DRIVES

Development and Research on Innovative Vocational Education Skills

Innovation Agent – Organisation Innovation

Job Role Skill Set

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TABLE OF CONTENTS

1 INTRODUCTION

1.1 OBJECTIVE

The objective of this deliverable is to provide an introduction to described Job Role within the applied skills definition model.

1.2 PURPOSE OF THE DELIVERABLE

The purpose of this deliverable is to define skills definitions of the Innovation Agent – Organisation job role within the ECQA skills definition model.

1.3 SCOPE OF THE DELIVERABLE

The deliverable contains

- Description of the content of the Job Role
- Description of used Skill Sets and skills definitions, coverage of Qualification Schemas

The deliverable does not cover:

- Course development, as this will be done after the skill definitions based on the defined skills which need to be covered by the course.

2 ECQA SKILLS DEFINITION MODEL

A skills definition contains the following items (see Fig. 1):

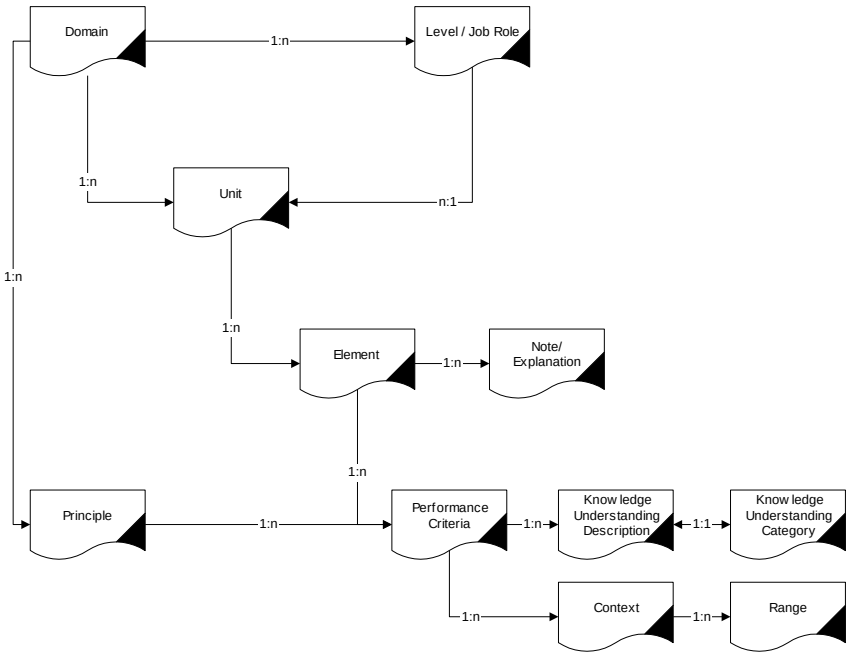

Figure 1 The Skill Definition Model (1:n = one to many relationship)

Context: A category of ranges; it represents some terminology used in a performance criterion that consists of different context, conditions or circumstances. A participant must be able to prove competence in all the different circumstances covered by the context.

Domain: An occupational category, e.g. childcare, first level management or software engineering.

Element: Description of one distinct aspect of the work performed by a worker, either a specific task that the worker has to do or a specific way of working. Each element consists of a number of performance criteria.

Evidence: Proof of competence.

Knowledge and understanding category: A category of knowledge and understanding descriptions.

Knowledge and understanding description: A description of certain knowledge and understanding. To be judged competent in a unit a participant must prove to have and to be able to apply all the knowledge and understanding attached to it.

NVQ (UK based): The National Vocational Qualification standard of England, Wales and N. Ireland.

Performance criterion: Description of the minimum level of performance a participant must demonstrate in order to be assessed as competent. A performance criterion may have relevant contexts.

Principle: A statement of good intentions; it underpins all competent domain practice.

Range: Description of a specific circumstance and condition of a performance criterion statement.

Qualification: The requirements for an individual to enter, or progress within a certain occupation.

Job Role: A certain profession that covers part of the domain knowledge. E.g. domain = Functional Safety, job role = Functional Safety Manager.

Unit: A list of certain activities that have to be carried out in the workplace. It is the top-level skill in the UK qualification standard hierarchy and each unit consists of a number of elements.

The rationales for developing the ECQA skills definition model is based on the skills definition proposed by the DTI (Department of Trade and Industry) in the UK for the NVQ (National Vocational Qualification) standards. These models have been re-used and slightly modified by other countries when they started employing skill cards [1], [2].

ECQA standards are used to describe the skills sets delivered within the DRIVES project (www.project-drives.eu). Further description and rationales are attached in annexes of this document. The ECQA structure was mapped in DRIVES project to DRIVES Reference and Recognition Framework with the links to ESCO[7], EQF[8], ECTS[9] and ECVET[10]. See more in deliverable DRIVES-D4.1.1 Reference and Recognition Framework – Analysis.pdf (www.project-drives.eu).

