value.
52. Sales Forecast				■	■	D.7,E .1	A projection of likely sales revenue, based on historical sales data, analysis of market surveys and trends.
53. Second Level Support			■			C.1,C .3	A Service assisting the first level support through on-the-job trainings, as well as through the documentation of newly elaborated solutions in order to make applicable the knowledge for the first level support. If the complexity of a request exceeds the know-how or the technical capabilities of the second level support, it is forwarded to the third level support.
54. Service Level Agreement	■					A.2	A service level agreement (SLA) is a contract between a service provider (either internal or external) and the end user that defines the level of service expected from the service provider.
55. Services Catalogue	■					A.4	A service catalogue information includes ordering and requesting processes/ prices/ deliverables /contract points.
56. Software Component		■				B.1	A Software Package, or module that encapsulates a set of related functions (or data)
57. Software Design Description	■					A.6	A description which shows how the software system will be structured to satisfy the requirements. It is the primary reference for code development and, therefore, it must contain all the information required by a programmer to write code.
58. Solution Documentation		■				B.5	A set of Documents which illustrate all aspects related to the Solution

59. Solution in Operation			■			C.3	A solution deployed and running in the actual operational environment
60. Solution Requirement	■			■		A.6, D.11	A software requirements specification is a description of a software system to be developed. It lays out functional and non-functional requirements, and may include a set of use cases that describe user interactions that the software must provide.
61. Solution Specification				■		A.6	A set of Documents which define in detail the Solution to be developed
62. Solved Incident			■			C.4	An incident at the stage where a Solution to address the problem has been applied
63. Sprint Planning					■	E.2	A time when the Scrum team gathers to agree on a sprint goal and determine what subset of the product backlog it can deliver during the forthcoming sprint.
64. Sustainable IT Policy	■					A.8	An IT Policy built on the principles of Green IT – reducing the environmental impact of IT products and infrastructure adding aspects of social responsibility such as working environment and socially responsible manufacturing of IT products.
65. Team Backlog	■					A.6	A set of user and enabler Stories that originate from the Program Backlog, as well as stories that arise locally from the team's specific context. It can contain other work items as well, representing all the things a team needs to do to advance their portion of the system
66. Technical Proposal				■		D.5	A document that defines the technical requirements of a project, and explains the plan formulated to address them.
67. Test Plan		■				B.3	A document describing the scope, approach, resources and schedule of intended test activities.
68. Test Procedure		■				B.3	A set of tests which addresses homogeneous/ similar solution areas
69. Test Result		■				B.3	A document which details the results after one of several sessions during Test Phase
70. Training Course				■		D.3-D.9	A component of a Training Program that has specific goals of improving one's capability, capacity, productivity and performance. Suggest replace with as follows as *It may not be part of traing programme., also this revised description 'matches' what we say re training programme deliverable. An event with the aim of the acquisition of knowledge, skills, and competences*
71. Training Policy				■		D.3	A set of principles/rules to guide decisions and achieve optimal outcome(s) in ICT training
72. Training Program				■		D.3	A program for the acquisition of knowledge, skills, and competences (note link to training course..)
73. Up-to-date Solution			■			C.2	An updated Solution during the Maintenance Phase
74. User Engagement Evaluation Tools				■		D.12	A set of appropriate tools and targets for the channels adopted to evaluate levels of customer engagement
75. User Experience Design		■				B.6	A set of product specifications to enhance user satisfaction by improving the usability, accessibility, and pleasure provided in the interaction with the product. User experience design encompasses traditional human–computer interaction design, and extends it by addressing all aspects of a product or service as perceived by users
76. Validated Solution		■				B.3	A solution at the end of Test and Validation Phase

Table B: Deliverables, related e-CF area and e-Competences, deliverable descriptions

ANNEX C: European ICT Professional Role Profiles – ESCO relationships

Important note: The relationship between the two columns does not represent an equivalence it offers a best fit approximation that readers may wish to investigate.

ESCO Occupation Title (from ICT occupations list)	EU ICT Professional Role Profile Title	Comment
database administrator	Data Administrator Role	
ICT system administrator	Systems Administrator Role	
ICT network administrator	Network Specialist Role	
IT auditor	Quality Assurance Manager Role	
telecommunications engineering technician	Network Specialist Role	
webmaster	Digital Media Specialst Role	
ethical hacker	Data Specialist Role	
digital forensics expert	Data Scientist Role	
ICT security technician	Cyber Security Specialist Role	
data centre operator	Systems Administrator Role	
ICT security administrator	Cyber Security Specialist Role	
search engine optimisation expert	Digital Media Specialst Role	
online community manager	Digital Media Specialst Role	
ICT trainer	Digital Educator Role	
ICT consultant	Digital Consultant Role	
ICT system integration consultant	Systems Architect Role	
green ICT consultant	Digital Consultant Role	
ICT security consultant	Cyber Security Specialist Role	
ICT technician	Technical Specialist Role	
ICT help desk agent	Service Support Role	
broadcast technician	Technical Sepecialist Role	
ICT network technician	Network Specialist Role	
mobile devices technician	Technical Specialist Role	
communication infrastructure maintainer	Network Specialist Role	
telecommunications technician	Network Specialist Role	
big data archive librarian	Data Specialist Role	
telecommunications equipment maintainer	Technical Specialist Role	
radio technician	Technical Specialist Role	
ICT presales engineer	Account Manager	
ICT buyer	Service Manager Role	
software manager	ICT Operations Manager Role	
ICT research manager	Digital Consultant Role	
ICT operations manager	ICT Operations Manager Role	
ICT help desk manager	Service Manager Role	
telecommunications manager	Service Manager Role	
e-learning architect	Systems Architect Role	
ICT resilience manager	Cyber Security Specialist Role	
ICT project manager	Project Manager Role	
web content manager	Digital Media Specialist Role	
ICT environmental manager	ICT Operations Manager Role	
ICT quality assurance manager	Quality Assurance Manager Role	
ICT auditor manager	Quality Assurance Manager Role	
ICT security manager	Cyber Security Manager Role	
ICT documentation manager	Quality Assurance Manager Role	

