

# Sectoral Qualifications Framework for the Automotive Sector (SQF Auto)

# **Sectoral Qualifications Framework for the Automotive Sector (SQF Auto)**

Warsaw 2020

**Editorial Team:**

Katarzyna Lidia Kuklińska, Ph.D. Eng.

Dominika Czajak

Monika Drzymulska-Derda

Małgorzata Osowska

**Polish Language Editor:**

Tomek Orszulak

**English Translation:**

Barbara Przybylska

**Graphic Design and Layout:**

Wojciech Maciejczyk

**Cover Photo:**

© Shutterstock.com

© Copyright by: Instytut Badań Edukacyjnych, Warszawa 2020

ISBN 9978-83-66612-19-8

**Publisher:**

Instytut Badań Edukacyjnych/Educational Research Institute

ul. Górczewska 8

01-180 Warsaw, Poland

tel. +48 22 241 71 00; [www.ibe.edu.pl](http://www.ibe.edu.pl)

This publication is co-financed by the European Social Fund of the European Union through the project: *The inclusion of innovative and socially needed qualifications in the Integrated Qualifications System as well as reducing barriers to the development of the IQS by providing support to its national and regional stakeholders.*

Free copy

# Table of Contents

<b>Introduction .....</b>	<b>5</b>
<b>1. The context of developing the Sectoral Qualifications Framework for the Automotive Sector .....</b>	<b>8</b>
<b>2. Implementation of the SQF Auto project .....</b>	<b>11</b>
2.1. Timetable.....	11
2.2. Team of experts .....	12
2.3. Analysis of competences .....	14
2.4. Developing the initial draft.....	21
2.5. Verifying the initial SQF Auto draft .....	23
2.5.1. Results of verifying the initial SQF Auto draft.....	25
2.6. Analysing correspondence with the PQF .....	30
2.7. Additional verification of SQF Auto .....	30
<b>3. Description of SQF Auto.....</b>	<b>31</b>
3.1. Definition of the sector.....	31
3.2. Structure of SQF Auto .....	32
3.2.1. Sectoral determinants.....	32
3.2.2. Referencing to the Polish Qualifications Framework.....	33
3.2.3. Contexts of SQF Auto .....	34
3.3. Level descriptors .....	36
3.4. Synthetic SQF Auto level descriptors .....	38
3.5. Using SQF Auto .....	41
<b>4.Recommendations on implementing and using SQF Auto in Poland .....</b>	<b>44</b>
4.1. The use of SQF Auto by employers and employees .....	44
4.2. The use of SQF Auto to determine qualification levels.....	48
4.3. The use of SQF Auto to describe a set of competences .....	49
<b>Glossary of Terms.....</b>	<b>51</b>
<b>Bibliography .....</b>	<b>54</b>
<b>ANNEX – The Proposed Sectoral Qualifications Framework for the Automotive Sector .....</b>	<b>57</b>



# Introduction

An essential condition for modern socio-economic development based on knowledge and information is the continuous improvement and adaptation of employees' skills for a dynamically changing labour market. In 2014, 80% of surveyed employers conducting recruitment reported difficulties in finding employees who met their expectations for specific job positions (Kocór, Strzebońska and Dawid-Sawicka, 2015). School and university education is not enough to keep up with the pace of change, which is why supporting the concept of lifelong learning is so important. Its main principles include, among others, an appreciation of learning in various forms and places at every stage of life; the validation of learning outcomes regardless of the way, place and time of their achievement; as well as effective investments in learning and making this a universal endeavour (Council of Ministers, 2013). This is the context in which Poland is implementing the Integrated Qualifications System (IQS), whose functioning is regulated by the Act of 22 December 2015 (Journal of Laws of 2020, item 226), hereinafter referred to as the IQS Act.

One of the main tools of the IQS is the Polish Qualifications Framework (PQF):

*The PQF has eight levels of qualifications, like the European Qualifications Framework. Each PQF level is described by general statements<sup>1</sup> about the learning outcomes required for a given qualification level. In determining a qualification's PQF level, it does not matter whether its required learning outcomes are attained within a structured education system or in another way. PQF level descriptors describe the full range of qualifications' required learning outcomes in the categories of knowledge, skills and social competence. The descriptors of successive PQF levels reflect the increasing requirements in these areas (Chłoń-Dominiczak et al., 2017, p. 4).*

The Integrated Qualifications System makes it possible to collect and systematise the various qualifications that are awarded in Poland. Until now, qualifications had been awarded in different structures, institutions and organisations on the basis of various regulations and laws, so it was difficult to compare them using uniform criteria. The IQS is especially valuable in its ability to now include qualifications operating in the free market, to describe them in the language of learning outcomes and to have them guaranteed by the state (based on the general principles of the inclusion and functioning of qualifications in the system) through the rules on validation<sup>2</sup> and quality assurance. The functioning of the IQS should therefore encourage lifelong learning and facilitate the development of competences in line with a person's own interests or labour market demand.

In accordance with art. 11 of the IQS Act, Polish Qualifications Framework entries can be further developed through the creation of sectoral qualifications frameworks (SQF). The sectoral qualifications framework is defined in the IQS Act as a description of the levels of qualifications functioning in a given sector or industry.

---

<sup>1</sup> Translator's note: known as "descriptors".

<sup>2</sup> Confirming that a person seeking to have a given qualification awarded has attained a distinguished part or all of the learning outcomes required for that qualification, regardless of how they were learned.

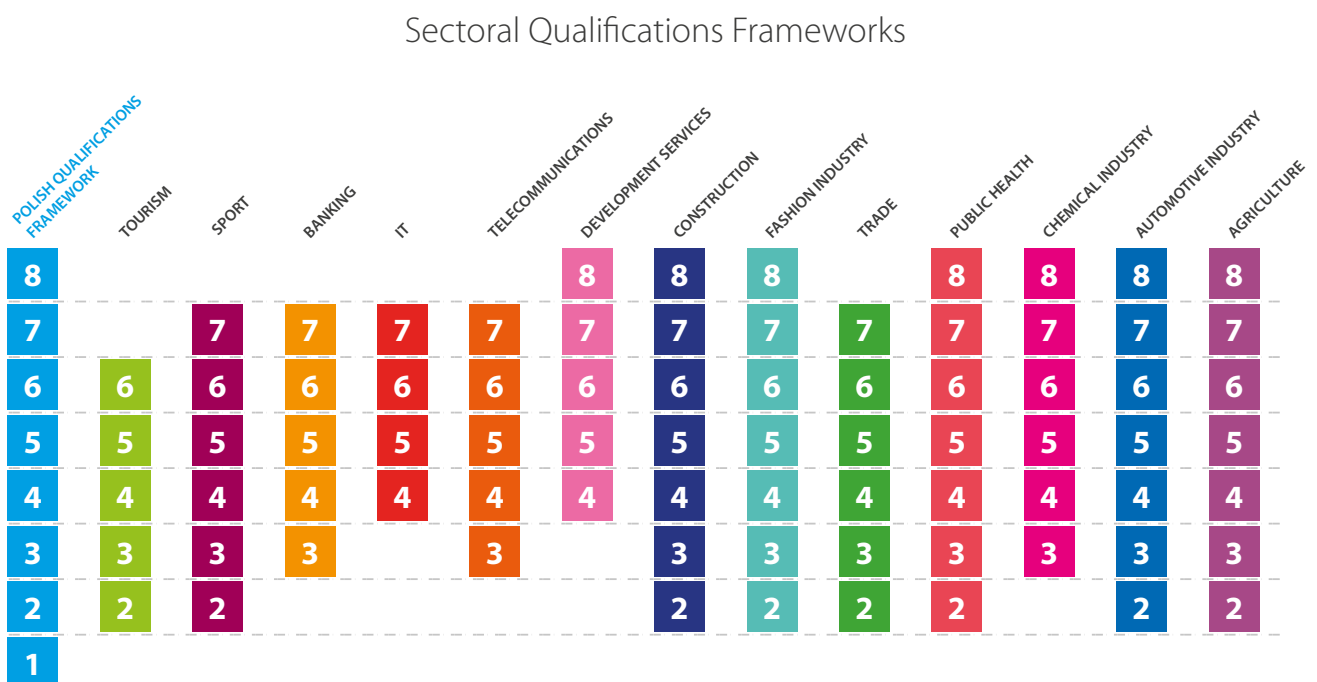
SQFs are developed for those areas of activity when such a need arises. They can further develop both first stage and second stage PQF descriptors.

The main idea adopted in the development of sectoral frameworks is that they are created “by the sector for the sector”. This means that the widest possible range of stakeholders is involved in the process of developing the framework – companies active in a given sector, chambers and industry organisations, representatives of higher education, vocational education and training, as well as regulatory institutions. Developing a framework starts with discussions about the competences and qualifications in the sector and allows for an exchange of information between the sector’s representatives. Industry stakeholders are therefore both the creators as well as the recipients of the solutions of the resulting sectoral framework. A team of experts from the given industry creates a proposed SQF draft, which is then consulted within the sector. One of the more important elements of the work on an SQF is defining the sectoral determinants, which present the competence areas essential in the given sector. This helps in determining the descriptors of specific levels, which (as in the PQF) can be arranged in series.

SQF levels must correspond to specific PQF levels, but their descriptive components should reflect the specificity of the given sector. Theoretically, the SQF could include all the levels of the PQF, but past work indicates that the number of described levels depends on the given sector.

To date, proposed SQFs have been developed for the following sectors: banking, IT, sport, tourism, telecommunications, construction, development services, fashion industry, trade, public health, agriculture, the chemical industry and the automotive sector. The range of these frameworks’ levels is shown in Figure 1.

Figure 1. Levels of Sectoral Qualifications Frameworks.



Sectoral qualifications frameworks are included in the IQS by means of a regulation issued by the minister coordinator of the IQS (the Minister of National Education). The SQF inclusion process is begun by the minister with jurisdiction over the sector, either at his/her initiative or at the request of an interested party. The sectoral frameworks for the sport and tourism sectors were officially included in mid-2017, for the construction industry in July 2019, and for the development services in November 2019. In 2018, the IQS Stakeholders Council also positively assessed the inclusion of the sectoral qualifications framework for banking.

Developing an SQF can bring many benefits. Above all, the framework is the result of dialogue among the representatives of a given industry, allowing them to develop many universal solutions. It also improves the description and inclusion of qualifications in the IQS, as the SQF translates the language of the PQF into the specific language of the industry. The SQF also makes it easier to understand how to relate PQF descriptors to a particular sector, which in turn facilitates the accurate assignment of a PQF level to a specific qualification.

It is worth noting that the concept of developing many sectoral qualifications frameworks and integrating them into the system is unique in Europe. In this way, SQFs may become an attractive way to promote a given sector in the European market.

This publication presents information on the proposed Sectoral Qualifications Framework for the Automotive Sector (SQF Auto). It consists of sections presenting the context of developing SQF Auto, a description of implementing the project and work methodology, structure of the framework, recommendations for implementing and using SQF Auto in Poland, as well as a glossary of terms. Annex 1 presents the SQF Auto level descriptors.



# 1. The context of developing the Sectoral Qualifications Framework for the Automotive Sector

The automotive sector is one of the largest industrial sectors in Poland – it accounted for 11.5% of the value of industrial production in the economy in 2017 (Statistics Poland, 2018, p. 79). In recent years, investment outlays have increased in this industry – in 2017 they amounted to PLN 6.7 billion (13.76% of outlays in the industrial sector) (Polish Automotive Industry Association, 2018, p. 196). This is particularly important in terms of the competences and qualifications sought, and means that suppliers and companies must meet a number of quality criteria required by large international corporations. The inclusion of the automotive sector in quality assurance systems raises specific expectations for personnel, their skills and scope of responsibilities, as the demand and supply of labour in Poland is strongly determined by the situation in the global market.

The consequence of a significant number of investment projects in the automotive industry in recent years has been the systematic increase in employment – despite fluctuations in production value. In 2017, this trend continued – employment increased by 12.8%, reaching 203,000 persons. Higher employment numbers were recorded only in food processing (391,000) and metal product manufacturing (283,000) (Polish Automotive Industry Association, 2018, p. 199). Automotive manufacturers are responsible for a total of 7.4% of jobs in Polish industry. Additionally, over half of the companies from the automotive sector in Poland plan to increase employment (Exact Systems S.A., 2017, p. 5).

Despite the fact that the automotive labour market needs new workers, several barriers exist in relation to employment, the most important of which in Poland is the small number of qualified specialists and the lack of knowledge about new technologies among management staff.

Microenterprises employing up to 9 people make up the largest segment of the automotive industry (77%). However, the key role in terms of contributing to economic performance, generating jobs, personal income and investments is played by companies employing more than 9 people. These are the companies responsible for the major share of industry-generated revenues. According to data published by Statistics Poland (GUS), companies employing over 250 employees generated almost 92% of the sector's revenue (GUS, 2018; KPMG, 2017, p. 14).

In 2017, the automotive industry had over 2,700 entities classified as manufacturers of motor vehicles, automotive parts and accessories, trailers and semi-trailers (PKD 29). Only 8% of them produced vehicles, the remaining companies were active in the area of spare parts (KPMG, 2017, p. 14).

A characteristic feature of the Polish automotive industry is its export orientation, which is strongly correlated with the situation in western European markets.

In 2017, the export of broadly defined automotive products from Poland increased by 8.2% YOY and amounted to EUR 33.1 billion. This represented 16.2% of the value of exported goods from Poland. The largest recipients of automotive exports from Poland are Germany, Italy, Great Britain, and France (Polish Automotive Industry Association, 2018, p. 205).

The traditionally understood automotive sector particularly includes the following categories of the Polish Classification of Economic Activity [*Polska Klasyfikacja Działalności*]:

- C.29 – production of motor vehicles, trailers, semi-trailers, except for motorcycles,
- G.45 – wholesale and retail trade of motor vehicles, repair of motor vehicles,
- other activities relating to the production, trade, distribution and repair of motor vehicles and motorcycles, including the area of electromobility (PKD 27.11, 27.12, 27.20, 27.90 and production of e-buses and electric cars).

Automotive goods are also produced by companies classified in other economic sectors. The largest number of such companies operate in the metal, rubber, plastics and electric machinery industries.

One of the most important phenomena in the automotive sector is the development of electromobility. This area of the industry is characterised by rapid development around the world. In 2017, for the first time ever, sales of electric vehicles exceeded one million (1,200,000 units), of which over 300,000 electric cars were purchased in Europe alone. These figures are projected to grow further and reach 9 million units in 2025 (Association of Automotive Part Distributors and Manufacturers, Frost & Sullivan, 2018, p. 9).

In Poland, 2017 was a breakthrough year, when the record of electric cars sales was broken – their number almost doubled, exceeding one thousand vehicles. Currently, 20 models of fully electric vehicles can be purchased in Poland, and their buyers are mainly fleet and business customers (Polish Association of Alternative Fuels, 2018, p. 6).

In addition, there are cars with hybrid engines powered by gasoline and electric motors, with a large battery capacity to store energy, resulting in high fuel savings. An important feature of hybrid cars is that they do not require services – they do not require charging or manual engine management. The energy needed by the battery is recovered from energy lost during braking and can also be recharged by the petrol engine. Among hybrid cars, Toyota is the best known manufacturer. Other companies that offer hybrids include: Lexus, Kia, Hyundai, Volvo, Porsche, BMW, Mitsubishi, Mini. This list has been changing over the years, which is influenced by legislation, e.g. the Worldwide Harmonised Light Vehicles Test Procedure (WLTP) that has recently appeared. The WLTP procedure is being introduced gradually. It applies to all passenger cars registered as of September 2018, and starting in September 2019, the WLTP rules also began to be applied to light commercial vehicles. Before its entry into force, Mercedes, Volkswagen, Audi and others could also be counted among the manufacturers of hybrid cars.

Today, a growing number of vehicles are being built that use only alternative fuel sources, such as hydrogen. The growing popularity of vehicles with engines running on fuels other than petrol or diesel is influenced by several phenomena:

- exemption from excise duty for electric and hydrogen-powered vehicles, as well as a time-limited exemption from excise duty for plug-in hybrid electric vehicles (PHEVs), i.e. those able to be charged from an external energy source, until 1 January 2021, as stipulated in Article 109a of the Excise Duty Act of 6 December 2008 (Journal of Laws of 2019, item 864, as amended). In addition, more favourable depreciation allowances will apply to electric vehicles compared to traditional ones,
- designation of parking spaces for electric vehicles for the duration of charging at charging points installed in publicly accessible stations,
- introduction of clean transport zones – special areas for vehicles powered by electricity, hydrogen, CNG (compressed natural gas) and LNG (liquefied natural gas) and allowing electric vehicles to use lanes designated for buses until 1 January 2026,
- the significant expansion of vehicle charging infrastructure in coming years,
- exemption from the requirement to obtain a concession for trading in electric energy,
- temporary exemption, until 31 December 2028, from tolls on national roads for zero-emission buses,
- the obligation of state institutions, local governments and treasury companies to purchase electric and plug-in hybrid cars and increase their share in the fleet with each subsequent year to reach 50% by 2025 (Polish Automotive Industry Association, 2018, p. 89).