3 SKILLS DEFINITION FOR THE JOB ROLE "INNOVATION AGENT - PRODUCT INNOVATION"

3.1 THE SKILLS HIERARCHY

In the DRIVES project in cooperation with SOQRATES (www.soqrates.de) the new job roles for innovation have been defined.

1. Innovation Agent – Product Innovation
2. Innovation Agent – Organisation
3. Innovation Agent – Business Model Innovation

The overall set of units and elements for innovation agents have also been assigned to levels of skills (awareness, practitioner, expert level), see Fig. 2 below.

Units (U) and Elements (E) of the skill card	InovationAgent Product Innovation	Innovation Agent Organisation	Innovation Agent Business Model Innovation
Unit 1 Introduction			
U1.E1 Innovation Vision 2030	awareness	awareness	awareness
U1.E2 Divers of Change Analysis	awareness	awareness	awareness
Unit 2 Product Innovation			
U2.E1: identification of opportunities and problems	expert		
U2.E2: Production and Evaluation of Ideas	expert		
U2.E3: Research and Development Work and Prototyping	expert		
U2.E4 Service based innovation	expert		
Unit 3 Organisational Innovation			
U3.E1 Core Competence Analysis & First Architecture		expert	
U3.E2 Dynamic Learning Cycles Design		expert	
U3.E3 Innovation Process Design including Ideation		expert	
U3.E4 Teamwork and leadership		expert	
U3.E5 Leading innovation projects and initiatives		expert	
Unit 4 Business Model Innovation			
U4.E1 Open Network Strategies			expert
U4.E2 Service Innovation Strategies			expert
U4.E2 Big Data and Cloud and new business scenarios			expert
U4.E3 Smart Technologies and new business scenarios			expert
U4.E4 Smart production and new business senarios			expert

Figure 2 The Skills Set for Innovation Agent Roles

Innovation Agent builds on the field studies of EU Blueprint projects like DRIVES where the association of manufacturers an suppliers in Europe cooperated to identify the major drivers of change which will influence how Europe will look like in 2030.

Unit 1 is setting the scene.

European Alliance projects (EU Blueprints) made analysis to predict the drivers of change for Europe 2030. ISCN is partner in both and will share that. This future pictures go to unit 1 to set the scene for the future EU business developments.

Unit 2 is focussing on empowering teams to be creative and come up with new ideas and products.

This is based on the training approaches from InnoTeach, ResEUr etc. with exercises. The training targets engineers at all levels in the company.

Unit 3 is focussing on making whole organisations to dynamic learning organisations which constantly update to new market needs.

This is based on the organisational innovation concepts developed in ORGANC and the uodated innovation manager.

Unit 4 is focussing on open innovation with the new networked approaches supported by e.g. OpenInnoTrain and other projects.

This shall give guidance about how to use the cloud based future infrastructure for networked innovation teams, sharing, etc. building critical multidisciplinary mass, etc.

In this document we describe the skills set for the innovation agent – organisation innovation.

3.2 THE SKILLS DESCRIPTIONS – JOB ROLE INNOVATION AGENT – ORGANISATION INNOVATION

Domain Acronym: INNO

Domain title: Innovation

Domain Description:

Companies that have a long lasting vision and exist for a long time are able to adapt to future needs dynamically. This requires innovation strategies at different levels such as a continuously updating and dynamically learning organisation, continuous development of new ideas and products and services, and recently the open innovation concept of networking the organisation into the cloud and using such strategies to empower teams, knowledge sharing and launching of new ideas and products.

Especially the DRIVERS of change in Automotive sector will lead to new partnerships, new types of products and services, new infrastructures, new partnerships etc.

The DRIVERS of Change are outlined in [8], a study performed in the EU Blueprint project DRIVES [9]. Global drivers influence the drivers in technological areas, and global drivers in the study are structured into:

New technologies and business models;

- Climate goals, environmental, and health challenges;
- Societal changes and changes in the way that consumers access, purchase, and use cars;
- Structural change;
- Globalisation and the rise of new players.

Future changes impacting automotive and production by using new smart technologies are described in the study [8] and project DRIVES as follows:

- Connected and automated driving (CAD) and advanced driver assistance systems (ADAS)
- Alternative power trains
- Electrification
- Advanced manufacturing, digitalisation, and robotisation of the manufacturing process
- Handling of/access to vehicle data
- 3D printing
- New communications technologies
- New/advanced materials

