



Automotive Engineer in Tool and Die Production and Maintenance

Job Role Skill Set



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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 Automotive Engineer in Tool and Die Production and Maintenance 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 clearly outlined the set of required courses.

2 ECQA SKILLS DEFINITION MODEL

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

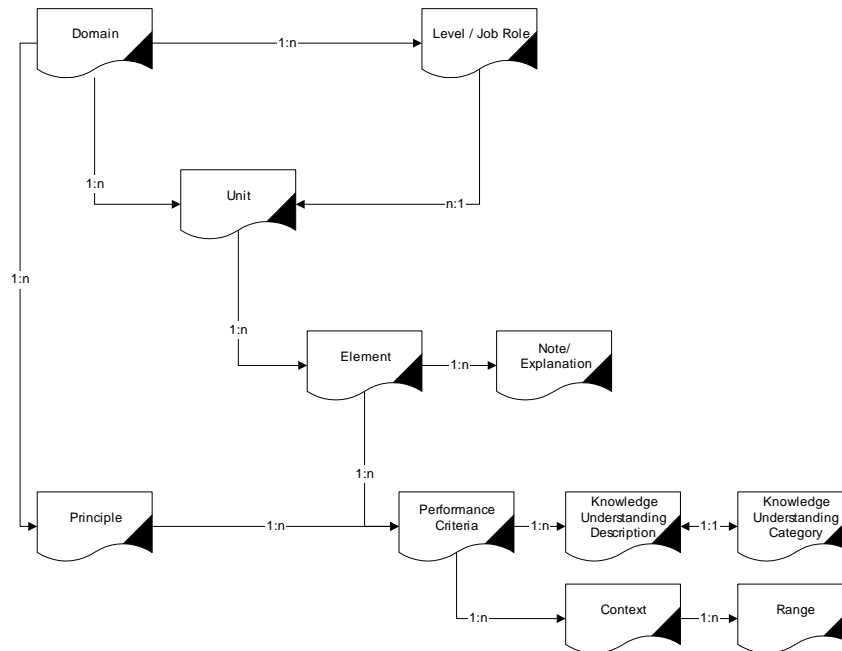


Figure 1: The Skill Definition Model (1:n = one to many relationship)

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 “AUTOMOTIVE ENGINEER IN TOOL AND DIE PRODUCTION AND MAINTENANCE”

3.1 THE SKILLS HIERARCHY

Using the terminology outlined in the skills definition model and including the skills identified during the demand analysis at the beginning of the project, the following skills hierarchy for the job role “Automotive engineer in tool and die production and maintenance” has been designed.

Unit ID	Unit Name	Element ID	Element Name
AETDPM.U1	INTRODUCTION AND THEORY OF THE DIE	AETDPM.U1.E1	Introduction
AETDPM.U2	DESING, PLANNING AND BUDGET	AETDPM.U2.E1	Calculation and dimension of die elements
		AETDPM.U2.E2	Computer Assisted Die Design
		AETDPM.U2.E3	Development and Coordination of projects
AETDPM.U3	TOOL PRODUCTION AND MAITENANCE	AETDPM.U3.E1	Manufacturing of die components
		AETDPM.U3.E2	Automation and Robotics
		AETDPM.U3.E3	Setting Up and Try Out
		AETDPM.U3.E4	Verification and control

Figure 2: The Skills Set for Automotive engineer in tool and die production and maintenance

3.2 THE SKILLS DESCRIPTIONS – JOB ROLE AUTOMOTIVE ENGINEER IN TOOL AND DIE PRODUCTION AND MAINTENANCE

Domain title: Automotive Engineering in Tool and Die Production and Maintenance

Domain Description:

The training project presented here aims to equip students and future workers with the knowledge required to meet the new challenges of Die production and maintenance that in the coming years will play a fundamental role in ensuring the requirements that the new Smart manufacturing requires. In addition, although the European system of education is of superior quality, it is obsolete with respect to the needs of industrial digitalization because it was designed for different industrial needs.