The diversity of the automotive sector, its continuous development and the emergence of such branches as electric vehicles result in a demand for employees with many new competences, which are worth bringing together and describing with the help of a Sectoral Qualifications Framework for the Automotive Sector. An SQF identifies the key competences for the automotive sector, indicating, through sector-specific determinants, the most important areas of activity. It is a tool for systematising existing competences – i.e. the qualifications awarded in the sector – as well as better adapting them to the needs of employers. SQF Auto is also intended to respond to the current expectations of employers and support the process of designing development programmes responding to labour market needs.

## 2. Implementation of the SQF Auto project

### 2.1. Timetable

**The process of developing the proposed SQF Auto was conducted in stages:**

1. Developing the substantive concept of the proposed SQF Auto,
2. Recruiting and organising the team of experts,
3. Analysing the competences in the sector,
4. Developing the initial draft of SQF Auto,
5. Consulting the initial SQF Auto draft in the sectoral community,
6. Working on the final version of the proposed SQF Auto,
7. Producing the final report.

Throughout the whole project, auxiliary products (draft versions, minutes, attendance lists, presentations for consultation meetings, forms, etc.) were developed as the result of sub-tasks leading to the main products, which were not included in the list because they were working documents. The specific stages of the activities are described in later sections of this publication.

The SQF Auto project was developed under a contract between the Educational Research Institute and a consortium of two companies: Eurokreator T&C Sp. z o.o. and PwC Advisory Sp. z o.o. sp.k.

Work on developing the proposed SQF Auto involved a wide range of people from all over Poland, who were also professionally active during the entire time. Due to the limited duration of the project, work was conducted simultaneously through onsite meetings and online communication.

The initial draft of SQF Auto was verified, i.e. consulted with representatives of the sector as well as with the experts and specialists from the Educational Research Institute overseeing the work on the SQF Auto project. Submitted comments were analysed and served as the basis for making necessary corrections to the preliminary draft. The last stage was preparing the final report, which includes recommendations, user instructions and additional materials. The proposed SQF Auto framework was also translated into English.

During the development of SQF Auto, the Automotive and Electromobility Sector Skills Council was consulted during the development of the draft and after its completion.

The project was also widely promoted in selected media. Articles on SQF Auto were published in auto industry magazines and Internet portals, bringing the

public information on its content and application, as well as the opinions of people knowledgeable about the framework on its use in the automotive industry (e.g. pim.pl – the Polish Automotive Chamber, warsztat.pl) as well as in education (Otwos.pl – Polish National Automotive Knowledge Tournament).

## 2.2. Team of experts

The SQF Auto project was developed by a team of experts with both specialist industry knowledge and knowledge of the Integrated Qualifications System and the Polish Qualifications Framework.

Representatives of industry organisations, employers' organisations, education, higher education and non-formal education institutions were invited to join in the development work. The team of experts included representatives of:

- enterprises (of various sizes) in the automotive sector,
- two sectoral organisations/chambers,
- employers' organisations,
- formal education institutions (higher education institutions, basic and upper secondary vocational schools),
- non-formal education and training institutions.

An additional premise was that expert team members had to fulfil at least five of the following seven criteria:

- participation in developing core curricula for education in professions associated with the automotive sector,
- participation in developing the National Qualifications Framework for Higher Education in a technical science area or working on describing learning outcomes leading to the achievement of competences in such a field,
- participation in developing a qualification (np. certificate, attestation, diploma) for the automotive sector awarded outside the formal general and higher education systems,
- participation in an international project on qualifications or further developing competences in the automotive sector (e.g. as part of a Leonardo da Vinci project implemented in the "Lifelong learning" Programme),
- participation in work on the Polish Qualifications Framework (e.g. in public debate meetings, regional seminars),
- membership in the Automotive and Electromobility Sector Skills Council,

- membership in the Stakeholders Council of the Integrated Qualifications System.

The experts who became members of the team had experience in five of the required areas.

An additional criterion of the candidates for experts was a minimum of 5 years of experience in automotive sector work or on its behalf. This condition had to be met by at least 80% of the experts.

Moreover, a recommendation was requested from the Automotive and Electromobility Sector Skills Council for the inclusion of the proposed candidates in the expert group. The list of experts is presented in Table 1.

**Table 1. List of experts involved in working on the SQF Auto project.**

Lp.	Imię i nazwisko	Podmiot
1.	Anna Szczepblewska	PwC
2.	Krzysztof Świerk	Zespół Szkół Rolniczych w Kaczkach Średnich [Complex of Agricultural Schools in Kaczki Średnie]
3.	Dariusz Walisiak	Hamaton / Tyresure
4.	Rafał Kosiński	Akademia Praktycznych Umiejętności Sp. z o.o. [Academy of Practical Skills]
5.	Artur Gontarz	Lubelskie Samorządowe Centrum Doskonalenia Nauczycieli/ Policealna Szkoła TEB Edukacja Zamość [Centre for the Continuing Education of Teachers of the Lublin Local Government/ TEB Education Post-Secondary School in Zamość]
6.	Artur Kowalski	Centrum Kształcenia Praktycznego w Pleszewie [Centre for Practical Education in Pleszew]
7.	Bożena Oleksy	Rada Sektorowa ds. Kompetencji Motoryzacja z uwzględnieniem Elektromobilności, Polska Izba Motoryzacji [Automotive and Electromobility Sector Skills Council, the Polish Automotive Chamber]
8.	Zbigniew Kopras	Okręgowa Stacja Kontroli Pojazdów w Fiałkowie [District Vehicle Inspection Station in Fiałkowo]
9.	Andrzej Reński	Politechnika Warszawska [Warsaw University of Technology]
10.	Zbigniew Żebrowski	Politechnika Warszawska [Warsaw University of Technology]

11.	Tomasz Mirosław	Politechnika Warszawska [Warsaw University of Technology]
12.	Jan Szlagowski	Politechnika Warszawska [Warsaw University of Technology]
13.	Beata Stępińska	Instytut Transportu Samochodowego [Motor Transport Institute]
14.	Bartosz Mielecki	Polska Grupa Motoryzacyjna [The Polish Automotive Group]
15.	Katarzyna Konarska	Landster
16.	Piotr Sarnecki	Polski Związek Przemysłu Oponiarskiego [Polish Tyre Industry Association]

## 2.3. Analysis of competences

The first stage of work for the team of experts and project implementation team was to analyse the competences in the automotive sector, with the aim of identifying the characteristic competences for this sector. The results of the analysis served as the basis for developing the SQF Auto level descriptors. The analysis was conducted throughout the country in November 2018.

Two methods were used to obtain data. Desk research was conducted for available data and information was obtained from experts and stakeholders through telephone interviews and email correspondence.

The interviews started by providing information on the Integrated Qualifications System (IQS). During each interview, the impact of the Act of 22 December 2015 on the Integrated Qualifications System was discussed. This includes, first, the functioning of the Integrated Qualifications Register portal as of July 15, 2016, as well as the appearance of the Polish Qualifications Framework trademark on certificates/diplomas to indicate their level, which makes it possible to compare them in almost 190 countries. Respondents did not know the PQF very well, so it was difficult for them to see the rationale of designing the SQF. Many times they focused on the details of their work. It was only in further discussions that generally accepted concepts and definitions for describing competences in the industry were developed, and the possibilities were recognised of having a tool that systematises the qualifications awarded in the general and higher education systems, non-formal education (training provided outside of school – among others, certified), as well as regulated and market qualifications. The biggest obstacles were respondents' lack of knowledge about the IQS and difficulties in distinguishing the learning outcomes relating to knowledge, skills and social competence.

The knowledge of experts and stakeholders gained from the interviews was particularly important for defining key processes in particular areas of activity performed by automotive industry employees. It also made it possible to determine the competences assigned to positions that have no direct equivalents in formal education.

The analysis of existing data used information contained in the Integrated Qualifications Register,<sup>3</sup> the Classification of Occupations and Specialities from 2014,<sup>4</sup> the Development Services Register<sup>5</sup> and job advertisement portals. The existing data were used at all stages of the analysis. The multilateral analysis of the examined areas allowed competences to be identified in relation to the knowledge, skills and social competence used in specific job positions.

Opportunities were ensured to consult the developed materials at all stages of the analysis. Comments could be submitted by telephone, e-mail, during on-line seminars and at an onsite seminar held in Warsaw on 15-16 November 2018. The results of this meeting included a preliminary definition of the automotive sector and the identification of key issues, used as the basis for further work. The seminar was attended by: project coordinators representing the consortium leader and partner, representatives of the Educational Research Institute, experts, entrepreneurs and representatives of employers' organisations, persons representing the Automotive and Electromobility Sector Skills Council as well as formal and non-formal education institutions.

The broad range of experts ensured that all branches of the sector were represented and, in the case of entrepreneurs, a distinction was made between small to medium-sized enterprises (SMEs) and large companies. Experts represented: vehicle manufacturers, component and subassembly manufacturers, training companies, validation bodies, industry education, formal university-level education, as well as SMEs, such as diagnostic stations, service and repair companies, authorised car dealers, car service providers, insurance, legal and financial service companies.

**The analysis of competences in the automotive sector included the following stages:**

1. Description of qualifications/competences/occupations,
2. Standardisation of the nomenclature and preparation for further analysis,
3. Development of a catalogue of competences and identification of the contexts in which they are used,
4. Definition of the main areas of activity in the sector,
5. Identification of the key processes for individual areas of activity,
6. Identification of key competences.

<sup>3</sup> <https://rejestr.kwalifikacje.gov.pl/>

<sup>4</sup> <http://www.klasyfikacje.gofin.pl/kzis/6,0.html>

<sup>5</sup> <https://uslugirozwojowe.parp.gov.pl/>



The specific stages are discussed below.

### **1. Description of qualifications/competences/occupations**

The first stage of the analysis was making an inventory of functioning qualifications.

- Full and partial qualifications listed in the Integrated Qualifications Register from PQF levels 2 to 5

The inventory consisted of the following information: name of the qualification, qualification code, number of learning outcome sets, PQF level, awarding body, external evaluation/external quality assurance entity, document certifying possession of the qualification.

- Full qualifications in the Integrated Qualifications Register from PQF levels 6 to 8

The inventory consisted of the following information: name of the field of study, PQF level, number of higher education institutions awarding the qualification.

- Professions having an occupation code from the classification of occupations and specialties needed by the labour market (KZiS)

The inventory consisted of the following information: occupation code and name of the profession.

The professions were chosen from a group of 1000 occupations that are the subject of a project supported by the Operational Programme Knowledge, Education and Development.

### **2. Standardisation of the nomenclature and preparation for further analysis**

The next stage of the analysis was standardising the nomenclature to allow further work to be accomplished. The work began by defining the sector and selecting the qualifications functioning in the automotive industry. For the purpose of this sectoral framework, the following definition of the automotive sector was adopted: all manufacture, repair and trade activities relating to transport equipment, including electromobility and other alternative power sources. The definition of "vehicle" was taken from art. 2 of the Act of 20 June 1997 – the Road Traffic Law (Journal of Laws of 2018, item 1990).

The inventory of functioning qualifications performed earlier allowed us to systematise and supplement the collected material. The standard for describing qualifications resulting from the IQS Act was compared with the structure (template) of information about the profession adopted in the INFODORAD-CA+ Project. The expected competence model includes in the job descriptions the knowledge, skills and social competence required to perform the work of the specific position.

### 3. Development of a catalogue of competences and identification of the contexts of their use

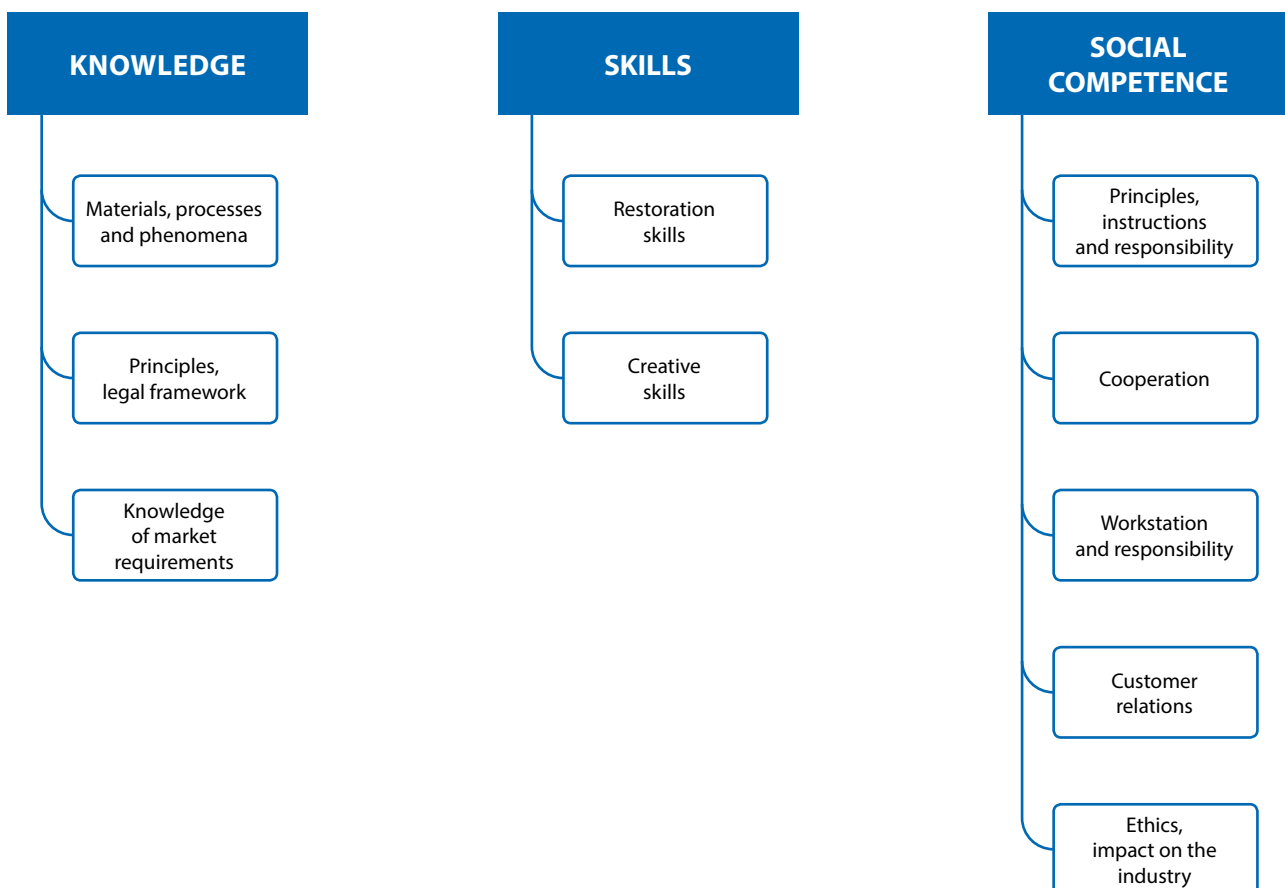
The third stage of the analysis was to develop a catalogue of competences and to define the contexts in which they are used.

In the automotive sector, a lack of consistency was identified in the descriptions of occupations, qualifications and jobs. Moreover, in order to compare learning outcomes at the level of higher education and sectoral/vocational education, basic knowledge of professions is required. It was found that the currently used documents confirming qualifications – diplomas and certificates – do not indicate whether a person is able to perform professional tasks. In addition, when taking into account non-formal education – training participants often do not obtain precise information about what they can do and at what level, even after having completed the course, regardless of whether it is certified or not.

The Integrated Qualifications System, and especially the requirement to assign a given qualification to a PQF level, makes it possible to systematise all qualifications functioning in the market, also outside of Poland.

This has been achieved through SQF Auto, among other things, by defining ten contexts for the activities that are specific to the whole automotive sector, distinguished by the experts working on SQF Auto. These contexts are presented in Figure 2.

Figure 2. The contexts of the use of competences.



#### 4. Definition of the main areas of activity in the sector

The main areas of activity in the automotive sector were defined in reference to all professional tasks relating to motor vehicles and were ultimately divided into three areas: production, sales and services. Several stages relevant to the life cycle of motor vehicles are distinguished, starting with the design of a prototype, related research and other legal procedures, through production, assembly, distribution and trade, maintenance, repair and renovation services and ending with disassembly and recycling. Sub-processes were selected from these stages:

- Production and design – the final result: a motor vehicle,
- Services, repairs and renovation – the final result: a technically efficient motor vehicle,
- Disassembly and recycling – the final result: a dismantled motor vehicle with its elements designated for reuse or disposal.