eBusiness manager	Digital Transformation Leader Role		
ICT account manager	Account Manager Role		
enterprise architect	Enterprise Architect Role		
ICT business analysis manager	Business Analyst Role		
ICT information and knowledge manager	Data Scientist Role		
ICT product manager	Solution Designer Role		
ICT vendor relationship manager	ICT Operations Manager Role		
ICT capacity planner	ICT Operations Manager Role		
ICT business development manager	Account Manager Role		
chief data officer	Digital Transformation Leader Role		
chief technology officer	Chief Information Officer Role		
chief ICT security officer	Cyber Security Manager Role		
chief information officer	Chief Information Officer Role		
ICT system tester	Test Specialist Role		
software tester	Test Specialist Role		
data quality specialist	Data Specialist Role		
ICT integration tester	Test Specialist Role		
ICT test analyst	Test Specialist Role		
digital games tester	Test Specialist Role		
ICT accessibility tester	Digital Media Specialist Role		
ICT usability tester	Solution Designer Role		
data scientist	Data Scientist Role		
computer scientist	Systems Analyst Role		
ICT research consultant	Systems Analyst Role		
software developer	Developer Role		
ICT application configurator	Solution Designer Role		
database integrator	Data Specialist Role		
embedded systems software developer	Developer Role		
database developer	Data Specialist Role		
digital games developer	Solution Designer Role		
ICT system developer	Developer Role		
telecommunications engineer	Network Specialist Role		
3D animator	Digital Media Specialist Role		
ICT network engineer	Network Specialist Role		
web developer	Digital Media Specialist Role		
ICT application developer	Developer Role		
mobile app developer	Developer Role		
industrial mobile devices software developer	Developer Role		
user interface developer	Developer Role		
technical communicator	None	Generation 3 Profile	not included CWA
instructional designer	Solution Designer Role		
e-learning developer	Digital Educator Role		
3D modeller	Digital Media Specialist Role		
embedded system designer	Systems Architect Role		
ICT intelligent systems designer	Systems Architect Role		
digital games designer	Solution Designer Role		
ICT network architect	Systems Architect Role		
digital media designer	Digital Media Specialist Role		
software architect	Systems Architect Role		
user interface designer	Digital Media Specialist Role		

database designer	Data Administrator Role	
data warehouse designer	Data Specialist Role	
ICT system architect	Systems Architect Role	
integration engineer	Systems Analyst Role	
data entry clerk	NONE	not CWA scope
system configurator	Systems Architect Role	
ICT business analyst	Business Analyst Role	
ICT disaster recovery analyst	Business Analyst Role	
telecommunications analyst	Network Specialist Role	
ICT system analyst	Systems Analyst Role	
software analyst	Solution Designer Role	
data analyst	Data Specialist Role	
knowledge engineer	Data Specialist Role	
user experience analyst	Product Owner Role	

Table C1: Relating ESCO Occupation Titles to European ICT Professional Role Profile Titles

Important note: The relationship between the two columns does not represent an equivalence it offers a best fit approximation that readers may wish to investigate.

EU ICT Professional Role Profile Title	ESCO Occupation Title	Comment
Account Manager Role	ICT account manager	
Business Analyst Role	ICT business analyst	
Business Information Manager Role	ICT business analysis manager	
Chief Information Officer Role	chief information officer	
Data Administrator Role	database administrator	
Developer Role	ICT application developer	
Digital Media Specialist Role	digital media designer	
Enterprise Architect Role	enterprise architect	
Digital Consultant Role	ICT consultant	
ICT Operations Manager Role	ICT operations manager	
Cyber Security Manager Role	ICT security manager	
Cyber Security Specialist Role	ICT security consultant	
Digital Educator Role	further education teacher	
Network Specialist Role	ICT network technician	
Project Manager Role	ICT project manager	
Quality Assurance Manager Role	ICT quality assurance manager	
Service Support Role	ICT help desk agent	
Service Manager Role	service manager	
Systems Administrator Role	ICT system administrator	
Systems Analyst Role	ICT system analyst	
Systems Architect Role	ICT system architect	
Technical Specialist Role	ICT technician	
Test Specialist Role	ICT system tester	
Solution Designer Role	integration engineer	
Digital Transformation Leader Role	strategic planning manager	
DevOps Expert Role	Combination of several roles including: ICT application developer, ICT system tester and integration engineer	
Data Scientist Role	data scientist	
Data Specialist Role	database integrator	
Scrum Master Role	business coach	
Product Owner Role	user experience analyst	

Table C2: Relating European ICT Professional Role Profile titles to ESCO Occupation titles

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