3.3 AETDPM UNIT 1: INTRODUCTION AND THEORY OF THE DIE

Acronym: AETDPM.U1

Title: Foundations for Automotive Sector and Introduction for stamping technology.

Description:

The first training unit introduces the subject of Automotive sector and stamping technology, with a particular focus on issues related to the different stamping process, tool systems and materials for automotive components.

3.3.1 AETDPM Unit U1 - Element 1: Introduction.

Acronym: AETDPM.U1.E1

Element Title: Introduction.

Element Note:

This element gives an overview about the concept of Automotive sector and stamping technology, in every aspect: Manufacturing Processes, Management and Business, Materials for car components and Tool designs.

Performance Criteria:

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

Performance Criterion	Evidence Check: The student can demonstrate
AETDPM.U1.E1.PC1	Knowledge of differences between cold stamping and hot stamping processes.
AETDPM.U1.E1.PC2	Knowledge of different kind of dies, principal characteristics, differences of principal die elements and which kind of work they do in hot stamping and cold stamping tools.
AETDPM.U1.E1.PC3	Knowledge of different kind of presses used in stamping processes, differences between hot and cold stamping presses. Principal influences in tool manufacturing and in try out process.
AETDPM.U1.E1.PC4	Knowledge of importance of quality process systems in stamping process.

Table 1: Performance Criteria for the Element AETDPM.U1.E1

3.4 AETDPM UNIT 2: DESING, PLANNING AND BUDGET

3.4.1 AETDPM Unit 2 – Element 1: Calculation and dimension of die elements

Acronym: AETDPM.U2.E1

Element Title: Calculation and dimension of die elements

Element Note:

This Element gives an overview about calculations for the dimensioning of the die components taking in account the technical data of the DFM and the process.

Performance Criteria:

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

Performance Criterion	Evidence Check: The student can demonstrate
AETDPM.U2.E1.PC1	The student knows how to identify results. Results have been identified and calculated during the process of conformation of sheet metal in the components of the die.
AETDPM.U2.E1.PC2	Knowledge of dimensioning results. The components of the die have been dimensioned in the design applying the different formulas, tables and standards that are used in the die-cutting.
AETDPM.U2.E1.PC3	Knowledge of standard components. The normalized elements have been selected based on the requests for work and the characteristics provided by the manufacturer.

Table 2: Performance Criteria for the Element AETDPM.U2.E1

3.4.2 AETDPM Unit 2 – Element 2: Computer Assisted Die Design

Acronym: AETDPM.U2.E2

Element Title: Computer Assisted Die Design

Element Note:

This element gives an overview about the design of dies and die elements using Computer Aided Design (CAD) software for its subsequent manufacture.

Performance Criteria:

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

Performance Criterion	Evidence Check: The student can demonstrate
AETDPM.U2.E2.PC1	Knowledge of design rules. The rules of 3D graphic representation have been met for the design of dies.
AETDPM.U2.E2.PC2	Knowledge about constructive solutions. A constructive solution of the die has been proposed, justified from the point of view of manufacturing feasibility, profitability and technical specifications.
AETDPM.U2.E2.PC3	Knowledge of material and treatments for die components.

Table 3: Performance Criteria for the Element AETDPM.U2.E2

3.4.3 AETDPM Unit 2 – Element 3: Development and Coordination of projects

Acronym: AETDPM.U2.E3

Element Title: Development and Coordination of projects.

Element Note:

This element gives an overview about the different phases of the automotive projects and how to coordinate projects for die constructions in tool shop.

Performance Criteria:

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

Performance Criterion	Evidence Check: The student can demonstrate
AETDPM.U2.E3.PC1	Knowledge of general phases in automotive sector.
AETDPM.U2.E3.PC2	Knowledge of project scope for die manufacturing.
AETDPM.U2.E3.PC3	Knowledge of design and tool construction homologations in tool shop and customer plant.
AETDPM.U2.E3.PC4	The student knows how to coordinate different projects (tool manufacturing) with customers and suppliers.