#### 5. Identification of the key processes for individual areas of activity

The second to last stage of competence analysis was to define key processes for particular areas of activity on the basis of collected data, organised by positions/occupations, professional tasks and competences. The logical sequence of tasks (or sub-processes) significantly impacting the achievement of a specific product/final result was defined as a key process. The most important processes for the automotive industry are: design, production, sales, operation, renovation, disassembly and recycling. The key processes were defined by assigning tasks to them that must be performed to complete a process, understood as obtaining a specific product or partial result.

#### 6. Identification of key competences

The final stage of the competence analysis was the identification of key competences, which was performed on the basis of key work processes in each area of activity. The key tasks were combined with the previously identified competences specific to the automotive industry required to complete a given task. The key work processes therefore influenced the identification of the key competences.

As globalisation continues, the European Union is constantly facing new challenges and each citizen should have a wide range of key competences to adapt easily to a changing world.

The Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning (2006/962/EC) identified eight key competences which are a combination of knowledge, skills and attitudes considered essential for personal fulfilment and development, active citizenship, social inclusion and employment:

- communication in the mother tongue,
- communication in foreign languages,

- mathematical competence and basic competences in science and technology,
- digital competence,
- learning to learn,
- social and civic competences,
- sense of initiative and entrepreneurship,
- cultural awareness and expression.

Key competences are defined as a combination of knowledge, skills and attitudes appropriate to the situation. Furthermore, key competences are those that everyone needs for personal fulfilment and development, active citizenship, social inclusion and employment. The essence of the key competences is that they are universal, they “overlap and interlock: aspects essential to one domain will support competence in another.”<sup>6</sup> They are equally important, and using them facilitates functioning in modern society.

It is recommended that Member States:

- develop opportunities for everyone to attain key competences as part of their lifelong learning strategies, including strategies for achieving universal literacy,
- provide education and training to children and young people in developing key competences to a level that equips them for adult life and provides a foundation for further learning and a professional life,
- enable adults to develop and update their key competences throughout their lives.

For employees in the automotive industry, the ability to properly perform professional tasks and interest in professional development are particularly important. For this reason, they are required to have appropriate key competences. Such competences are presented in the form of profiles shown in Figures 3, 4 and 5, illustrating their importance.

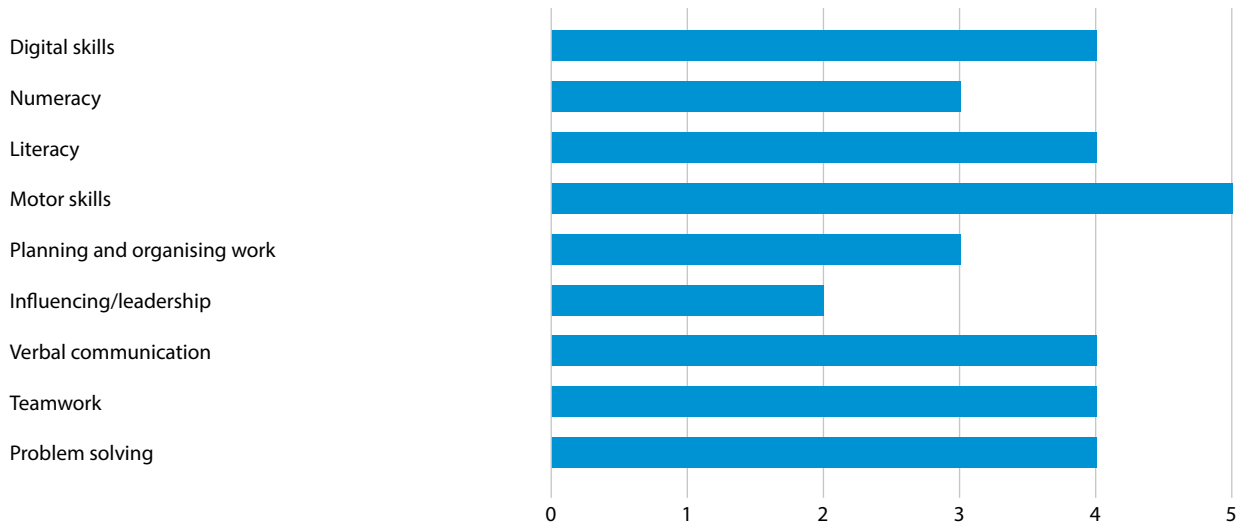
The set of key competences was developed on the basis of the list from the *Programme for the International Assessment of Adult Competencies* (PIAAC) study, coordinated by the Organisation for Economic Co-operation and Development (OECD) (2016).

Depending on the level of the PQF and the set of learning outcomes, the key competences of the profiles take on different levels of importance. Figures 3, 4 and 5 show three examples of key competence configurations for automotive occupations.

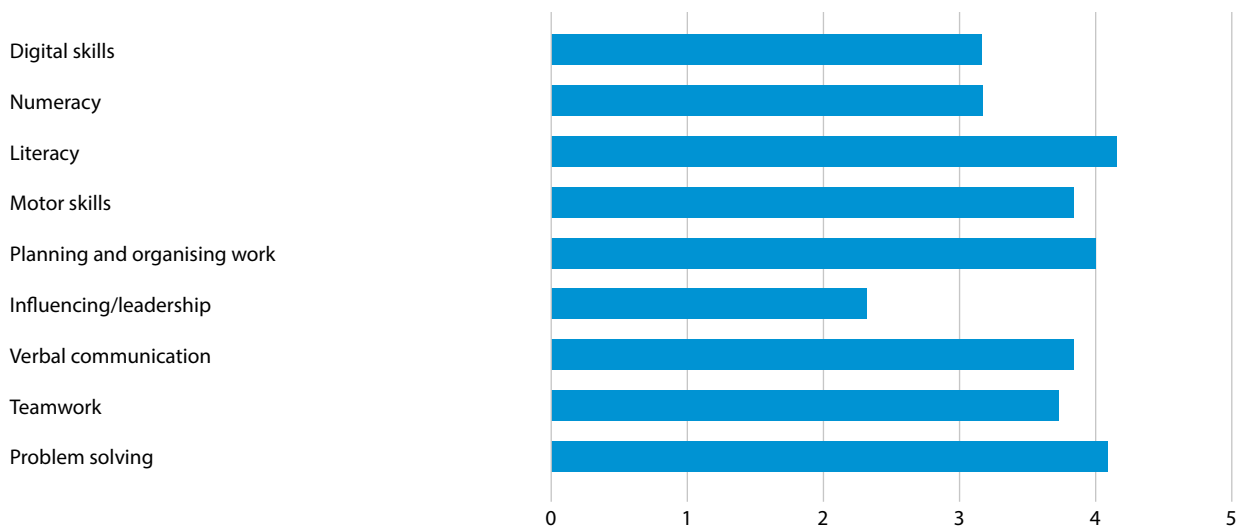
---

<sup>6</sup> Translator's note: Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning (2006/962/EC), L 394/13-14.

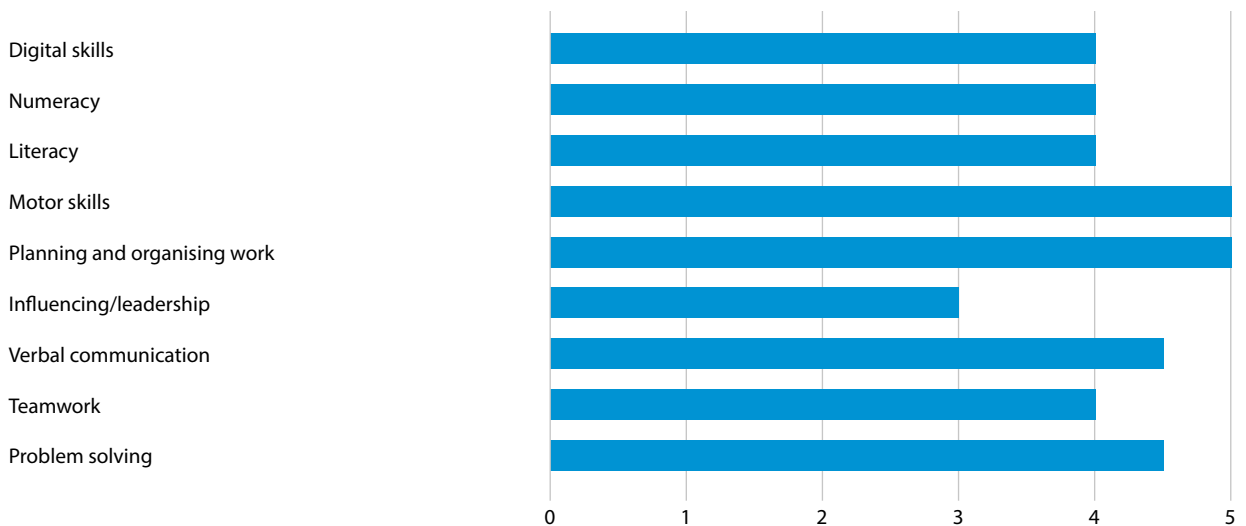
**Figure 3. Profile of key competences for the profession of car mechanic.**



**Figure 4. Profile of key competences for the profession of installer of electric measuring instruments.**



**Figure 5. Profile of key competences for the profession of installer of automotive electronics.**



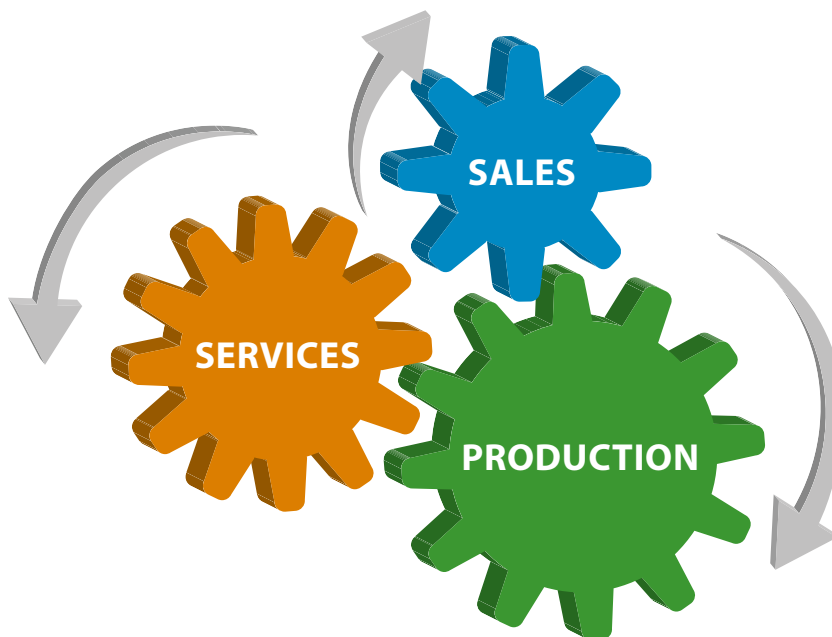
## 2.4. Developing the initial draft

On the basis of the competence analysis, further expert work was conducted, supported by consultations with industry representatives. The results of these activities are the final version of the definition of the automotive sector and its sectoral determinants, which then served as the basis for developing the SQF Auto level descriptors. These descriptors define the requirements of knowledge, skills and social competence adequately responding to the specific characteristics of the automotive sector.

In developing the substantive concept of creating SQF Auto, it was acknowledged that the automotive sector encompasses the following areas (Figure 6):

- 1. Production:** designing motor vehicles; producing components, parts, sub-assemblies; vehicle assembly,
- 2. Sales:** distribution and trade,
- 3. Services:** servicing and repairs, renovation, disassembly, recycling.

Figure 6. Areas of the automotive sector.



Therefore, the previously cited definition of the automotive sector in Poland was adopted:

All activities relating to the production, sales and servicing of motor vehicles used for the transport of people, property and for various specialised functions.

This definition, which has a synthetic nature, was subsequently discussed during the consultation seminars of the SQF Auto project. As a result, the final version was

developed, called the “full definition”, depicting the broader context in which the sector operates. This definition will be discussed in the next section.

It was also agreed that the main processes in the automotive sector (relating to the product life cycle), such as design, production, sales, operation, renovation, disassembly and recycling, are the sector’s determinants for SQF Auto, which is also further elaborated in the next section.

During the work, we observed that there are also three contexts that must be taken into account in constructing SQF Auto:

- mechatronics,
- painting and bodywork,
- diagnostics and repairs.

Their specific scope is presented in the section analysing the structure of SQF Auto.

Based on the collected material, work on describing the level descriptors began. The first step in their development was the process of ordering the identified competences, which was done in the competence analysis stage. Next, the correctness of the description of individual competences was verified, categorised by knowledge, skills and social competence, and then the terms describing the sets of competences were broken down and replaced with individual competences. After this, the phrases describing the competences were generalised so that they could apply to the defined types of professional tasks. A uniform nomenclature relating to the Polish Qualifications Framework was also applied.

At the stage of developing level descriptors, work continued on the precise formulation of individual entries. On many occasions, we verified whether they are sufficiently general to apply to the whole sector, regardless of the specifics of the individual activities within the sector’s branches or, for example, the size of a company. Despite the necessary generalisations, it was important not to deviate too far from the specificity of the sector and to keep the most important aspects in the descriptors.

The individual entries were then grouped into series, i.e. sequences of related statements that differ in the degree of complexity of the described learning outcomes. At this stage, the process of referencing the entries of the proposed SQF Auto to the Polish Qualifications Framework (PQF) began. Each of the distinguished series were placed at the appropriate SQF Auto level, and its complexity was compared with second stage PQF descriptors typical for vocational qualifications. In some cases, additional entries needed to be formulated when the difference between two consecutive entries within a series was too great and exceeded one level.

A glossary of the terms used was made at the same time the SQF Auto level descriptors were being developed. The glossary was needed to unequivocally define the meaning of words that could be interpreted in an intuitive way much more broadly than was adopted for SQF Auto. The result is a glossary of industry terms.

Additionally, a set of terms relating to the methodological nomenclature of qualifications frameworks was produced.

Initial concept development work, as well as the subsequent analysis of competences in the sector and consultations with experts showed that the automotive sector is closely linked to many other sectors: IT, logistics, metallurgy, the chemical industry, environmental protection, transport, energy and the fashion industry. The solutions and products from other sectors are used in production and service processes, especially from the manufacture of electronic, electrical, upholstered, rubber, plastic, chemical, IT, glass and metal products; as well as from the systems ensuring the active and passive safety of other elements/products. Automotive sector job positions combine the competences of persons prepared to perform professional activities within the industry with those outside of it.

Taking into account all the preparatory work conducted, the initial design of the automotive sector's qualifications framework was finally based on levels 2 to 8, with level descriptors developed for the sectoral determinants (design, production, sales, operation, renovation, disassembly and recycling). The proposed framework was consulted for its verification with experts and persons from companies and institutions involved in the industry.

## 2.5. Verifying the initial SQF Auto draft

The preliminary design of SQF Auto was verified, including the definition of the automotive sector and the design and content of the framework itself, i.e. the distinguished sectoral determinants and the completeness and adequacy of the level descriptor entries. It was also checked in terms of the language used – the correctness of the applied specialist terminology and the clarity of individual entries. Surveys and individual interviews were designed and conducted for the verification. A questionnaire survey yielded 72 respondents, 10 individual interviews were conducted twice, and 5 consultation seminars were held with industry representatives.

The aim was to have the respondents represent the entire automotive sector, include different types and sizes of companies, and to have representatives of industry organisations, higher and vocational education, as well as training companies participate in the research. The expert team members developing SQF Auto were involved in the consultation process and supported the individual interviews.

### **The survey questionnaire**

A sample size of 72 SQF Auto project respondents were provided a questionnaire. They represented mainly enterprises, vocational schools, non-formal education institutions, and were also members of the Automotive and Electromobility Sector Skills Council.

The questionnaire consisted of a set of survey questions and socio-demographic data, which characterised the size of the organisation, type of institution, voivodship represented, as well as the respondents' work experience in the automotive sector. The survey consisted of multiple-choice questions using a five-point scale



and fields for entering text. The questions assessed knowledge about the Polish Qualifications Framework, asked for assessments of the definition and scope of SQF Auto, the range of skills, levels and social competence, product life cycle, division of the sector and transparency of qualifications awarded in the automotive sector. The questionnaire contained the description of the sector, definitions, areas of activity and other information that the questions concerned to make it easier for the respondents to complete the survey.

The survey did not limit the length of answers and allowed some questions to be omitted. The use of this type of survey was aimed at facilitating its reception among the respondents. However, most of the questionnaires received were not fully completed, and some of them exhibited a low level of understanding of the subject by the respondents, which meant that the quality of the qualitative part of the survey was somewhat reduced. Respondents' answers are discussed in more detail in the sub-section *Results of verifying the initial SQF Auto draft*.

### **The seminars**

As part of verifying the initial SQF Auto draft, five consultation seminars were conducted, during which the premises of the Integrated Qualifications System (IQS) and Sectoral Qualifications Framework (SQF) were presented. A total of 78 participants attended, representing, among others, industry organisations, universities, non-formal education institutions, employers and the media.