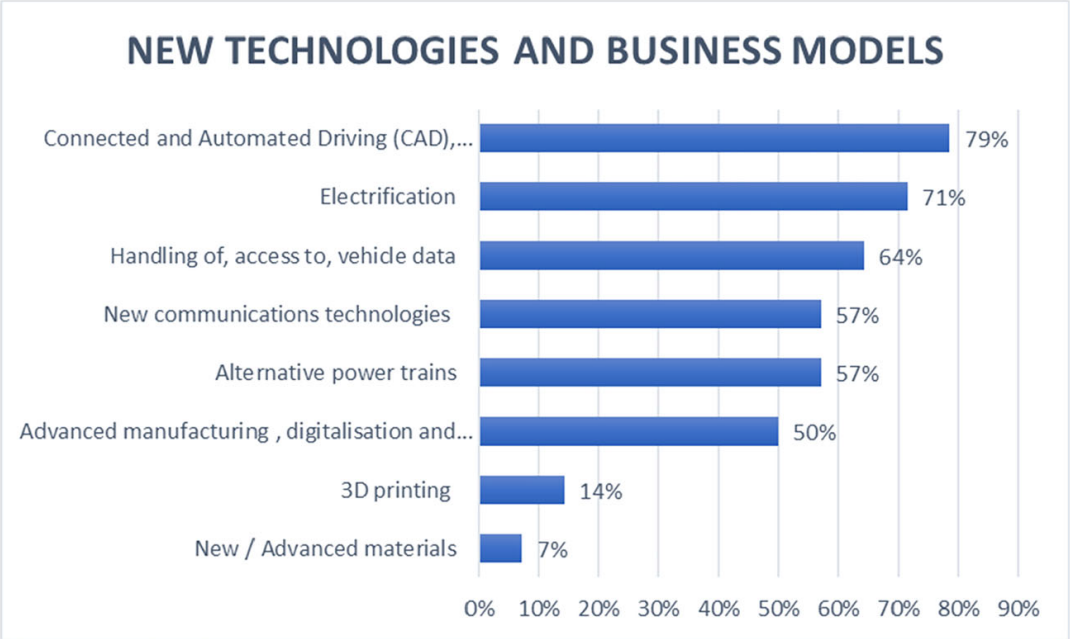

Figure 3 New technologies and business models

Job Role Acronym: INNOAGE

Job Role Title: Innovation Agent

Public Description:

Companies nowadays need to be able to quickly adapt to future needs dynamically. This requires innovation at different levels such as to set up a continuously updating and dynamically learning organisation, empowering staff to continuously develop new ideas and products and services, and recently the open innovation concept of using the cloud and networking to build thematic and knowledge driven new partnerships, alliances and value chains.

The innovation agent knows tools and methods to empower employees and managers to implement innovation at these three levels in an organisation and can act as a catalyst for the organisation to adapt to the new market needs and global trends.

The Innovation Agent helps to develop new business scenarios for leading European industry in the areas outlined by DRIVES to hep to adapt industry for the main drivers of change in the DRIVES study [8].

This includes innovation and business scenarios for the use of

- Connected and automated driving (CAD) and advanced driver assistance systems (ADAS)
- Alternative power trains
- Electrification
- Advanced manufacturing, digitalisation, and robotisation of the manufacturing process
- Handling of/access to vehicle data
- 3D printing
- New communications technologies
- New/advanced materials

Also the Innovation Agent helps to realise strategy initiatives at European level like Gear 2030 and ALBATTS.

The Gear 2030 [9] initiative includes the European Automotive manufacturer association, the European Automotive supplier association, key players in Automotive education to develop the skills needed for future dependent vehicles in a complex eco system and environment. Gear 2030 proposes a very wide scope of qualifications including the whole life cycle of vehicle design and production. The

Gear 2030 formed a so called Skills council providing guidance to the European Commission and the European automobile manufacturer association (ACEA). The Gear 2030 skills council report to the European Commission and the ACEA mentions key job roles of the future based on a high level European commission viewpoint level.

ALBATTS is a new EU blueprint project where Northvolt as a strategy to create Europe's battery production chain and research (VW, BMW are co-investing with EU) and developed a set of new innovative drivers and job roles that need to be supported in future.

Description:

The Skill card comprises the following thematic learning units

1. Unit 1 Introduction
    a. U1.E1 Innovation Vision 2030 (awareness)
    b. U1.E2 Divers of Change (awareness)
2. Unit 3 Learning Organisation
    a. U3.E1 Core Competence Analysis & First Architecture (expert)
    b. U3.E2 Dynamic Learning Cycles Design (expert)
    c. U3.E3 Innovation Process Design including Ideation (expert)
    d. U3.E4 Teamwork and leadership (expert)
    e. U3.E5 Leading innovation projects and initiatives (expert)

3.3 UNIT INNOAGE.U1 INTRODUCTION

Acronym: INNOAGE.U1

Title: Introduction

Description:

This unit deals with studies [8] that outline future developments and targets of major European industry. This gives a direction towards what innovation needs to be supported to achieve the EU 2030 goals in the industry. The studies referenced have been supported by major industry associations in Europe, such as the ACEA (European Automobile Manufacturer Association).