Table 4: Performance Criteria for the Element AETDPM.U2.E3.

3.5 AETDPM UNIT 3: TOOL PRODUCTION AND MAINTENANCE

3.5.1 AETDPM Unit 3 – Element 1: Manufacturing of die components

Acronym: AETDPM.U3.E1

Element Title: Manufacturing of die components

Element Note:

This element gives an overview about the manufacturing of die components. Especially, how to prepare and make programs for mechanizing and use the necessary equipment and means for documentation and technical specifications.

Performance Criteria:

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

Performance Criterion	Evidence Check: The student can demonstrate
AETDPM.U3.E1.PC1	Knowledge of programs for die components.
AETDPM.U3.E1.PC2	Knowledge of the assembly of the pieces on the tooling for the machining of die components.
AETDPM.U3.E1.PC3	Knowledge of the different machines preparation for the mechanization of die components.
AETDPM.U3.E1.PC4	Skills for the machining of die components with conventional and CNC (Computer Numerical Control) machines.

Table 5: Performance Criteria for the Element AETDPM.U3.E1

3.5.2 AETDPM Unit 3 – Element 2: Automation and Robotics

Acronym: AETDPM.U3.E2

Element Title: Automation and Robotics

Element Note:

This element gives an overview about the configuration for robotic systems, in every aspect: programming and parameter settings.

Performance Criteria:

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

Performance Criterion	Evidence Check: The student can demonstrate
AETDPM.U3.E2.PC1	The student is able to set up a robotic system / or movement control, and connect the elements that compose it.
AETDPM.U3.E2.PC2	The student knows how to program robots, using different techniques and data processing.
AETDPM.U3.E2.PC3	The student is able to verify operations of robots and control systems, adjusting the control devices and applying safety regulations.

Table 6: Performance Criteria for the Element AETDPM.U3.E2

3.5.3 AETDPM Unit 3 – Element 3: Setting Up and Try Out

Acronym: AETDPM.U3.E3

Element Title: Setting Up and Try Out

Element Note:

During this Element the student will acquire the necessary skills in order to develop the tool and die set up and try out process. This Element will show how to use the manual working tools in a proper and safe manner, how to assemble and disassemble dies and die elements, as well as develop the skills regarding the manual set up process, surface finish and die maintenance, in accordance with health and safety standards.

This Element also explains how to identify any defect caused on the metal sheet after the stamping process, the causes of the defects and the required actions on the die in order to avoid the defects.

Performance Criteria:

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

Performance Criterion	Evidence Check: The student can demonstrate
AETDPM.U3.E3.PC1	The student knows how to use the manual work tools and other equipment in a proper and safe manner.
AETDPM.U3.E3.PC2	The student is able to assemble and disassemble the die elements, setting up the die operating parameters, as well as the hydraulic and pneumatic parameters, according to design specifications.

Performance Criterion	Evidence Check: The student can demonstrate
AETDPM.U3.E3.PC3	The student is able to identify defects after the stamping processes, the causes and solutions to correct those defects.
AETDPM.U3.E3.PC4	The student knows how to operate the press, using different parameters for each kind of die and process.
AETDPM.U3.E3.PC5	The student knows how to develop the set up and try out processes in accordance with health and safety and environmental standards.

Table 7: Performance Criteria for the Element AETDPM.U3.E3

3.5.4 AETDPM Unit 3 – Element 4: Verification and control

Acronym: AETDPM.U3.E4

Element Title: Verification and control

Element Note:

This Element gives an overview about the different quality and metrology essays required for the verification and quality control of a die or the die elements.

The student will learn how to use different kind of equipment in a quality laboratory, as well as develop laboratory tests in order to ensure that the parts produced with a die meet all the technical specifications set by the client and other measuring standards. Analysing the possible defects that appear in the parts that have been produced with a die, the student will be able to establish corrective measures on the die for its resolution.

Performance Criteria:

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

Performance Criterion	Evidence Check: The student can demonstrate
AETDPM.U3.E4.PC1	The student knows how to select and use the appropriate equipment and tests for each application.
AETDPM.U3.E4.PC2	The student is able to verify the shape, dimensions and surface finish of die elements based on the established procedures and quality standards.