The issues consulted during the seminars concerned:

- determining a coherent definition of the sector,
- designating the sector's areas of activity, its boundaries and key processes,
- making a decision on the final form of SQF Auto (as two prototypes of the SQF project were developed).

The seminars were also attended by experts involved in the work on developing the SQF Auto draft. As a result, they were able to explain the premises of SQF Auto or the genesis of individual solutions on an ongoing basis, as well as to ask additional questions in order to learn participants' opinions on specific topics.

### **Individual interviews**

The purpose of the individual interviews was to consult the preliminary draft of SQF Auto. They were conducted twice: after the respondents became acquainted with the preliminary draft of SQF Auto (stage I) and after its modifications establishing the final form of SQF Auto (stage II). Ten people were interviewed in each round. The information obtained from the respondents during the first stage of individual interviews significantly influenced the final form of SQF Auto.

The research included an analysis of respondents in terms of the represented institutions/organisations, sectors and experience in the automotive industry, as well as of their understanding of the provisions of the Sectoral Qualifications Framework for the

Automotive Sector, PQF definitions, assessment of SQF Auto in the context of the level descriptors, skills, social competence and the transparency of qualifications.

The respondents' comments referred to the links between the automotive sector and the IT and fashion industries. They were aimed at the need to clarify the important relationships between SQF Auto and these sectors.

Differences in the understanding of competences was noted, e.g. levels of competence in team management or the progression of specialist competences, such as disassembling mechatronic devices and systems. The special role of problem-solving or customer-oriented competences were highlighted. The comments also concerned the need to include competences that can be combined, e.g. adhering to rules and ethical standards (compliance).

All comments made by the respondents were forwarded to the experts, who accepted several of them after their analysis. Some of the respondents' reservations was due to their lack of familiarity with the process of developing an SQF, and also resulted from their own professional experience (specific cases), therefore these were not included in the preliminary SQF Auto draft. An example is the observation that there should also be a first level in the framework, but not categorised by the sectoral determinants. This idea was rejected because the PQF describes first level competences at too low a level to allow people to work safely in the conditions prevailing in production plants or service stations.

Selected comments (also the rejected ones) are addressed in the following sub-section.

### 2.5.1. Results of verifying the initial SQF Auto draft

The vast majority of respondents considered the proposed definition of the automotive sector and the SQF Auto entries to be understandable, and also positively acknowledged the proposed division of SQF Auto by its sectoral determinants, determined as the most typical processes in the industry (following the product life cycle of a vehicle).

The level descriptors were assessed as adequate to the needs of the sector and described in accordance with industry terminology, therefore the main premises of the SQF Auto draft were considered fulfilled.

The respondents of the individual interviews, survey questionnaires and seminars made valuable comments indicating the need to modify, supplement or clarify the adopted methodology of developing particular industry entries. Respondents made general statements, as well as ones referring to specific examples, which were treated as particularly valuable.

Some comments concerned the very definition of SQF Auto. Its form was perceived differently by the respondents, therefore some of them, for example, wanted to develop IT-related issues, while others even wanted to limit this subject. The willingness to extend entries on IT was connected with drawing attention to the impact of these technologies on servicing vehicles. However, the framework's developers

considered that this was not necessary because IT is an integral part of the vehicle – all processes relating to production, operation and other technologies are based on it. Digital competence was not specifically named in the definition, but SQF Auto's component entries indicate the required level of knowledge and skills in this area.

Doubts were also raised about the connection of SQF Auto with the fashion industry and it was suggested that the name should be changed to "industrial design". These comments were not taken into account.

One of the ideas was to include vehicle categories, as this is included in the Road Traffic Law of 20 June 1997. This did not meet with broader acceptance, because laws can change and the Act regulates a broad scope of legal issues. The SQF Auto draft focused on competences and arose from the need to describe the required knowledge, skills and social competence in the professional tasks performed in the automotive sector. The dominant contexts were mechatronics, painting and bodywork, services and repairs.

An interesting proposal was to distinguish motor vehicles by how they are powered and not by functionality. However, this proposal was rejected because the functionality of a vehicle is determined to a greater extent by its actual use (e.g. for transporting people, cargo). Vehicles with the same functionality may have different power sources, but this does not determine their functionality.

Aside from issues relating to the definition of the automotive sector, others were also raised, such as opinions on the need to more precisely define particular SQF Auto entries. It was noted that the methods of surface engineering should be described in more detail in the "Knowledge" section, by providing the following information: "Surface engineering methods: fluorescent treatments, CVD<sup>7</sup> and PVD<sup>8</sup> techniques, ion implantation, laser treatments".

It was also noted that a proper progression was lacking for "disassembling mechatronic devices and systems", giving as an example, assigning "Diagnosis and measurement" to level 4. It was argued that in order to perform a diagnosis, the device should first be disassembled, and this should be assigned to level 3, rather than level 5, as initially proposed. The response to this was that diagnosis and measurement relate to programming competences, which are included in the SQF Auto level descriptors, so for this reason, diagnosis may include the skills of correcting an error. On the other hand, the disassembly of devices and systems requires more advanced knowledge about their construction, therefore it was considered that this should be placed at a higher level.

Another reservation was that "Knowledge" and "Design" did not take into account the planned obsolescence of materials. The developers of SQF Auto did not take this into account because they considered that limiting the durability of materials

---

<sup>7</sup> Chemical vapour deposition (CVD) – A surface coating technique based on depositing gaseous phase coating material in which chemical reactions take place. CVD methods are used most often to produce coatings that are hard and resistant to abrasion and corrosion.

<sup>8</sup> Physical vapour deposition (PVD) – Physical deposition of gaseous phase coatings, connected with the development of vacuum technology. Initial PVD techniques were used on an industrial scale for the application of shiny metallic coatings to mirrors and headlight reflectors.

may be based on marketing premises and fault-free cars impact on the functioning and profitability of service and repair companies. For the industry, environmental protection is particularly important and is what sets the development trends.

For SQF Auto, maintaining the norms and standards of quality, environmental protection, occupational health and safety and other industry-specific standards is important. Therefore, any shortcomings in these areas have been taken into account. Existing homologation and environmental requirements or those pertaining to regulated qualifications (such as diagnostician or car appraiser) relate to areas of knowledge, skills and social competence, and are included in the framework in a general way. The level of detail of the qualifications framework's level descriptor entries was established during consultations of the draft.

The automotive sector framework developers agreed with opinions concerning the placement of certain competences in inappropriate processes or the lack of consistency in the information provided about the scope of work at different SQF Auto levels. Changes were made to resolve these problems. In some cases, however, the original division of competences was maintained, as the framework had been developed on the basis of the competence analysis of the automotive sector, which included an inventory of all professions/qualifications functioning in the industry. Key occupations were selected, but this does not mean that only people with formal education work in the industry. However, the scopes of learning or educational outcomes served as the basis for developing the components of the SQF Auto level descriptors.

The next element was the analysis of the recruitment needs of entrepreneurs operating in the industry and confronting their remarks with school and university curricula. The use of SQF Auto by entrepreneurs will be easy and flexible, as they will be able to use the level descriptors to develop job descriptions. The legislators have imposed the next requirement, which is to adapt the entries of SQF Auto to the Polish Qualifications Framework and the European Qualifications Framework. In the case of sectoral frameworks, due to their Polish specificity, the PQF is key in this process.

Distinguishing the nomenclature for describing qualifications applicable in small automotive businesses from that used in large corporations was rejected. This comment was not taken into account because the starting point for users is the job description and scope of responsibilities, and not the size of a company. For the purpose of this project, the scope of responsibilities of comparable positions was analysed, in the contexts of both SMEs and large companies or corporations. The required knowledge and skills vary only slightly depending on the size of the company. These differences, however, result from the ways businesses function, the technologies used and processes taking place.

Framework developers also disagreed with the reservation that the material is incomplete and that descriptors are lacking for some of the determinants, e.g. in "Design" there are no descriptors for levels 2–4, and descriptors are missing at level 8 for all determinants except "Design". During the consultation process, sectoral determinants were developed corresponding to the defined vehicle life cycle. The professions (positions) represented in the automotive sector within a given

determinant were studied by analysing and selecting characteristic professional tasks and assigning them to the determinants, as well as by distinguishing the key competences for the individual sectoral determinants. The key competences were adopted as the basis for developing the SQF Auto level descriptors. At this stage, the categories of “Knowledge”, “Skills” and “Social Competence” relating to the distinguished professional tasks were analysed. The SQF Auto level descriptors take into account the key groups of competences required in the indicated determinants and relating to the most important qualifications awarded in the automotive sector. On this basis, Polish Qualifications Framework levels were chosen in reference to the determinants, establishing such a range of levels for each determinant as seemed most appropriate in the given case.

Level 1 was omitted because the qualifications of an automotive worker at this level are in no way specific to the industry and the general provisions of the Polish Qualifications Framework were deemed sufficient. Framework developers also did not agree with remarks to include level 1 without apportioning its descriptors to the sectoral determinants, as such a solution would contradict the concept of SQF Auto.

One of the rejected suggestions was to emphasise the existence, development and use of documentation and all formalities. It was acknowledged that references to formalities and documentation are not an element of the sectoral framework, but rather refer to the standard of describing qualifications. However, insofar as these elements pertain to vehicles, they have been included in the SQF level descriptors on homologation, sales processes and others.

Those who verified the proposed draft also saw the need to modify the social competence entries of SQF Auto. The first issue suggested supplementing levels 2 to 4 with entries relating to compliance with rules. The second concerned entries on problem solving, which, in the opinion of persons assessing the framework, were placed in several unrelated locations. This comment was accepted. A number of concepts were clarified, like “resolving technical problems”, which was clarified by placing the entries at SQF Auto level 6, while readiness to “act in a manner leading to the resolution of problems” was placed at level 5. “Customer orientation” and “resistance to stress” are considered important and were missing from the framework. The problem analysis showed that these competences are not a distinguishing feature of the automotive industry. The consultations did not indicate that the required level of resistance to stress is greater in the automotive industry than in other sectors. However, “customer orientation” was described in detail in the framework.

The suggestion that “team leadership” should be set at higher levels was not accepted. But the framework developers agreed that the entries in this case refer to the requirements for the position of work crew leader or shift manager, who should have the ability to lead a small team. Nor was combining certain competences accepted, e.g. those relating to compliance with regulations and ethical standards. It was determined that they should remain where placed in “knowledge” (compliance with regulations) and in “social competence” (ethical standards). Another suggestion that was not incorporated concerned providing more detailed occupational descriptions and the requirement of exams in the recruitment process. The response to this was that SQF Auto is not a list of professions, learning outcomes or educational outcomes, and other methods are used to describe professions. Others agreed with

this view, but this did not affect the design of the framework. It was also stated that “updating knowledge” should be added to the determinants “sales” and “operation”. This was taken into account and added to all the determinants.

The need for continuously modifying the framework was recognised due to the ongoing technological changes in the industry, which was agreed to by the framework developers and the reason for the general wording of part of the SQF Auto entries. However, the authors of SQF Auto did not agree with some respondents’ remarks that several entries were not only general, but constituted sets of competences that should be included with separate and more extensively written entries. The level of detail of the SQF level descriptor components was worked out during the consultations with automotive industry representatives. It was assumed that persons interested in issues not directly associated with a given industry, e.g. personnel management, should use the entries of other sectoral frameworks.

SQF Auto was developed in such a way as to enable it to evolve over time and for its entries to be expanded or narrowed, or even deleted as needed.

The verification of the initial SQF Auto draft enabled respondents to provide proposals on the practical use of the framework and its further development. Respondents were asked whether implementing SQF Auto will contribute to developing courses and training programmes that more adequately respond to the needs of industry employers and the labour market; about the possibility of using SQF Auto in professional work and the related guidelines and conditions for this; as well as about the projected directions of further development in relation to potential market changes.

The respondents agreed that implementing SQF Auto will contribute to the creation of courses and training programmes more relevant to the needs of employers in the industry (especially in terms of product or technical training imposed by manufacturers) and will eliminate the problem of the vague assessment of skills and qualifications. The respondents pointed out the possibilities of broadening knowledge and skills and making it easier for employers to compare employees’ qualifications. Their responses contain suggestions relating to the need to introduce detailed and more rigorous examination methods.

All comments were discussed in detail when the study results were prepared. In most cases, they were taken into account by modifying the entries – specifying or supplementing them, eventually adding additional terms to the glossary. The research confirmed the need for precise information on the function of the framework and its relationship to professions, qualifications and curricula. The results of this research are described in more detail in section 4.

Before starting work on the final draft of SQF Auto, it was reviewed once more for:

- the correct assignment of specific entries to SQF Auto levels,
- the correct categorisation of specific descriptors to the appropriate categories of knowledge, skills and social competence,

- the similarity among entries in the categories of knowledge, skills and social competence,
- the extent to which the entries relate to the sector.

## 2.6. Analysing correspondence with the PQF

The last stage of verifying the initial draft of SQF Auto was the analysis of its compatibility with the premises of the Polish Qualifications Framework. This is needed to enable the inclusion of SQF Auto in the Integrated Qualifications System in the future. The compatibility analysis was conducted by referencing each entry of SQF Auto to a corresponding second stage PQF level descriptor typical for vocational qualifications. The process of referencing SQF Auto to the PQF is presented in section 3.2.2.

## 2.7. Additional verification of SQF Auto

The developed SQF Auto draft was additionally verified by the online community (April 2020) and industry expert reports to assess its utility by representatives of educational institutions, companies and industry organisations. As a result, some entries were modified, and also analysed in terms of their compatibility with the PQF.

## 3. Description of SQF Auto

### 3.1. Definition of the sector

A brief definition of the automotive sector in Poland was produced at the stage of conceptualising the substantive development of SQF Auto:

All activities relating to the production, sales and servicing of motor vehicles used for the transport of persons, property and for various specialised functions.

During later work, the final definition was developed, which fully presents the broader context of the sector's operations.

All activities relating to the production, sales and servicing of motor vehicles used for the transport of persons, property and for various specialised functions.

#### **1. Types of activities**

The automotive industry is a type of tangible and intangible production and service activity directly associated with processes of production, sales, operation and other services relating to motor vehicles, buses, motorcycles, semi-trailers and trailers and other means of transport, and includes various power-train systems (internal combustion and low-emission).

#### **2. Areas of activity**

- a. production: designing motor vehicles; producing components, parts, sub-assemblies; assembling vehicles
- b. sales: distribution and trade
- c. services relating to operating a vehicle: servicing and repairs, renovation, disassembly, recycling

#### **3. Development trends**

The automotive sector is one of the fastest growing industries in the Polish and global economy. In their latest solutions, designers are generating vehicles that are autonomous, self-controlled, flying, electromobile, printed, powered by alternative energy sources, using increasingly innovative materials and process technologies.

Identified factors catalysing development in the industry:

- a. the fourth industrial revolution 4.0, i.e. the digital transformation
- b. development of advanced technology and process control
- c. innovative business models
- d. automation, robotisation
- e. real-time use of big data
- f. electrification, automation and integration of vehicles into the Internet
- g. cyber security



**4. Life cycle of a motor vehicle**

- a. design
- b. production
- c. sales
- d. operation
- e. renovation
- f. disassembly and recycling

## 3.2. Structure of SQF Auto

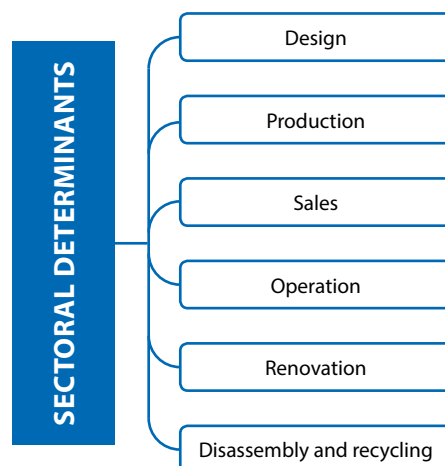
During the development of SQF Auto, several concepts for the design of the qualifications framework emerged. First of all, it was important to take into account the specificity and complexity of the automotive sector, while being quite general and taking into account the rapid development of the industry and its constant changes.

It was considered that even though the sector contains three areas: production, servicing the operation of vehicles and sales services, there should be one common framework organised by the typical categories of “knowledge”, “skills” and “social competence”, rather than three or more sub-frameworks. However, it was decided to further detail these categories by using sectoral determinants, which define the different stages of the vehicle life cycle (these were described in sub-section 2.4.). Within the individual determinants, competence series were used to make it easier to match relevant competences to a given qualification. The entirety is supplemented with a glossary of terms containing the definitions used in developing SQF Auto.

### 3.2.1. Sectoral determinants

The main processes in the automotive sector (relating to the product life cycle) are represented by the SQF Auto sectoral determinants. The selection of determinants describing the automotive industry in an optimal way was based on the analysis of competences for SQF Auto (Figure 7).