3.3.1 Unit INNOAGE.U1 - Element 1: Innovation Vision 2030

Acronym: INNOAGE.U1.E1

Element Title: Innovation Vision 2030

Element Note:

This element specifically deals with expectations from industry and Europe towards products, services, environments in 2030 and down to the year 2050. The example automotive and manufacturing are used to demonstrate the future changes and drivers of change.

Performance Criteria:

The student must be able to show evidence of competencies for the following performance criteria/skills (PCs):

Performance Criterion	Evidence Check: The student can demonstrate
INNOAGE.U1.E1.PC1	The student knows drivers of change and can list smart technologies which are related to the drivers of change.
INNOAGE.U1.E1.PC2	The student knows the initiatives like Gear 2030, DRIVES and ALBATTS and can explain the drivers promoted by these initiatives for Europe.

Table 1: Performance Criteria Example for the Element INNOAGE.U1.E1

3.3.2 Unit INNOAGE.U1 - Element 2: Drivers of Change Analysis

Acronym: INNOAGE.U1.E2

Element Title: Drivers of Change Analysis

Element Note:

This element outlines how to map existing services and departments in an organisation towards the drivers of change and list of new smart technologies. This mapping will help later as a strategy road map as an input for brainstorming or new business scenarios to be identified.

Performance Criteria:

The student must be able to show evidence of competencies for the following performance criteria/skills (PCs):

Performance Criterion	Evidence Check: The student can demonstrate
INNOAGE.U1.E1.PC1	The student is able to map the existing services of the organisation onto the drivers of change.

Performance Criterion	Evidence Check: The student can demonstrate
INNOAGE.U1.E1.PC2	The student is able to create a high level strategy road map picture showing which service area of the company is impacted by which driver of change and assigns a business impact rating.

Table 2: Performance Criteria Example for the Element INNOAGE.U1.E2

3.4 UNIT INNOAGE.U3 ORGANISATIONAL INNOVATION

Acronym: INNOAGE.U3

Title: ORGANISATIONAL INNOVATION

Description:

The development of innovation in an organisation requires to analyse and structure a continuously learning organisation which can adapt their structures, products and services dynamically to customer and market needs. This unit is about designing continuous learning organisations for innovation.

3.4.1 Unit INNOAGE.U3 - Element 1: Core Competence Analysis & First Architecture

Acronym: INNOAGE.U3.E1

Element Title: Core Competence Analysis & First Architecture

Element Note:

This element focusses on the importance of the Core Competence Analysis for the design of an organisation's Innovation Architecture.

Performance Criteria:

The student must be able to show evidence of competencies for the following performance criteria/skills (PCs):

INNOAGE.U3.E1.PC1	The student knows how to identify a core competence.
INNOAGE.U3.E1.PC2	The student knows how to establish a learning organisation architecture model.
INNOAGE.U3.E1.PC3	The student knows related approaches which help increasing the idea sources.

Table 3: Performance Criteria Example for the Element INNOAGE.U3.E1

3.4.2 Unit INNOAGE.U3 - Element 2: Dynamic Learning Cycles Design

Acronym: INNOAGE.U3.E2

Element Title: Dynamic Learning Cycles Design

Element Note:

This element focusses on the design of innovation cycles in the organisation to continuously increase the core competencies on which the products and services are building.

Performance Criteria:

The student must be able to show evidence of competencies for the following performance criteria/skills (PCs):

INNOAGE.U3.E2.PC1	The student knows how to design dynamic learning cycles.
INNOAGE.U3.E2.PC2	The student knows patterns of feedback loop based innovation.
INNOAGE.U3.E2.PC3	The student knows how to form joined learning teams.

Table 4: Performance Criteria Example for the Element INNOAGE.U3.E2

3.4.3 Unit INNOAGE.U3 - Element 3: Innovation Process Design including Ideation

Acronym: INNOAGE.U3.E3

Element Title: Innovation Process Design including Ideation

Element Note:

This element focusses on success criteria to establish an innovation process in the organisation.

Performance Criteria:

The student must be able to show evidence of competencies for the following performance criteria/skills (PCs):

INNOAGE.U3.E3.PC1	The student knows the Key Success Factors for a successful Ideation Process.
INNOAGE.U3.E3.PC2	The student understands the relationship of Design Thinking with Innovation Management and Entrepreneurship.
INNOAGE.U3.E3.PC3	The student knows how to compose Innovative (Ideation) Teams.
INNOAGE.U3.E3.PC4	The student knows the requirements to Key Competencies of Innovation Managers with respect to Entrepreneurship for Radical Innovations.

Table 5: Performance Criteria Example for the Element INNOAGE.U3.E3

3.4.4 Unit INNOAGE.U3 - Element 4: Teamwork and leadership

Acronym: INNOAGE.U3.E4

Element Title: Teamwork and leadership

Element Note:

Nowadays innovation is not done any more by just one person or expert. In an environment with a network of knowledge, skills, and ideas the innovation nowadays usually bases on a complementary team where different team members play different role and add different skills to the whole. In a multidisciplinary approach the same topic is studied from the viewpoint of several disciplines. It is also crucial to involve stakeholder following the transdisciplinary approach.