Performance Criterion	Evidence Check: The student can demonstrate
AETDPM.U3.E4.PC3	The student is able to verify the die performance with operational tests, analysing the produced parts and establishing corrective measures.
AETDPM.U3.E4.PC4	The student knows how to develop verification and control tests in accordance with health and safety and environmental standards.

Table 8: Performance Criteria for the Element AETDPM.U3.E4

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.

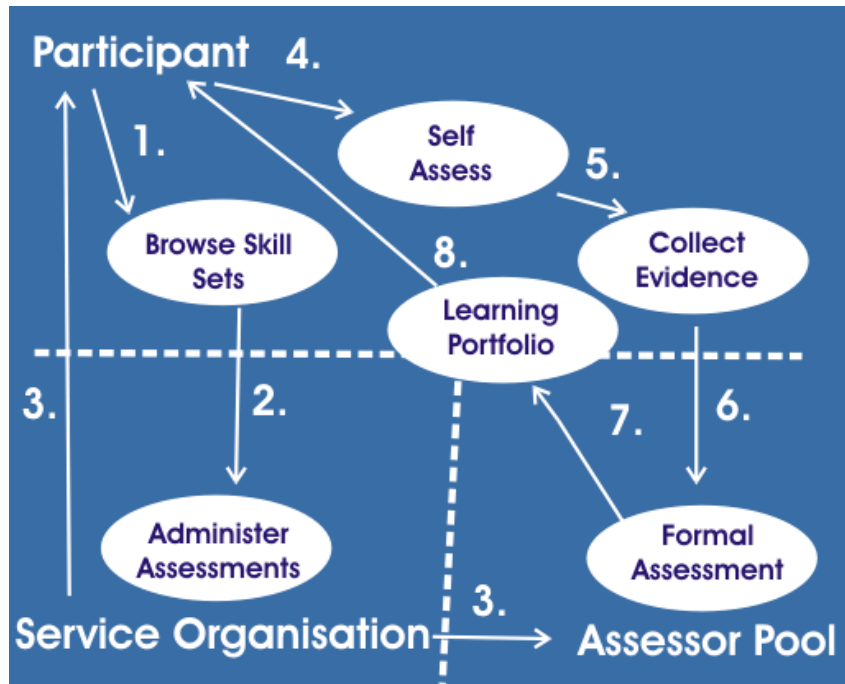
ECQA SKILLS ASSESSMENT MODEL

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.



Picture 1: 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, as 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 and strategic thinking
- Level 5: professional / university level

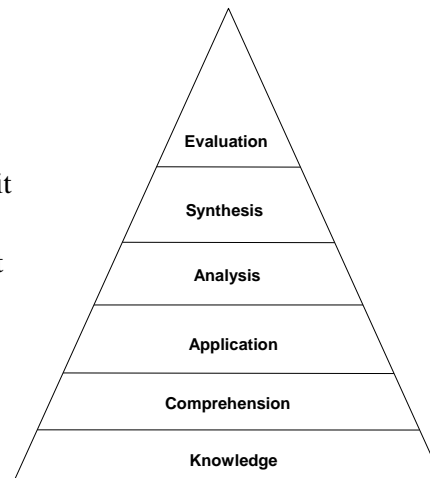
In most cases the same job role can be offered on different levels. e.g. IT Security Manager Basic Level (NVQ level 2), IT Security Manager Advanced level (NVQ Level 3), and IT Security Manager Expert Level (NVQ Levels 4 and 5).

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)



Picture 3: 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	<ul style="list-style-type: none"> • 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

Picture 4 : 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 in 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

Picture 5 : 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 are 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

Picture 6 : 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	2
		Safety in the Production, Operation an	2
U5	4	Legal aspects and Liabilities	2
		Regulatory & Qualification Requireme	2
ECVET Points Total			30

Picture 7 : 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.



ANNEX D REFERENCES

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