**Figure 7. Sectoral determinants.**



Each determinant was precisely described in the consultations.

**Design** – A creative process, a product-related and innovative activity, based on choosing such technical possibilities, as well as defining such interdependencies among them, so that the scheme of measures created in appropriate external conditions provides the possibility of achieving a previously set goal. This also includes augmenting the original state [of something] with certain functions.

**Production** – the material realisation of design, including activities relating to the design of technological processes, the organisation of production processes and the manufacture of a technical object.

**Sales** – the supply of goods and services against payment in the territory of a country, the export of goods and intra-community supply of goods (in accordance with the Act on the Goods and Services Tax of 11 March 2004); the sequence of organisational, technical, legal and financial activities relating to the supply of goods or services against payment.

**Operation** – the sequence of activities, processes and phenomena relating to the human use of a technical object. Four types of activities are distinguished in this process: using, servicing, supplying power and management, of which servicing and repair processes are the ones mainly performed in the automotive industry.

**Renovation** – the set of technical activities and tasks aimed at refurbishing, renewing, and restoring the functionalities of a technical object.

**Disassembly and recycling** – disassembly is the process of dismantling a technical object into assemblies, subassemblies and machinery parts. Recycling is the process of reusing individual parts, subassemblies, assemblies or materials recovered/disassembled from a technical object withdrawn from use.

The sectoral determinants of SQF Auto ensure the consistency and completeness of the Sectoral Qualifications Framework and are an element of systematising competences.

The formulation of the level descriptor components in relation to the sectoral determinants in terms of knowledge and skills ensures the consistency and completeness of SQF Auto. As a result, the sectoral determinants have become another element of SQF Auto, whose task is to facilitate the use of the framework.

### 3.2.2. Referencing to the Polish Qualifications Framework

SQF Auto covers levels 2–8 of the Polish Qualifications Framework and is divided by the determinants discussed above. The individual determinants cover different ranges of level descriptors (Figure 8).

Figure 8. Referencing to the Polish Qualifications Framework.

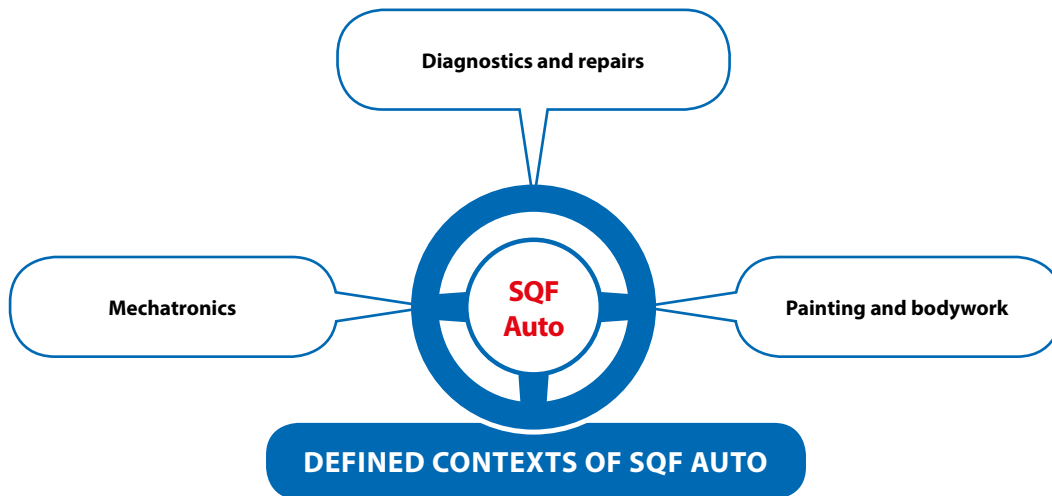
		SQF Levels						
		2	3	4	5	6	7	8
SECTORAL DETERMINANTS	Design				■			
	Production	■						
	Sales	■						
	Operation	■						
	Renovation	■						
	Disassembly and recycling	■						
		2	3	4	5	6	7	8
		PQF Levels						

### 3.2.3. Contexts of SQF Auto

Initially, three main areas of the automotive industry were delineated: production, sales and the services relating to use. From these, the sectoral determinants were identified for the purpose of better characterising the sector's knowledge and skills. The motor vehicle was used as the focus, as it is the key object of this industry. It served as the model to guide our work in ensuring that the increase in knowledge and skills presented in the descriptors is adequate to the complexity of implementing the professional tasks required for specific positions. This increase is indicated by the components of the level descriptors, which change by adding further aspects that build up the complexity of the competences (knowledge, skills and social competence). During this work, we noticed that contexts should also be defined, i.e. types of work characteristic only in the automotive industry. These were determined to be:

- mechatronics,
- painting and bodywork,
- diagnostics and repairs.

Figure 9. Defined contexts of SQF Auto.



- **Mechatronics** – encompasses all the work of diagnosing the technical condition of a mechanical, electrical or electronic component and its adjustment, replacement or repair. Mechatronics includes assembly work consisting of positioning, connecting and mounting parts, subassemblies or assemblies in order to obtain subassemblies, higher-level assemblies or a finished technical object.
- **Painting and bodywork** – encompasses all the work of producing and repairing damaged motor vehicle body parts and covering these parts with protective and decorative coatings. Painting and bodywork includes assembly work consisting of positioning, connecting and mounting parts, subassemblies or assemblies in order to obtain subassemblies, higher-level assemblies or a finished technical object.
- **Diagnostics and repairs** – encompasses all the work of determining the technical condition of an object and maintaining it in serviceable condition, restoring the required functional properties of a technical object by performing inspections, adjustments, cleaning, maintenance, repairs and overhauling. Diagnostics and bodywork includes assembly work consisting of positioning, connecting and mounting parts, subassemblies or assemblies in order to obtain subassemblies, higher-level assemblies or a finished technical object.

The contexts are independent of the determinants and level descriptor components, they are viewed as a whole, which allows the industry to be looked at from different perspectives (Table 2).

**Table 2. Contexts of activity and sectoral determinants.**

Sectoral determinants	Design	Production	Sales	Operation	Renovation	Disassembly and recycling
Knowledge	KNOWS AND UNDERSTANDS in the context of: mechatronics, painting and bodywork, diagnostics and repairs					
Skills	IS ABLE TO in the context of: mechatronics, painting and bodywork, diagnostics and repairs					
Social competence	IS READY TO in the context of: mechatronics, painting and bodywork, diagnostics and repairs					

### 3.3. Level descriptors

The analysis of the essential qualifications of the automotive sector showed that specialist qualifications occur at almost every PQF level, except level 1. The first step in developing the level descriptors was the process of systematising the identified competences at the stage of the competence analysis. Next, the correctness of the description of individual competences was verified, categorised into the knowledge, skills and social competence required for a given level and referenced to the professional activities and operations in the automotive sector. Then, the terms describing sets of competences were replaced with individual competences. The phrases describing the competences were generalised so that they adequately referred to specific types of professional tasks rather than individual ones.

The descriptors for knowledge and skills were grouped by sectoral determinant, i.e. design, production, sales, operation, renovation, disassembly and recycling. Descriptors for social competence were combined so that they are common to all determinants, as they were considered to be universal. In this way, the clearest possible picture of the entire SQF Auto was obtained. Producing social competence descriptors for each sectoral determinant would have resulted in the unnecessary duplication of descriptors as well as in making the size of SQF Auto excessively large. A uniform nomenclature appropriate for the Polish Qualifications Framework was also used. The diagram of the structure of SQF Auto is presented in Figure 10.

Figure 10. Diagram of the structure of SQF Auto.

		SQF Levels						
		2	3	4	5	6	7	8
<b>KNOWLEDGE</b>	Design							
	Production							
	Sales							
	Operation							
	Renovation							
	Disassembly and recycling							
<b>SKILLS</b>	Design							
	Production							
	Sales							
	Operation							
	Renovation							
	Disassembly and recycling							
<b>Social competence</b>								

### 3.4. Synthetic SQF Auto level descriptors

Examples of comprehensive syntheses of knowledge, skills and social competence for specific levels and potential qualifications are presented below.

#### LEVEL 2

1. In terms of **knowledge**, a person knows and understands: basic facts, concepts and relationships in the fields of mechatronics, diagnostics and repairs, painting and bodywork as well as the elementary conditions of performing auxiliary professional tasks in the automotive industry.
1. In terms of **skills**, a person is able to: perform simple auxiliary tasks in accordance with instructions and under supervision, under typical conditions and solve simple, routine problems within the scope of the performed work; understand and formulate simple statements relating to the performance of auxiliary work in mechatronics, diagnostics and repairs, painting and bodywork.
2. In terms of **social competence**, a person is ready to: act in accordance with required principles, instructions and orders to safely perform simple activities, strictly following guidelines and under supervision.

Examples of potential qualifications at SQF Auto level 2: PAINTING ASSISTANT (932907), MECHANICS ASSISTANT (932908) – according to the Classification of Occupations and Specialties for labour market needs (Journal of Laws of 2018 item 227).

#### LEVEL 3

1. In terms of **knowledge**, a person knows and understands: facts, principles, phenomena, processes and general terms relating to professional tasks in the performance of mechatronics, diagnostics and repairs, painting and bodywork; the basic legal regulations in the field of motorisation as well as the elementary conditions for operating a business and entrepreneurship in the automotive sector.
2. In terms of **skills**, a person is able to: perform tasks and solve not very complex problems, select the basic methods, tools and products used to perform one's own professional tasks in mechatronics, diagnostics and repairs, painting and bodywork; perform professional tasks in accordance with general instructions, under partially variable conditions; solve routine problems in assigned/commissioned tasks in mechatronics, diagnostics and repairs, painting and bodywork.
3. In terms of **social competence**, a person is ready to: follow instructions, principles and legal regulations on safety and ergonomics in work processes.

Examples of potential qualifications at SQF Auto level 3: AUTO MECHANIC (723103), AUTO BODY WORKER (721306) – according to the Classification of Occupations and Specialties for labour market needs (Journal of Laws of 2018 item 227).

#### LEVEL 4

1. In terms of **knowledge**, a person knows and understands: the general legal regulations and principles functioning in the automotive industry; the theoretical bases of methods and solutions relevant to the professional tasks performed in the automotive industry within the scope of mechatronics, diagnostics and repairs, painting and bodywork; the principles of organising work safety in the automotive industry; the principles of directing a small team as well as conducting business activities and entrepreneurship in the automotive sector.
2. In terms of **skills**, a person is able to: perform moderately complex professional tasks in mechatronics, diagnostics and repairs, painting and bodywork, often under variable, predictable conditions, by choosing appropriate methods, technologies, tools, products and information; organise one's own work and that of a subordinate team to perform assigned/commissioned tasks in mechatronics, diagnostics and repairs, painting and bodywork; communicate with superiors and co-workers in a manner that ensures the effective functioning of a small team.
3. In terms of **social competence**, a person is ready to: perform one's own tasks, those of the team and take responsibility for this.

Examples of potential qualifications at SQF Auto level 4: MOTOR VEHICLE TECHNICIAN (311513), MECHANICAL TECHNICIAN OF THE OPERATION OF THE MEANS OF TRANSPORT (311506) – according to the Classification of Occupations and Specialties for labour market needs (Journal of Laws of 2018 item 227).

#### LEVEL 5

1. In terms of **knowledge**, a person knows and understands: the legal regulations and principles of the automotive industry, producing documentation, and assuming professional responsibility.
2. In terms of **skills**, a person is able to: coordinate not very complex professional tasks in the automotive industry; manage subordinate employees performing mechatronics, diagnostics and repairs, painting and bodywork; select the methods, technologies, procedures and materials for the performed tasks; maintain documentation of the performed professional tasks; organise and conduct the training process in the automotive company.
3. In terms of **social competence**, a person is ready to: develop principles and instructions for employees; define the limits of responsibility for supervising processes by means of monitoring and recording systems.

Examples of potential qualifications at SQF Auto level 5: DIAGNOSTICIAN AUTHORISED TO PERFORM TECHNICAL TESTS ON MOTOR VEHICLES (311501), MOTOR VEHICLE INSPECTOR (311503) – according to the Classification of Occupations and Specialties for labour market needs (Journal of Laws of 2018 item 227).



## LEVEL 6

1. In terms of **knowledge**, a person knows and understands: the principles and methods of business management in the automotive industry; at an advanced level, the facts, theories, and working methods functioning in the automotive industry and the complex relationships among them; various complex conditions occurring in the professional activities of the automotive industry; the methods of design work in the automotive industry.
2. In terms of **skills**, a person is able to: innovatively perform professional tasks in mechatronics, diagnostics and repairs, painting and bodywork, and solve complex, non-routine problems when performing professional tasks under variable and not fully predictable conditions; design; communicate with the professional community and justify one's position; organise and supervise the work of a team performing specific professional tasks in the automotive industry.
3. In terms of **social competence**, a person is ready to: take responsibility for the activities of large teams and for the results of their work.

Examples of potential qualifications at SQF Auto level 6: SUPPLY, TRANSPORT AND STORAGE ENGINEER (214104), MECHANICAL ENGINEER – MEANS OF TRANSPORT (214406) – according to the Classification of Occupations and Specialties for labour market needs (Journal of Laws of 2018 item 227).

Examples of potential qualifications at SQF Auto level 6: DIPLOMA OF COMPLETION OF CYCLE I STUDIES IN THE FIELD OF MOTORISATION.

## LEVEL 7

1. In terms of **knowledge**, a person knows and understands: the principles of quality and safety management in the automotive industry; the economic and financial aspects of the functioning of the automotive sector; the principles governing the automotive market; the professional relationships with related sectors.
2. In terms of **skills**, a person is able to: autonomously solve complex problems relating to the implementation of professional tasks in the automotive industry; perform a comprehensive analysis of the automotive market; coordinate the work of large teams and complex organisations/enterprises and other legal entities operating in the automotive industry; use the legal regulations contained in legislation, regulations and standards in the performance of tasks; develop principles of professional ethics in the automotive industry.
3. In terms of **social competence**, a person is ready to: shape models of rational and economic resource management.

Examples of potential qualifications at SQF Auto level 7: DIPLOMA OF COMPLETION OF CYCLE II STUDIES IN THE FIELD OF MOTORISATION; DIPLOMA OF COMPLETION OF LONG CYCLE MASTER'S DEGREE STUDIES IN THE FIELD OF MOTORISATION.

**LEVEL 8**

1. In terms of **knowledge**, a person knows and understands: contemporary theories and research on phenomena and processes enabling the use of new products, methods and technologies in the automotive industry; significant achievements in basic and applied sciences influencing the development of innovative solutions used in the automotive industry; the latest organisational solutions.
1. In terms of **skills**, a person is able to: creatively apply scientific and design work methods in the automotive industry; co-create motorisation development strategies; initiate justified changes in legal and organisational solutions as well as generate and supervise the implementation of development programs in the automotive industry; co-create innovations and advanced solutions to improve the performance quality and effectiveness of professional tasks in the automotive industry by using the results of research and development; develop new methods, tools and technologies for the professional activities of the automotive industry.
1. In terms of **social competence**, a person is ready to: shape models of rational and economic resource management.

Examples of potential qualifications at SQF Auto level 8: DOCTORATE DIPLOMA IN TECHNICAL SCIENCES IN THE FIELD OF MOTORISATION.

### 3.5. Using SQF Auto

Codes were introduced to identify specific descriptors to facilitate the use of the Sectoral Qualifications Framework for the Automotive Sector:

- K** – Knowledge
- S** – Skills
- C** – Social competence
- L** – Level (from 2–8)
- A** – Design
- B** – Production
- C** – Sales
- D** – Operation
- E** – Renovation
- F** – Disassembly and recycling

The Sectoral Qualifications Framework for the Automotive Sector can be read in various ways, e.g. comparing the relationships among the descriptors by:

- knowledge, skills and social competence
- levels (2 – 8)
- determinants (A – F)

Each distinguished SQF Auto level (2 to 8) describes the extent and complexity of the learning outcomes for the qualifications assigned to the level. They correspond to PQF levels, but the learning outcomes specific to SQF Auto levels have a descriptive layer (knowledge, skills, social competence) with a much greater degree of detail than the learning outcomes of the PQF level descriptors.

The sectoral determinants cover part or all of the framework's levels, indicating their range. For example, "Design" extends from level 5 to 8, and "Renovation" from 2 to 6. Each level is adapted to the PQF. The entire Sectoral Qualifications Framework for the Automotive Sector covers levels 2 to 8.

The blank spaces found in certain locations of SQF Auto mean that there are no specific sectoral competences required to perform professional tasks at that level.

Reading the sectoral qualifications framework table starts with the sectoral determinants – the production and service processes. Each of the processes is described by means of knowledge, skills and social competence, with the social competence descriptors being the same for all determinants. These are written together, without repeating them for each determinant. The entries in individual cells of a row, i.e. the components of the description for a particular determinant, are juxtaposed with the column of the assumed qualification level. In this way, we obtain a picture of the competences required to perform tasks at a certain level within a specific production or service process (e.g. competences required for renovation at level 3 in terms of knowledge).