Performance Criteria:

The student must be able to show evidence of competencies for the following performance criteria/skills (PCs):

INNOAGE.U3.E4.PC1	The student understands diversity and the need related to concrete challenges.
INNOAGE.U3.E4.PC2	The student knows & uses the different complementary roles needed in a team to empower innovation within projects
INNOAGE.U3.E4.PC3	The student understands the principles and methods of diversity and how to use this in the innovation process.
INNOAGE.U3.E4.PC4	The student understands the importance of integration of stakeholders into the innovation process

Table 6: Performance Criteria Example for the Element INNOAGE.U3.E4

3.4.5 Unit INNOAGE.U3 - Element 5: Leading innovation projects and initiatives

Acronym: INNOAGE.U3.E5

Element Title: Leading innovation projects and initiatives

Element Note:

To lead an innovation project factors for successful entrepreneurship, the planning and monitoring of an innovation project, the creation of a stakeholder network are important contributors to success.

Innovation also requires to have social skills paired with technical abilities and to be able to take leadership.

Characteristics of a successful entrepreneur are:

- High degree of energy
- Being Innovative
- Acting Independent
- Ability to anticipate needs
- Effective communicator
- Responsive to criticism
- Able to take the lead
- Learning from mistakes
- Being Self-directed

Key factors to make an innovation project a success are:

1. Having a mission statement - Clearly define the **innovation idea and its business opportunity (what problem will be solved?)**
2. **Identifying what makes your innovation different from others** – Researching the existing and explaining the difference
3. Developing a **Business Plan** (including Marketing plan) and a **Business Network**
4. Explaining **What-is-in-it-for-me** for the potential customers.
5. Setting up a project to implement the business idea (**registration** of the Enterprise) and monitoring the performance of this project

Successful Innovation Leaders usually build a charisma by:

- ❑ Challenging The Status Quo
- ❑ Creating A Compelling Vision
- ❑ Establishing Shared Values
- ❑ Enabling Others To Act
- ❑ Modelling The Way Which Others can Follow
- ❑ Encouraging The Heart in Case of Risks and Problems to Solve on the Way

The success of an innovation depends on the ability to create a network of stakeholders. This includes:

- A network of supporters who co-develop the idea
- A network of customers and users that are interested
- A network of sponsors who help to finance the innovation project
- Network users who provide feedback and form a crowd of interested people
- Etc.

Such a network can be created by different means

- Social media (LinkedIn, XING, etc.)
- Workshops
- Conferences
- Marketing and contact databases
- Collaborative platforms on the Internet
- User and interest groups
- Intermediary agencies that support innovation on a regional and EU level
- Etc.

Performance Criteria:

The student must be able to show evidence of competencies for the following performance criteria/skills (PCs):

INNOTEACH.U3.E1.PC1	The student knows the key success factors for entrepreneurship.
INNOTEACH.U3.E1.PC2	The student knows principles for creating a business network (network of all stakeholders including customers).
INNOTEACH.U3.E1.PC3	The student is able to use methods and tools for project planning.

Table 7: Performance Criteria Example for the Element INNOAGE.U3.E5

ANNEXES

The annex provides overview of used skills set, coverage of Qualification Schemas and Legal background for Certification

ANNEX A ECQA DESCRIPTION

ECQA – EUROPEAN CERTIFICATION AND QUALIFICATION ASSOCIATION

ECQA standards are used to describe the skills sets delivered within the DRIVES project (www.project-drives.eu). ECQA is the pilot Certification body, which structure is mapped to DRIVES Reference and Recognition Framework providing the EU-wide overview of training courses and possible certifications, and micro-credentials. DRIVES Reference and Recognition Framework provides links to ESCO[7], EQF[8], ECTS[9] and ECVET[10]. See more in deliverable DRIVES-D4.1.1 Reference and Recognition Framework – Analysis.pdf (www.project-drives.eu).

Europe Wide Certification

The ECQA is the result of a number of EU supported initiatives in the last ten years where in the European Union Life Long Learning Programme different educational developments decided to follow a joint process for the certification of persons in the industry.
Through the ECQA it becomes possible that you attend courses for a specific profession in e.g. Spain and perform a Europe wide agreed test at the end of the course.

Access to a Vast Pool of Knowledge

ECQA currently supports 27 professions in Europe and with the continuous support until 2012 by the European Commission the pool is growing to 30 certified professions in Europe. ECQA offers certification for professions like IT Security Manager, Innovation Manager, EU project manager, E-security Manager, E-Business Manager, E-Strategy Manager, SW Architect, SW Project Manager, IT Consultant for COTS selection, Internal Financial Control Assessor (COSO/COBIT based), Interpersonal Skills, Scope Manager (Estimation Processes), Configuration Manager, Safety Manager, and so forth.