To make it easier to navigate through the SQF Auto entries, individual rows of the framework are marked with the text identification code. These symbols facilitate and focus the discussions among automotive company specialists on the needs for and requirements of job candidates, preparing information on the demand for a specific type of job, as well as specifying the competences required when writing a job description and filling a vacancy.

Example descriptions:

**KAL6** – knowledge, determinant A – design, level 6

**SCL7** – skills, determinant C – sales, level 7

**CL5** – social competence, level 5

The Sectoral Qualifications Framework for the Automotive Sector can be used in various ways. Figure 11 presents four possible options.

Figure 11. Ways of using SQF Auto.



## 4. Recommendations on implementing and using SQF Auto in Poland

### 4.1. The use of SQF Auto by employers and employees

Work on the Sectoral Qualifications Framework was motivated by recruitment problems, which are common in the automotive industry. They occur at every stage, starting with recruitment announcements and the way they are formulated. The approach of presenting such information is very variable – from the professional advertisements of large corporations producing or assembling cars, through the advertisements of small, one-person companies in free websites. The basic problem is how employers formulate the requirements and expectations of future industry employees.

Many people working in the automotive industry lack formal training in the field, and are driven solely by their passion and professional experience. However, according to data from recruitment companies, employees who are professionally trained and educated in the field are increasingly being sought by owners, entrepreneurs and companies.

The Sectoral Qualifications Framework (SQF) and the Integrated Qualifications System (IQS) can help address staff shortages as well as problems with the appropriate and effective recruitment of employees.

In terms of developing better tailored courses and training programmes to meet the needs of automotive industry employers, the SQF Auto project identified three important aspects that could be addressed after the framework is introduced in the sector:

- the elimination of unclear assessments of skills and qualifications,
- targeting gaps in the system, by providing information on the level of a person's deficiencies; this will allow changes to be made in employee education and training,
- establishing a basis for augmenting employees' professional development through systematic training within a company/institution, which will complement the basic knowledge gained in a sectoral vocational school.

Tools such as the IQS and SQF make it possible for employers to know exactly the type of people who are needed and make it easier to determine whether a candidate meets the requirements. Moreover, if there are no candidates, it will be easy to retrain people who have outdated or obsolete skills.

The second issue in which the Sectoral Qualifications Framework proves very useful is in the various ways employees can attain and confirm qualifications.

Based on the SQF Auto project study results, it was concluded that implementation of the project will contribute to establishing more adequate education

and training programmes for the automotive sector's labour market needs, and thus create greater opportunities for employee development.

Currently, investments of time and money in various types of courses providing qualifications in automotive fields that would be useful in the labour market have not been successful. Many of these qualifications are not valued by the employer. The main problems noted include inadequate adaptation to the requirements of current workstations, low level of transferred knowledge and the inability to determine the educational outcomes resulting from the lack of standards accepted by the entire automotive sector.

The Sectoral Qualifications Framework allows education to be organised and planned. Persons who choose a specific course will be confident that they will gain relevant and useful skills for the chosen field. Moreover, the courses will be placed at a specific level and will be able to be compared with others or presented when eventually changing jobs.

The labour market is looking for qualified workers with professional competence, professionals in the sector and persons with professional experience. Additionally, social competences, also known as "soft skills", are becoming increasingly indispensable. Having "social intelligence" is recommended, as this facilitates analysing situations and enables the use of appropriate communication techniques. Interpersonal skills are no longer a sufficient asset.

In an era of rapid changes, the main asset of a company has become human capital, which now determines the competitive advantage in the market and directly affects the quality and development of the organisation. The research conducted in the field of human capital development takes into account various forms, places and paths of education. The results of these studies confirm and encourage participation in the process of lifelong learning (Council of Ministers, 2013).

The model of working in a profession learned in school, in one place throughout one's life is no longer a reality. Employees are increasingly more often faced not only with the need, but rather the requirement to change professions. This means that qualifications and professional and social competence must be constantly attained and improved.

Making the aforementioned changes in the automotive industry is possible thanks to the existence of a Sectoral Qualifications Framework adapted to this sector. SQF Auto is a tool that will make it possible and easier for people to quickly change and retrain, depending on the developments taking place.

The research conducted in the SQF Auto project showed that the creation of new professions is understood as expanding existing professions with currently unknown skills and competences. The development of the automotive sector is seen through the prism of creating new occupations, especially in the field of production, design and operation. An important issue is to fill the existing gaps in administrative activities, based on the Road Traffic Act.

A systematic diagnosis of the demand for competences and qualifications in the industry will allow the automotive sector to adequately adapt its requirements of the potential employees being sought in the labour market. Mismatches of employees' skills and employers' needs is a significant problem, thus the existence of a standard for describing market qualifications sought from people in the labour market can help address these problems.

The benefits associated with establishing a Sectoral Qualifications Framework for the Automotive Sector will have a European dimension, as the industry is strongly linked to multinational corporations having a decisive influence on its development. Thus, the development of SQF Auto should have a very large impact on the skills of the industry's employees in the context of better and faster adaptation to market needs and for employers looking for employees.

**The use of SQF Auto by the industry community will especially impact:**

- developing descriptions of full and partial qualifications for formal and non-formal education and informal learning,
- formulating learning outcomes and combining them into sets to describe professional and market skills,
- assigning levels to specific learning/educational outcomes and sets of learning outcomes in vocational education, known as learning outcome units,
- developing learning outcomes or sets of learning outcomes to be shared with other sectors or professional areas (e.g. manufacturing upholstered car seats – most of the learning outcomes will be in the furniture sector; installation of digital devices – most of the learning outcomes will be based on digital skills),
- developing learning outcomes or sets of learning outcomes that will form the basis for learning in a sector or for a group of occupations, in a given sectoral determinant at a given level,
- developing education as well as continuing education programmes for students as well as teachers,
- developing training programmes providing participants with up-to-date and marketable skills and qualifications,
- diagnosing the scope of existing qualifications and the need to further develop or retire them,
- developing procedures for confirming and certifying qualifications that are being attained or have been attained, with particular emphasis on different forms of education at different times and places,
- developing tools for confirming qualifications in the sector,

- identifying and bridging the gap between education and the labour market,
- developing qualification maps in individual areas of the sector showing the links between qualifications as well as the progression of requirements and opportunities for credit accumulation and transfer. This makes career development easier, more effective and flexible. In addition, such maps will be an important element when careers need to be changed and for further development in the sector (e.g. from jobs involving numerous business trips to stationary work, etc.),
- improving the ability of broadly understood counsellors supporting clients (including guidance counsellors) to promote skills audits, career planning and development path choices and to document learning outcomes for different needs, including through an eventual validation process,
- organising the sector in the context of identifying qualifications, occupations, job positions, professional profiles, etc.

Various possibilities for using SQF Auto by respondents' organisations were expressed during the research:

- to prepare job descriptions, detailed and precise scopes of responsibility and authorisations, as well as market qualifications,
- to enable employers to compare workers' qualifications,
- to increase the prestige of the company by improving qualifications,
- to develop recruitment tests,
- to provide training, offering opportunities to improve knowledge and skills, especially for people with skills gaps,
- to certify improved skills,
- to enable people with high qualifications to work in appropriate job positions,
- to enable employees to know which level they represent,
- to increase the level of vehicle restoration,
- to create opportunities to impart professional knowledge,
- to develop new professional fields, e.g. motorcycle mechanic, antique vehicle mechanic-renovator (tinsmith), galvanizer.

The responses indicate that the theoretical premises correspond to the practical expectations of automotive industry employers and employees.



Automotive industry representatives also defined the principles and conditions of using SQF Auto:

- education should be the main target of activities, as the sectoral framework for the automotive sector is still a little known topic,
- all activities should be conducted in accordance with detailed procedural rules,
- the acceptance of competences from another sector should be determined by the specificity of the job position (e.g. the social competence described for another sector may be important for people in sales),
- job descriptions should be very detailed,
- examinations should be conducted in the recruitment process, both in theoretical and practical form; they should be of a high standard, similar to journeyman's examinations, which are supported by counselling and assistance in Austria, the Netherlands, the Czech Republic and Germany (countries with advanced levels of vocational education),
- new scientific materials should be developed and build on materials from other countries.

## 4.2. The use of SQF Auto to determine qualification levels

The Sectoral Qualifications Framework for the Automotive Sector is the further development of the Polish Qualifications Framework level descriptors using language specific to the sector. Thus it reflects market practices and is understandable to entities functioning in the automotive industry. As a result, it is a friendly and easy-to-use tool for determining the level of the market qualifications described and included in the IQS.

Assigning a level to a qualification is based on comparing the learning outcomes required for a qualification with the SQF Auto level descriptors. This comparison is conducted separately for each learning outcome, referring individual learning outcomes to the relevant SQF Auto level descriptor. The adopted structure of SQF Auto that takes into account determinants and contexts allows the appropriate components of the level descriptors to be quickly found. Figure 12 presents a diagram of comparing learning outcomes with the SQF Auto level descriptors.

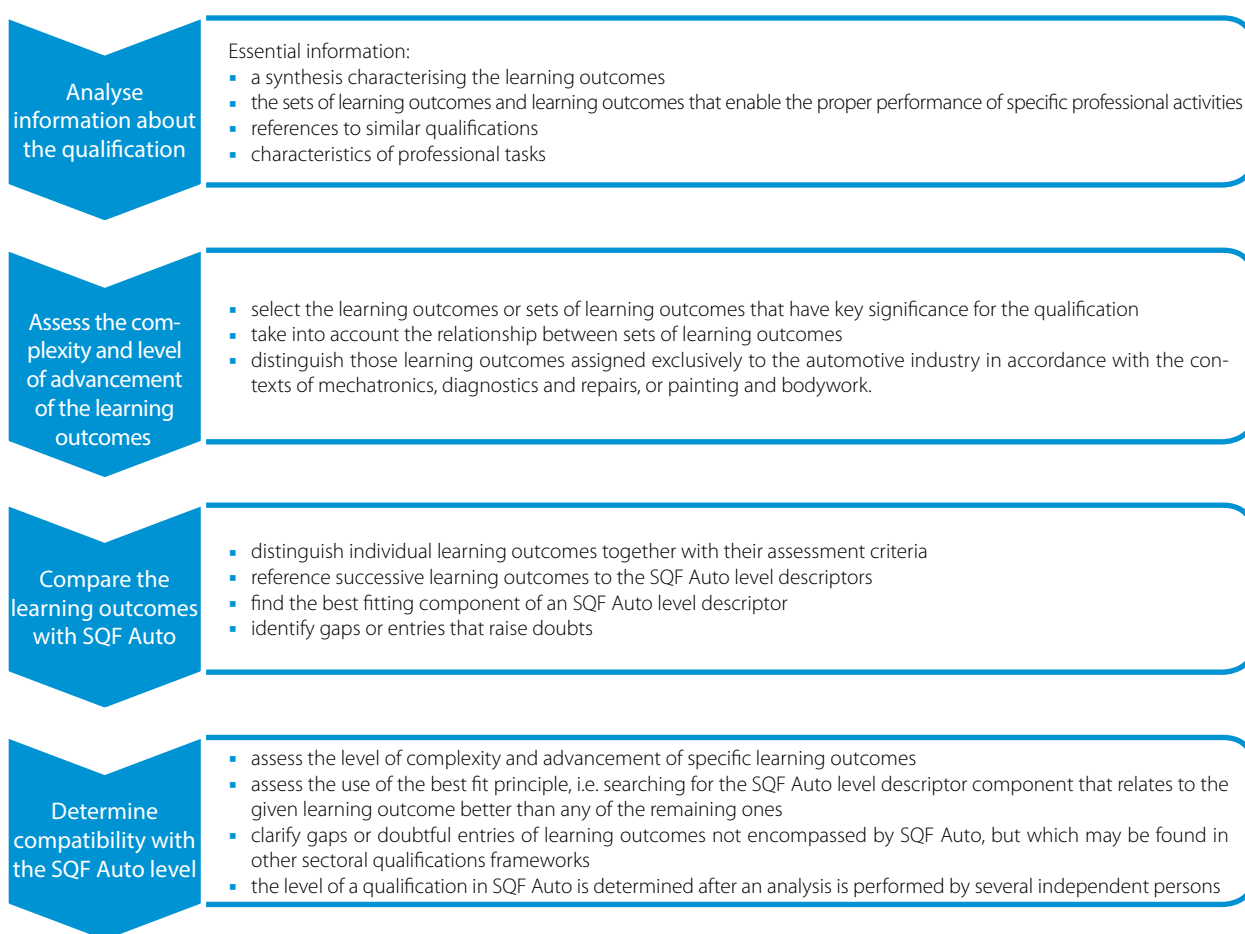
It should be noted that the learning outcomes required for a qualification do not necessarily have to reflect the full description of the level in question, nor do they have to cover all the entries within an area or determinant. The qualification may refer to only several entries of the SQF Auto level descriptors.

SQF Auto contains only those entries relating to sector-specific competences, which does not mean that these are the only ones used in the sector.

Competences that are not specific to the automotive industry include those relating to the use of IT, management or sales as well as research skills. The learning outcomes of such competences may appear in qualifications described in the sector. These learning outcomes should be compared with the descriptors of other sectoral frameworks (appropriate for the given type of activity) or the descriptors of the Polish Qualifications Framework.

Individual learning outcomes can be referenced to various levels, but when determining the level of the whole qualification, particular consideration is given to the levels of the key learning outcomes for the given qualification.

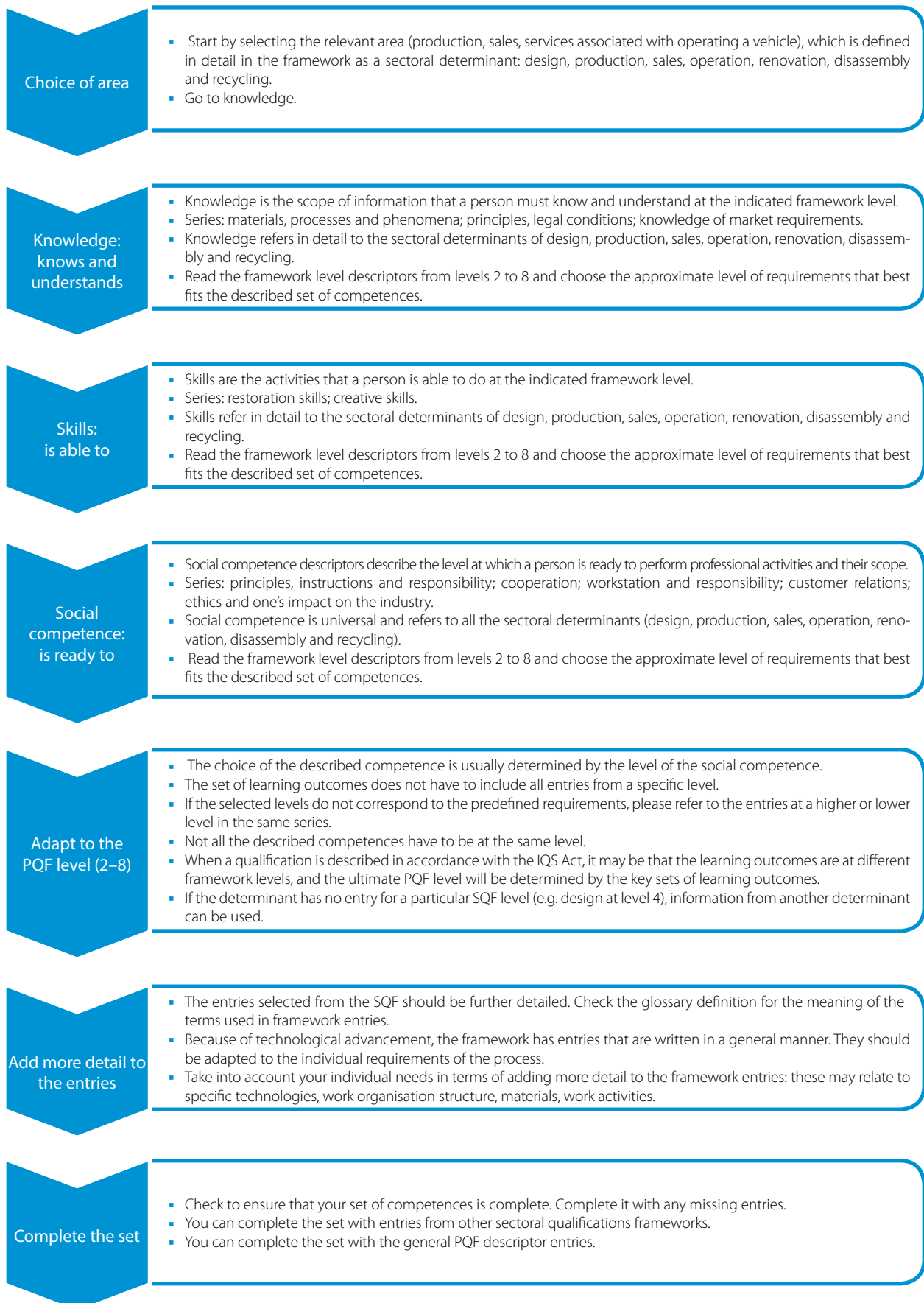
**Figure 12. Diagram of assigning SQF levels.**



### 4.3. The use of SQF Auto to describe a set of competences

SQF Auto is a tool to develop sets of competences that can be the basis for developing a description of a qualification, job description or training programme. The construction of SQF Auto allows for a very simple and intuitive way of selecting the required competences for a set. The whole process of describing sets of competences with SQF Auto takes place in a few simple steps, which are described in Figure 13.

Figure 13. Diagram of developing sets of competences using SQF Auto.



## Glossary of Terms

<b>ALTERNATIVE POWER SOURCES</b>	Type of motor vehicle power source using products as engine fuel other than those based on petroleum (petrol, diesel): electricity, LPG (liquefied natural gas), CNG (compressed natural gas), hydrogen, biofuels.
<b>ASSEMBLY</b>	All the work in the areas of mechatronics, painting and bodywork, diagnostics and repairs based on positioning, connecting and mounting parts, subassemblies or assemblies in order to obtain subassemblies, higher-level assemblies or a finished technical object.
<b>AUTONOMOUS VEHICLE</b>	A computer-controlled motor vehicle that can move on the road, detect, avoid and circumvent obstacles without human intervention. It is fully automated, equipped with technologies allowing the system to perform all the functions of driving without human intervention.
<b>DESIGN</b>	<p>One of the SQF Auto sectoral determinants.</p> <p>A creative process, a product-related and innovative activity, based on choosing such technical possibilities, as well as defining such interdependencies among them, so that the scheme of measures created in appropriate external conditions provides the possibility of achieving a previously set goal. This also includes augmenting the original state [of something] with certain functions.</p> <p>The purpose of design is to develop a planned model of a technical object (vehicle, its assemblies, components, parts, etc.) or an outline of the technological and operational process of this object. Design is a process that requires extensive knowledge, contacts and experience, as well as forecasting ability.</p>
<b>DIAGNOSTICS AND REPAIRS</b>	<p>One of the SQF Auto contexts.</p> <p>All the work performed to: determine the technical condition of the object, maintain the technical object in usable condition, restore the required functional properties of the technical object by performing inspections, adjustments, cleaning, maintenance, repairs and renovations.</p>
<b>DISASSEMBLY AND RECYCLING</b>	<p>One of the SQF Auto sectoral determinants.</p> <ul style="list-style-type: none"> <li>▪ disassembly – activities performed to dismantle a motor vehicle to obtain individual assemblies, subassemblies and parts.</li> <li>▪ recycling – the process of reusing specific parts, subassemblies, assemblies or materials obtained/dismantled from a motor vehicle withdrawn from service.</li> </ul>
<b>DISTRIBUTION</b>	This is the direct sale in the primary market of motor vehicles from production plants or through authorised dealers in sales networks.
<b>DUAL EDUCATION</b>	The dual education system is based on learning taking place simultaneously in formal education (school, higher education institution) and informal practical learning.

<b>INTERNAL COMBUSTION ENGINE</b>	Type of motor vehicle power source using an internal combustion engine, where petroleum products (petrol, diesel) are used as the fuel.
<b>MATERIALS</b>	Raw materials in the form of primary/raw or partly processed (semi-finished) products used in production, servicing, maintenance, renovation or repairs.
<b>MECHATRONICS</b>	One of the SQF Auto contexts. All of the work based on diagnosing the technical condition of a mechanical, electrical or electronic component and its adjustment or replacement.
<b>MOTOR VEHICLE</b>	Means of transportation intended for use on roads as well as machines or devices adapted for this purpose.
<b>MOTORCYCLE</b>	A two-wheeled motor vehicle, a two-wheeled motor vehicle with a side car, or a motor vehicle with three symmetrically positioned wheels.
<b>OPERATION</b>	One of the SQF Auto sectoral determinants. A sequence of activities, processes and phenomena relating to the human use of a technical object. There are four types of activities in operation: using, servicing, supplying power and management. The main processes are servicing and repairs.
<b>PAINTING AND BODYWORK</b>	One of the SQF Auto contexts. All the work encompassing the production and repair of elements of damaged motor vehicle body parts and covering these elements with protective and decorative coatings.
<b>PASSENGER CAR</b>	Motor vehicles intended for the transport of not more than 9 persons (including the driver) and their luggage.
<b>PRINCIPLES, LEGAL FRAMEWORK</b>	An individual packet/set of documents ensuing from legal acts, the operating instructions for machines and equipment, the company's workstation requirements as well as the individual regulations of the work place and other documents.
<b>PRODUCTION</b>	One of the SQF Auto sectoral determinants. One of the three areas of the automotive sector. Production includes product and technology design activities; manufacture of parts, sub-assemblies, components; assembly activities and all other intangible process activities in this area. This is an essential part of the operation of a company, and includes economic and technical activities as well as the process of manufacturing a technical object (a vehicle, its assemblies, components, parts, etc.). It is the material realization of design, includes activities relating to the design of technological processes, the organisation of production processes and the manufacture of a technical object.

<b>PRODUCTION PROCESS</b>	All the activities aimed at transforming parts, subassemblies and components into a finished product. It includes the technological process and auxiliary processes (quality control, safety, logistics).
<b>RENOVATION</b>	One of the SQF Auto sectoral determinants. A set of technical activities and tasks aimed at refurbishing, renewing, and restoring the functionalities of a technical object.
<b>SALES</b>	One of the SQF Auto sectoral determinants. Sales is the supply of goods and services against payment in the territory of a country, the export of goods and intra-community supply of goods (according to the Act of 11 March 2004 on the Goods and Services Tax). Sales encompasses a sequence of organisational, technical, legal and financial activities relating to the supply of goods or services against payment. One of the three areas of the automotive sector. Sales was distinguished on the basis of classifying the business entities in the industry with a predominant sales function: distribution and trade.
<b>SELF-PROPELLED VEHICLE</b>	A vehicle that moves by its own power source, used for specialist work, e.g. in building roads and bridges.
<b>SEMI-TRAILER</b>	A trailer that partially rests on the motor vehicle, thereby adding to its load.
<b>SERVICES</b>	One of the main areas of the automotive sector. Services were distinguished based on the process of classifying the business entities in the industry with a predominant service function in the operation and recycling of motor vehicles, financial and sales-related services.
<b>SPECIAL PURPOSE VEHICLE</b>	Vehicles or trailers designed to perform special functions that require adaptations to the body or the addition of special equipment. Such vehicles may transport persons and goods relating to the performance of these functions.
<b>TRADE</b>	The aftermarket of motor vehicles and parts.
<b>TRAILER</b>	Vehicles without motors with adaptations enabling them to be connected to other vehicles.
<b>WORKSTATION</b>	Part of the technological process of working on a specific element of the product or on the product itself in a particular location performed by one employee or group of employees.

## Bibliography

Bednarczyk, H., Woźniak, I., Kwiatkowski, S. M. (red.). (2007). *Krajowe standardy kwalifikacji zawodowych. Rozwój i współpraca*. Pobrano z [https://archiwum.mpips.gov.pl/gfx/mpips/userfiles/File/rynek%20pracy%20proramy/standardy/Ksiazka\\_KSKZ\\_Rozwoj%20i%20wspolpraca.pdf](https://archiwum.mpips.gov.pl/gfx/mpips/userfiles/File/rynek%20pracy%20proramy/standardy/Ksiazka_KSKZ_Rozwoj%20i%20wspolpraca.pdf)

Budziewski, M. (2019). *Sektorowa Rama Kwalifikacji to bardzo ważny dokument* [Plik dźwiękowy]. Pobrano z <http://pim.pl/sektorowa-rama-kwalifikacji-to-bardzo-wazny-dokument/>

Chłoń-Domińczak, A., Sławiński, S., Kraśniewski, A., Chmielecka, E. (2017). *The Polish Qualifications Framework*. Warszawa: Instytut Badań Edukacyjnych.

Czajak, D. (2019). *Sektorowe Ramy Kwalifikacji jako jeden z elementów Zintegrowanego Systemu Kwalifikacji*. Pobrano 18 marca 2019 z [http://radasektorowa-motoryzacja.pl/wp-content/uploads/2019/04/SQF\\_ZSK\\_podst\\_info\\_sektor-moto.pdf](http://radasektorowa-motoryzacja.pl/wp-content/uploads/2019/04/SQF_ZSK_podst_info_sektor-moto.pdf)

Departament Rynku Pracy MRPiPS (2014). *Rozwijanie zbioru krajowych standardów kompetencji zawodowych wymaganych przez pracodawców (Projekt B2.2)*. Pobrano z <http://psz.praca.gov.pl/-/176380-rozwijanie-zbioru-krajowych-standardow-kompetencji-zawodowych-wymaganych-przez-pracodawcow-projekt-b2-2->

Dobrowolski, R. (2019). *Rama kwalifikacji – kolejny przejaw biurokracji czy narzędzie porządkujące?* Pobrano z <https://warsztat.pl/dzial/18-warto-wiedziec/artykuly/rama-kwalifikacji-kolejny-przejaw-biurokracji-czy-,68744/2>

Doradca Consultants Ltd., Instytut Technologii Eksploatacji – Państwowy Instytut Badawczy z Radomia, Instytut Pracy i Spraw Socjalnych z Warszawy, Centralny Instytut Ochrony Pracy – Państwowy Instytut Badawczy z Warszawy, Agencja badawcza PBS z Sopotu. *Aktualności. W: INFOdoradca+. Rozwijanie, uzupełnianie i aktualizacja informacji o zawodach oraz jej upowszechnianie za pomocą nowoczesnych narzędzi komunikacji*. Pobrano z <http://www.infodoradca.edu.pl/news.php>

Doradca Consultants Ltd., Instytut Technologii Eksploatacji – Państwowy Instytut Badawczy z Radomia, Instytut Pracy i Spraw Socjalnych z Warszawy, Centralny Instytut Ochrony Pracy – Państwowy Instytut Badawczy z Warszawy, Agencja badawcza PBS z Sopotu. *Opis projektu. W: (bda.). INFOdoradca+. Rozwijanie, uzupełnianie i aktualizacja informacji o zawodach oraz jej upowszechnianie za pomocą nowoczesnych narzędzi komunikacji*. Pobrano z <http://www.infodoradca.edu.pl/opis.php>

Exact Systems S.A. (2017). *MotoBarometr 2017. Nastroje w automotive. Polska, Czechy, Niemcy, Rosja, Rumunia, Słowacja*. Pobrano z <https://motobarometr.pl/wp-content/uploads/2018/10/MotoBarometr2017.pdf>

Frost & Sullivan (2018). *Barometr Branży Części Motoryzacyjnych w Polsce. Badanie przeprowadzone przez SDCM i Frost & Sullivan*. Pobrano z [https://old.motofocus.pl/media/file/2018/pdf/Barometr\\_SDCM\\_F&S%20\(1\).pdf](https://old.motofocus.pl/media/file/2018/pdf/Barometr_SDCM_F&S%20(1).pdf)

Główny Urząd Statystyczny (2018). *Rocznik Statystyczny Przemysłu*. Pobrano z [https://stat.gov.pl/files/gfx/portalinformacyjny/pl/defaultaktualnosci/5515/5/11/1/rocznik\\_statystyczny\\_przemyslu\\_2017.pdf](https://stat.gov.pl/files/gfx/portalinformacyjny/pl/defaultaktualnosci/5515/5/11/1/rocznik_statystyczny_przemyslu_2017.pdf)

Gmaj, I., Grzeszczak, J., Leyk, A., Pierwieniecka, R., Tauber, M., Walicka, S. (2017). *Zagraniczne systemy walidacji. Przegląd rozwiązań*. Warszawa: Instytut Badań Edukacyjnych.

Instytut Badań Edukacyjnych (2018). *Badanie PIAAC*. Pobrano z <http://eduentuzjasci.pl/ude/110-badanie/194-miedzynarodowe-badanie-kompetencji-osob-doroslych-piaac.html>

Kocór, M., Strzebońska, A., Dawid-Sawicka, M. (2015). *Rynek pracy widziany oczami pracodawców*. Warszawa: PARP.

Komisja Europejska (2018). *Poznaj ESCO*. Pobrano z <https://ec.europa.eu/esco/portal/home?resetLanguage=true&newLanguage=pl>

KPMG, Polski Związek Przemysłu Motoryzacyjnego (2017). *Stan branży motoryzacyjnej oraz jej rola w polskiej gospodarce. Raport KPMG w Polsce z inicjatywy Polskiego Związku Przemysłu Motoryzacyjnego*. Pobrano z [https://pzpm.org.pl/\\_\\_sk/\\_\\_sk\\_files.php?d=1506523216vqrfjrhubkwfumdnyidmcuvqpigjispislykricycdjzjdmnqI&u=1113](https://pzpm.org.pl/__sk/__sk_files.php?d=1506523216vqrfjrhubkwfumdnyidmcuvqpigjispislykricycdjzjdmnqI&u=1113)

Kuklińska, K. L. (2019). *Zintegrowany System Kwalifikacji na targach Motor Show. Ogólnopolski Turniej Wiedzy Samochodowej*. Pobrano z <http://www.otws.pl/a,68641,zintegrowany-system-kwalifikacji-na-targach-motor-show.html#>

Marszałek, A., Ziółkowski, R., Zespół ds. Sektora Publicznego PwC Polska Sp. z o.o. (2017). *Podstawowe procedury w realizacji zadań ministrów odpowiedzialnych za kwalifikacje w Zintegrowanym Systemie Kwalifikacji*. Warszawa: Instytut Badań Edukacyjnych.

Organisation for Economic Co-operation and Development (2016). *The Survey of Adult Skills (PIAAC)*. Pobrano z <https://www.oecd.org/skills/piaac/about/>

Polski Związek Przemysłu Motoryzacyjnego (2018). *Branża motoryzacyjna. Raport kwartalny PZPM i KPMG*. Pobrano z <https://home.kpmg/pl/pl/home/insights/2018/01/raport-kwartalny-kpmg-w-polsce-i-pzpm-branza-motoryzacyjna-edycja-q1-2018.html>

Rada Ministrów (2013). *Perspektywa uczenia się przez całe życie*. Załącznik do uchwały Nr 160/2013 Rady Ministrów z dnia 10 września 2013 r.

Seminarium o SQF Auto, czyli rozmawiamy o kwalifikacjach zawodowych (2019) z <https://warsztat.pl/artykuly/seminarium-o-sqf-moto-czyli-rozmawiamy-o-kwalifika,68391>

Sławiński, S. (2017). *Przegląd kwalifikacji uregulowanych*. Warszawa: Instytut Badań Edukacyjnych.



Sławiński, S. (2017). *Mała Encyklopedia Zintegrowanego Systemu Kwalifikacji*. Warszawa: Instytut Badań Edukacyjnych.

Sławiński, S. (2016). *Słownik Zintegrowanego Systemu Kwalifikacji*. Warszawa: Instytut Badań Edukacyjnych.

Sławiński, S., Królik, K., Stęchły, W. (2017). *Włączanie kwalifikacji do Zintegrowanego Systemu Kwalifikacji*. Warszawa: Instytut Badań Edukacyjnych.

Stowarzyszenie Dystrybutorów i Producentów Części Motoryzacyjnych, Frost & Sullivan. (2018). *Barometr Branży Części Motoryzacyjnych w Polsce. Badanie przeprowadzone przez SDCM i Frost & Sullivan*. Pobrano z [https://old.motofocus.pl/media/file/2018/pdf/Barometr\\_SDCM\\_F&S%20\(1\).pdf](https://old.motofocus.pl/media/file/2018/pdf/Barometr_SDCM_F&S%20(1).pdf)

Symela, K., Woźniak, I. (2018). *Podręcznik. Jak tworzyć informacje o zawodach funkcjonujących na rynku pracy?* Warszawa: Instytut Badań Edukacyjnych.