The ECQA guide can be downloaded at www.ecqa.org -> Guidelines.

Defined procedures are applied for:

- Self assessment and learning

- http://www.ecqa.org/fileadmin/documents/Self_Assessment/eucert-users-self-assessment-learning-guide-v5-doc.pdf
- Exam performance
- http://www.ecqa.org/fileadmin/documents/ECQA_Exam_Guide_Participant_v2.pdf

ECQA SKILLS DEFINITION MODEL

The ECQA skills definition model, used for Job Role definition, is described in section 2 of this document.

ECQA SKILL SET STRATEGY

Imagine that in the future Europeans will have a skill set like a card with a chip which stores your skill profile to fulfil specific professions, job roles, and tasks. It's working like an ID card. This future scenario requires -

- A standard way to describe a skill set for a profession, job, or specific task.
- A standard procedure to assess the skill and to calculate and display skill profiles.

Such a common set of skill sets in Europe is needed due to the free mobility of workers. European countries such as UK, The Netherlands, and France already have well established open universities which support APL (Accreditation of Prior Learning). In APL the skills of students are assessed, already gained skills are recognised, and only for the skill gaps a learning plan is established. The skill assessment bases on defined skill units and a skill profile displaying how much of the skill units are covered.

In a previous project CREDIT (Accreditation of Skills via the Internet) [1] in which some of the project partners were involved such an Internet based skills assessment system has been built. Therefore another possible scenario of the future is that representative educational bodies per country in Europe maintain skill profiles in databases which can be accessed via defined ID codes for people.

ECQA SKILLS ASSESSMENT MODEL

Step 1 – Browse a Skills Set: You select a set of skills or competencies, which are required by your profession or job using national standards or your company standards. You browse different skills cards and select a job role you would like to achieve.

Step 2 – Register for Self Assessment with a Service Unit : This can be a service unit inside your own company (e.g. a personnel development department) or a skills card and assessment provider outside

your company which offers skills assessment services. In case of the Safety Manager Project the registration will automatically assign a predefined service unit.

Step 3 – Receive an Account for Self-Assessment and Evidence Collection : With the registration you automatically received an account to login to the working space in which you can go through the steps of online self assessment and the collection of evidences to prove that you are capable of certain performance criteria.

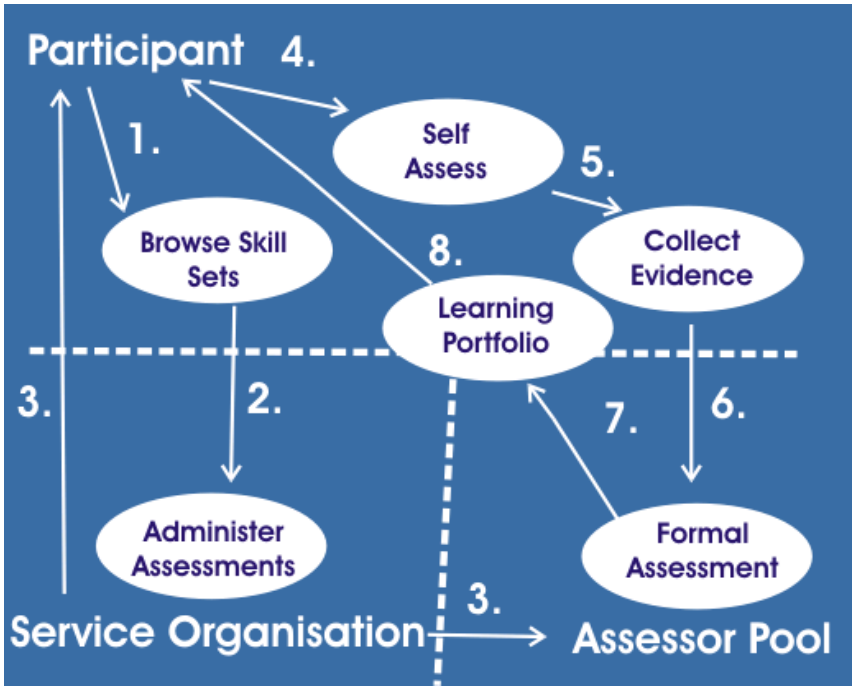

Figure 4 Basic steps of the skills assessment model

Step 4 – Perform Self Assessment: You log into the system , browse through the skills required and self assess performance criteria, whole elements or whole units with a standard evaluation scale of non-applicable, not adequate, partially adequate, largely adequate, and fully adequate. A skills gaps profile can be generated and printed illustrating in which areas your self assessment shows improvement potentials.

Testing of Skills (Addition to Step 4) – The system provides a multiple-choice test for each performance criteria so that you can check your capabilities as realistically as possible.

Step 5 – Collect Evidences: Before you want to enter any formal assessment you need to prove your skills by evidences. Evidences can be any electronic files (sample documents, sample graphics, results of some analysis, etc.) or any references with details (e.g. a certificate received from a certain institution). Evidences you can then link to specific performance criteria or whole elements of skills units.

Testing of Skills (Addition to Step 5) – In traditional learning schemes people have always needed to go to a learning institution (university, accreditation body, professional body, etc.) to take exams and they received a certificate if they pass. This traditional approach however is insufficient when it comes to measuring experience and (soft) skills learned on the job and fails to give recognition to skills gathered on the job. The APL (Accreditation of Prior Learning) approach, by contrast, collects so called evidences. Evidences can be certificates obtained in the traditional way, but also references from previous employers, materials from previous projects in which the person took ownership of results (e.g. a test plan) to prove their capability, as well as any kind of proof of competence gathered on the job. The assessors will then evaluate the evidences provided and not only rely on certificates and exams.

Step 6 – Receive Formal Assessment: Formal assessors are assigned by the service unit to the skills assessment. Once formal assessors log into the system they automatically see all assigned assessments. They select the corresponding one and can see the uploaded evidences. They then formally assess the evidences and assess the formal fulfilment of performance criteria, whole elements or whole units with a standard evaluation scale of non-applicable, not adequate, partially adequate, largely adequate, and fully adequate. In case of missing competencies they enter improvement recommendations, a well as learning options.

Step 7 – Receive Advise on Learning / Improvement Options: After the formal assessment the participants log into the system and can see the formal assessment results from the assessors, can print skills gaps profiles based on the assessor results, and can receive and print the improvement recommendations and learning options. If required, the generation of learning options can also be automated through the system (independent from assessor advises).

ECQA CERTIFICATE TYPES

In the standard test and examination procedures for levels of certificates are offered:

- Course Attendance Certificate
  - Received after course attendance
  - Modular per Element
- Course / Test Certificate
  - Test in a test system (European pool of test questions)
  - 67% satisfaction per element
- Summary Certificate

  - Overview of covered elements where the student passed the test, all elements shall be covered
  - Generation of certificate
- Professional Certificate
  - Uploading applied experiences for review by assessors
  - Rating by assessors
  - Observation of 2 years

The certificates show credited elements in comparison to all required.

ANNEX B ECQA COVERAGE OF QUALIFICATION SCHEMAS

MAPPING BASED ON NVQ QUALIFICATION LEVELS

Qualification / training levels: Five levels of qualification / training are defined by European legislation and this structure can be used for comparability of vocational qualifications from the different European countries.

- Level 1: semi-skilled assistant performing simple work
- Level 2: basic employee performing complex routines and standard procedures
- Level 3: skilled professional with responsibility for others and performing independent implementation of procedures
- Level 4: middle management & specialist performing tactical an strategic thinking
- Level 5: professional / university level

In most cases the same job role can be offered on different levels. e.g. IT Security Manager Basic Level (NVQ level 2), IT Security Manager Advanced level (NVQ Level 3), and IT Security Manager Expert Level (NVQ Levels 4 and 5).

MAPPING BASED ON EUROPEAN QUALIFICATION FRAMEWORK (EQF) LEARNING LEVELS

- Six level taxonomy:

Level 0: I never heard of it

1. Knowledge (I can define it):
2. Comprehension (I can explain how it works)
3. Application (I have limited experience using it in simple situations)
4. Analysis (I have extensive experience using it in complex situations)
5. Synthesis (I can adapt it to other uses)
6. Evaluation (I am recognized as an expert by my peers)

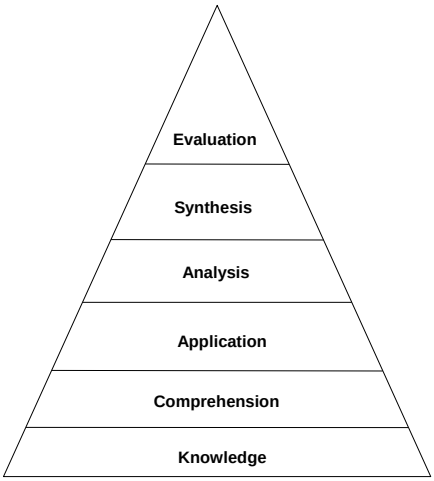

Figure 5 BLOOMS Learning Levels

Level	Knowledge	Example
Level 1	Basic general knowledge	
Level 2	Basic factual knowledge of a field of work or study	
Level 3	Knowledge of facts, principles, processes and general concepts, in a field of work or study	Six Sigma Yellow Belt
Level 4	Factual and theoretical knowledge in broad contexts within a field of work or study	
Level 5	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	
Level 6	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	Six Sigma Green Belt
Level 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 and/or research • Critical awareness of knowledge issues in a field and at the interface between different fields	Six Sigma Black Belt

Level	Knowledge	Example
Level 8	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	Six Sigma Master Black Belt

Figure 6 EQF Learning Levels

MAPPING BASED ON ECTS AND ECVET SCHEMA

ECQA has established a procedure to map ECQA skills sets onto the ECTS (European Credit Transfer System) and the ECVET framework n the European Union.

A job role is assigned ECTS and ECVET points using a defined framework.

ECTS Mapping

Each element of the skills set is assigned hours of lecturing and exercises. These hours determine the ECTS points which are then agreed among a cluster on different universities in Europe.

Level	Knowledge	AQUA	ECTS	Safety Manager	ECTS
Level 1	Basic general knowledge	-		-	
Level 2	Basic factual knowledge of a field of work or study	-		-	
Level 3	Knowledge of facts, principles, processes and general concepts, in a field of work or study				
Level 4	Factual and theoretical knowledge in broad contexts within a field of work or study				
Level 5	Comprehensive, specialized, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge				
Level 6	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	AQUA - Automotive Quality Integrated Skills - presentations / theory	3	AQUA - Automotive Quality Integrated Skills - presentations / theory	3
Level 7	- Highly specialized knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research - Critical awareness of knowledge issues in a field and at the interface between different fields	AQUA - Automotive Quality Integrated Skills - with exercises to apply on nan example (e.g. ESCL)	4	AQUA - Automotive Quality Integrated Skills - with exercises to apply on nan example (e.g. ESCL)	4
Level 8	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	AQUA - Automotive Quality Integrated Skills - implementation in a research at PhD level / with link to a real project	5	AQUA - Automotive Quality Integrated Skills - implementation in a research at PhD level / with link to a real project	5

Figure 7 EQF Example Automotive Quality Engineer and Safety Manager

The 2 job roles illustrated in the picture above have been assigned to ECTS and are taught using the same skills set at industry and also universities.

ECVET Mapping

Also ECQA provides a framework to assign ECVET points onto elements of the skills set. The ECQA guidance recommends to offer the ECQA course (which is offered as a lecture at university) as a short course (2 weeks with exercises) in industry to retrain for a job role in industry. The recommended size is 30 ECVET points in total. The lecturing time and exercise per element determine how many ECVET points ae assigned to an element of the skills set.

Automotive Quality Engineer			
			ECVET L7&8
U1	4	U1.E1: Introduction	2
		U1.E2: Organisational Readiness	2
U2	32	U2.E1 Life Cycle	8
		U2.E2 Requirements	8
		U2.E3 Design	8
		U2.E4 Test and Integration	8
U3	12	U3.E1: Capability	2
		U3.E2: Hazard and Risk Management	8
		U3.E3 Assessment and Audit	2
U4	12	U4.E1: Measurement	6
		U4.E2: Reliability	6
		ECVET Points Total	60

Figure 8 ECVET Mapping example - Automotive Quality Engineer

Functional Safety Manager / Engineer			
			ECVET L7&8
U1	2	U1.E1 International Standards	1
		U1.E2 Product Life Cycle	1
		U1.E3 Terminology	
U2	4	Safety management on organisational	1
		Safety Case Definition	1
		Overview of Required Engineering an	1
		Establish and Maintain Safety Plannin	1
U3	16	System Hazard Analysis and Safety Co	4
		Integrating Safety in System Design &	4
		Integrating Safety in Hardware Design	4
		Integrating Safety in Software Design	4
U4	4	Integration of Reliability in Design to I	2
		Safety in the Production,Operation an	2
U5	4	Legal aspects and Liabilities	2
		Regulatory & Qualification Requireme	2
		ECVET Points Total	30

Figure 9 ECVET Mapping example – Functional Safety Manager / Engineer

ANNEX C ECQA LEGAL BACKGROUND FOR CERTIFICATION

ISO/IEC 17024 STANDARD FOR PERSONNEL CERTIFICATION PROGRAMMES

The ISO/IEC 17024 standard describes standard processes for the examination and certification of people. Some of the basic principles described include:

- Standard exam procedure
- Standard certification procedure
- Identification of persons receiving the certificate
- Independence of examiner and trainer
- Certification system that allows to log the exam to keep a record/proof that the examinee passed the exam
- Mapping of processes towards ISO 17024

ECQA AND ISO/IEC 17024 STANDARD

- ECQA defined standard exam processes
- ECQA defined standard certification processes
- ECQA developed an exam system that generates random exams and corrects exams.
- ECQA developed a certification database to identify persons and map them to exam results
- ECQA established a mapping onto the ISO 17024 norm and published that in form of a self declaration.

LIASION WITH NATIONAL UNIVERSITIES

ECQA established cooperation with national universities who teach job roles with ECTS. The same job roles are offered with ECVET on the market by training bodies.

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