**ANNEX**  
**The Proposed Sectoral Qualifications Framework  
for the Automotive Sector**

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>KNOWS AND UNDERSTANDS:</b>							
<b>in design (A)</b>				The structure of metals and alloys, their physical (mechanical) properties and the methods of strengthening them.	Various structures and properties of surface coatings.		
				The mechanical properties of structural materials, ceramic materials, polymers, composites and smart materials.	The various principles of shaping the properties of structural and functional materials using the surface engineering techniques of the automotive industry.	The principles of using the newest innovative materials that have not yet been used in designed vehicles.	
				The parameters defining the variable waveforms in the electrical and electronic systems of vehicles.	Advanced surface engineering methods, i.e. fluorescent treatment, CVD and PVD processes, ion implantation, laser treatment, and others.		
				The principles of fluid mechanics and thermodynamics.	Complex techniques that take into account the processes of thermal and detonation spraying as well as the chemical and electrochemical deposition of coatings.		
				The principles of technical mechanics and automation.	Advanced principles of continuum mechanics.		
				The principles of using alternative power sources and trends in the area of low-emission and autonomous vehicles.	The vibroacoustic processes taking place in mechanical systems.	The principles of vibration and noise propagation in construction, types of sources, and the mutual interactions of various energy forms.	
				The principles of the functioning of machine and vehicle powertrains using mechanical, electrical, hydraulic and pneumatic systems.		In depth, the passive and active methods to minimise vibrations and noise and the development trends in this area.	
				The principles of designing vehicle parts, subassemblies and assemblies.			
				The principles of vibration theory.			
				The legal regulations on the technical standards and requirements of vehicle design.		Practical guidelines on technology transfer in the automotive industry.	
				The principles of operating the means of transport in compliance with existing regulations.		Phenomena relating to the automation and robotisation of production processes in the automotive industry.	
				The principles of the safety, control and operation of vehicles			
				Market requirements and trends relating to the vehicles being designed and services being offered.	Trends in vehicle design.		The development of the principles of research methodology and the principles of organising research processes in the automotive industry.

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>KNOWS AND UNDERSTANDS:</b>							
<b>in design (A)</b>				The principles of using the newest product and service solutions in the vehicles being designed.	The standards of calculating the costs of vehicle production.		
					The principles of developing software to support advanced computer-aided 3D modelling.		The development of the principles of operating software to support advanced computer-aided 3D modelling.
						The principles of developing and integrating software (algorithms) enabling communication between vehicles and external systems (e.g. autonomy, safety, navigation).	The development of the principles of integrating software (algorithms) enabling communication between vehicles and external systems (e.g. autonomy, safety, navigation).
						The principles of developing and integrating software (algorithms) controlling the mechanical and electronic sub-assemblies of vehicles.	The development of the principles of developing and integrating software (algorithms) controlling the mechanical and electronic sub-assemblies of vehicles.
<b>in production (B)</b>	The basic properties of metals and plastics used to perform professional activities.	The basic properties of metals and plastics used to perform tasks in vehicle production.		The structure of metals and alloys as well as their physical (mechanical) properties and the methods of strengthening them.	The various structures and properties of surface coatings for vehicles.	The principles of using structural materials with hyper-deformable properties in vehicle production.	
		The basic properties of structural materials and consumables used to perform tasks in vehicle production.		The mechanical properties of structural materials, ceramic materials, polymers, composites and smart materials.	Various principles of shaping the structural and functional properties of materials using the surface engineering techniques of the automotive industry.	The principles of using the latest innovative materials that have not yet been applied in vehicle production.	
		The basic properties of the materials used and products manufactured in the automotive sector.	The properties of the materials used and vehicles produced and their parts.	The parameters characterising the variable waveforms of the electrical and electronic systems of vehicles.			
		The physical parameters of the direct and alternating current used in vehicle construction.	The phenomena relating to the use of direct and alternating current in the electrical and electronic components of vehicles.	The principles of fluid mechanics and thermodynamics.			
			The concepts of electrotechnology and electronics.	The principles of technical mechanics and automation.			
	The most basic techniques and methods of producing parts, machinery and equipment.	The basic techniques and methods of producing parts, machinery and equipment.	The techniques and methods of producing parts, machinery and equipment in the automotive industry.	The basic theoretical methods and technologies used in vehicle production.			
	The most basic principles of using vehicle parts, subassemblies and assemblies.	The basic principles of using vehicle parts, subassemblies and assemblies to perform production tasks.	The general principles of using vehicle parts, subassemblies and assemblies to perform production tasks.	The principles of using the newest materials in vehicle production.	Advanced methods of surface engineering, i.e.: fluorescent, CVD and PVD processes, ion implantation, laser processing, etc.	Modern integrated manufacturing components, their role and application in computer integrated manufacturing (CIM) in vehicle production.	
	The principles of using simple tools for manual and machine machining to perform professional activities.	The principles of using tools for manual and machine machining to perform not very complex production tasks.	The processes of wear in vehicle bodies and chassis.	The principles of vehicle production.	Complex techniques including thermal and detonation spraying, chemical and electrochemical processes of coating production.	Modern production models and tasks performed in integrated vehicle manufacturing.	

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>KNOWS AND UNDERSTANDS:</b>							
<b>in production (B)</b>	The basic processes of performing auxiliary work relating to the assembly, servicing, disassembly, cleaning, repair and maintenance of simple subassemblies, assemblies, parts of simple machinery and equipment that are disconnected from the power source.	The processes of performing work relating to the assembly, servicing, disassembly, cleaning, repair and maintenance of simple subassemblies, assemblies, parts of simple machinery and equipment that are disconnected from the power source.			At an advanced level, the basics of analysing stress and systems for the numerical analysis of mechanical systems.		
		Basic principles of the functioning of powertrain types in the scope of performing not very complex tasks in vehicle production.		The principles of the functioning of machine and vehicle powertrains using mechanical, electrical, hydraulic and pneumatic systems.			
		The principles of operating and using tools, machines and equipment for manual and machine machining.	The principles of the functioning of electrical and electronic components and systems used in vehicles.	The principles of using alternative power sources and the trends in low emission and autonomous vehicles.			
		The principles of using measurement instruments in not very complex tasks of vehicle production.					
		Vehicle construction and the basic principles of vehicle operation.	The principles of the operation of powertrain types				
		The operating principles of vehicle construction.					
		The principles of using parts of machinery and equipment in vehicles.					
		The basic principles of tolerance and fit in vehicle construction.					
		The basic functions of electrical components and systems in vehicles.					
		The principles of using electrical and electronic components and systems in vehicles.					
	The principles and procedures of occupational health and safety, ergonomics, environmental protection and fire prevention in the scope of performed activities in vehicle production.	The principles of the procedures and standards of occupational health and safety, ergonomics, environmental protection and fire prevention in the scope of performed tasks in vehicle production.		The principles of the safety, control and operation of vehicles.			
		The principles of conducting the quality control of vehicle production.		The quality assurance principles in the production of parts, assemblies, components and vehicles.			
		Homologation requirements.		The principles of complying with technical standards and the requirements of the regulations in force on production in the automotive industry.			

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>KNOWS AND UNDERSTANDS:</b>							
<b>in production (B)</b>				The legal regulations on the technical standards and requirements of vehicle production.			
				The principles of operating the means of transport in compliance with existing regulations.			
						Computer-aided methods for solving problems relating to the mechanics used in vehicle production.	
	The principles of using computer programs to perform production activities in the automotive industry.	The typical software used to perform the tasks of vehicle production.				The principles of implementing and optimising the IT systems used in vehicles.	The principles of optimising the systems (algorithms) controlling the mechanical and electronic subassemblies and the external communication systems in vehicle production companies.
<b>in sales (C)</b>		The basic properties of metals and plastics used to perform tasks in vehicle production.	Phenomena relating to direct and alternating current in electrical and electronic vehicle systems.	The structure of metals and alloys, their physical (mechanical) properties, and the methods of strengthening them.	The diverse structure and properties of vehicle surface coatings.		
		The basic properties of structural materials and consumables used to perform tasks in vehicle production.	The concepts of electrotechnology and electronics.	The mechanical properties of structural materials, ceramic materials, polymers, composites and smart materials.	The various principles of shaping the properties of structural and functional materials using the surface engineering techniques of the automotive industry.		
		The basic properties of the materials used and products manufactured in the automotive sector.		The parameters characterising the variable waveforms of the electrical and electronic systems of vehicles.	At an advanced level, the basics of analysing stress and systems for the numerical analysis of mechanical systems.		
		The basic techniques and methods of producing parts, machinery and equipment.	The techniques and methods of producing parts, machinery and equipment in the automotive industry.	The principles of fluid mechanics and thermodynamics.			
		The operating principles of subassemblies and assemblies in vehicles.	The principles of using vehicle parts, subassemblies and assemblies.	The principles of technical mechanics and automation.			
		Information on the processes of performing auxiliary work relating to the assembly, servicing, disassembly, cleaning, repair and maintenance of simple subassemblies, assemblies, parts of simple machinery and equipment that are disconnected from the power source.	The processes of wear in vehicle bodies and chassis.	The principles of using the newest product and service solutions in vehicles.			
		Vehicle construction and the basic principles of vehicle operation.		The principles of vehicle design and production.			

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>KNOWS AND UNDERSTANDS:</b>							
<b>in sales (C)</b>		The principles of operating vehicles.		The principles of the functioning of machine and vehicle powertrains using mechanical, electrical, hydraulic and pneumatic systems.			
		The principles of using parts of machinery and equipment in vehicles.					
		The basic principles of tolerance and fit in vehicle construction.					
		The basic functions of electrical components and systems in vehicles.	The principles of the functioning of electrical and electronic components and systems used in vehicles.				
		The principles of using electrical and electronic components and systems in vehicles.					
		The principles, procedures and standards of occupational health and safety, ergonomics, environmental protection and fire prevention in the scope of performed activities in vehicle sales.		The principles of the safety, control and operation of vehicles.			
		Homologation requirements.		The legal regulations on the technical standards and requirements of vehicles being sold.			
		The principles of conducting the quality control of vehicle sales services.		The principles of operating the means of transport in compliance with existing regulations.			
				The principles of conducting business activities in car sharing, leasing, rental, fleet sales, credit sales, and retail.			
	The principles of using software for performing activities in vehicle sales.	The typical software used to perform the tasks of vehicle sales.				The principles of implementing and optimising the IT systems used in vehicles.	
				Market requirements and trends relating to the sale of products and services.	The principles of operating different brands and types of vehicles.	The principles of setting goals and monitoring the implementation of sales plans in the automotive market.	
					The principles of preparing offers and proposals for target sales groups.	The principles of maximising return in business relations in the automotive industry.	
					The principles of business analytics in optimising the sales network in the automotive market.		

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>KNOWS AND UNDERSTANDS:</b>							
<b>in operation (D)</b>	The basic properties of metals and plastics used to perform professional activities.	The basic properties of metals and plastics used to perform tasks relating to the operation of vehicles.		The structure of metals and alloys, their physical (mechanical) properties and the methods of strengthening them.	The diverse structure and properties of vehicle surface coatings.	The principles of using materials with common properties in the context of vehicle homologation.	
		The basic properties of structural materials and consumables used in vehicle production.		The mechanical properties of structural materials, ceramic materials, polymers, composites and smart materials.	The various principles of shaping the properties of structural and functional materials using the surface engineering techniques of the automotive industry.	The processes of the functioning of vehicles.	
		The physical parameters of direct and alternating current during the operation of vehicles.	Phenomena relating to direct and alternating current.	The parameters defining the variable waveforms in the electrical and electronic systems of vehicles.	At an advanced level, the basics of analysing stress and systems for the numerical analysis of mechanical systems.		
	The most basic techniques and methods of servicing, regenerating and repairing parts, machinery and equipment.	The basic techniques and methods of servicing, regenerating and repairing parts, machinery and equipment.	The techniques and methods of servicing, regenerating and repairing parts, machinery and equipment.	The principles of fluid mechanics, thermodynamics and mechanics.	Advanced surface engineering methods, i.e. fluorescent treatment, CVD and PVD processes, ion implantation, laser treatment, and others.		
	The most basic principles of using vehicle parts, subassemblies and assemblies.	The basic principles of using vehicle parts, subassemblies and assemblies to perform tasks relating to the operation of vehicles.	The principles of using subassemblies and assemblies in vehicles.	The principles of technical mechanics and automation.			
		The principles of using tools for manual and machine machining to perform not very complex tasks relating to the operation of vehicles.		The principles of designing and producing vehicle parts, subassemblies and assemblies.			
	The basic processes of performing auxiliary work relating to the assembly, servicing, disassembly, cleaning, repair and maintenance of simple subassemblies, assemblies, parts of simple machinery and equipment that are disconnected from the power source.	The processes of performing auxiliary work relating to the assembly, servicing, disassembly, cleaning, repair and maintenance of simple subassemblies, assemblies, parts of simple machinery and equipment that are disconnected from the power source.	The processes of wear in the components of vehicle bodies and chassis resulting from use.	The principles of using the newest materials in the vehicles being produced.			
		The principles of the functioning of types of drives.	The concepts of electrotechnology and electronics.	The principles of the functioning of machine and vehicle powertrains using mechanical, electrical, hydraulic and pneumatic systems.	Complex techniques that take into account the processes of thermal and detonation spraying as well as the chemical and electrochemical deposition of coatings.		
	The principles of using simple tools for manual and machine machining to perform professional activities.	The principles of performing activities and using tools, machines and equipment for manual and machine machining.					
		The principles of using measurement instruments in not very complex tasks of vehicle production.					
	The construction of vehicles and the principles of their operation.						



SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>KNOWS AND UNDERSTANDS:</b>							
<b>in operation (D)</b>		The principles of operating vehicles.					
		The principles of using parts of machinery and equipment in vehicles.	The principles of using the newest materials in vehicles being operated.				
		The basic principles of tolerance and fit in vehicle construction.					
		The basic functions of electrical components and systems in vehicles.	The operating principles of the electrical and electronic components and systems used in vehicles.				
		The basic methods and technologies of bodywork and painting repairs.	The basic methods and techniques of the solutions used in bodywork and painting repairs.	The methods and techniques of the solutions used in bodywork and painting repairs.	Advanced methods and techniques of the solutions used in bodywork and painting repairs.	The methods and techniques of new solutions used in bodywork and painting repairs.	
		The principles and procedures of occupational health and safety, ergonomics, environmental protection and fire prevention in the scope of performed activities relating to the operation of vehicles.	The principles, procedures and standards of occupational health and safety, ergonomics, environmental protection and fire prevention in the scope of performed tasks relating to the operation of vehicles.		The principles of the safety, control and operation of vehicles.		
		The principles of conducting the quality control of services relating to the operation of vehicles.			The principles of operating the means of transport in compliance with existing regulations.		
		Homologation requirements.			Legal regulations on the technical standards and requirements of vehicles being operated.		
		The principles of using software in performing activities relating to the operation of vehicles.	The typical software used to perform tasks relating to the operation of vehicles.		Market requirements and trends relating to offered services.		The technical and technological innovations in various fields as well as their potential application in the processes of servicing and repairing vehicles.
<b>in renovation (E)</b>	The basic properties of metals and plastics used to perform professional activities in vehicle renovation.	The basic properties of metals and plastics used in vehicle renovation.	Phenomena relating to direct and alternating current.	The structure of metals and alloys, their physical (mechanical) properties and the methods of strengthening them.	The diverse structure and properties of vehicle surface coatings.		
	The most basic techniques and methods of producing, regenerating and repairing parts, machinery and equipment.	The basic techniques and methods of producing, regenerating and repairing parts, machinery and equipment.	The techniques and methods of producing, regenerating and repairing parts, machinery and equipment.	The mechanical properties of structural materials, ceramic materials, polymers, composites and smart materials.	The various principles of shaping the properties of structural and functional materials using the surface engineering techniques of the automotive industry.		
		The basic properties of structural materials and consumables used in performing tasks in vehicle renovation.			The parameters characterising variable waveforms.		
	The most basic principles of using parts, subassemblies and assemblies in vehicle renovation.	The basic principles of using parts, subassemblies and assemblies to perform tasks in vehicle renovation.	The principles of using subassemblies and assemblies intended for vehicles.		The principles of fluid mechanics and thermodynamics.		

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>KNOWS AND UNDERSTANDS:</b>							
<b>in renovation (E)</b>	The principles of using simple tools for manual and machine machining to perform professional activities in vehicle renovation.	The principles of using tools for manual and machine machining to perform not very complex tasks in vehicle renovation.	The principles of the functioning of electrical and electronic components and systems used in vehicles.	The principles of technical mechanics and automation.			
	The basic processes of performing auxiliary work relating to the assembly, servicing, disassembly, cleaning, repair and maintenance of simple subassemblies, assemblies, parts of simple machinery and equipment that are disconnected from the power source.	The processes of performing auxiliary work relating to the assembly, servicing, disassembly, cleaning, repair and maintenance of simple subassemblies, assemblies, parts of simple machinery and equipment that are disconnected from the power source.	The concepts of electrotechnology and electronics.	The principles of designing and producing vehicle parts, subassemblies and assemblies.			
		The construction of vehicles and the principles of their operation.	The processes of the wear and regeneration of vehicle bodies and chassis components.	The principles of the functioning of machine and vehicle powertrains using mechanical, electrical, hydraulic and pneumatic systems.			
		The principles of the functioning of various types of drives.	The principles of using the newest materials in vehicles being renovated.		Advanced surface engineering methods, i.e. fluorescent treatment, CVD and PVD processes, ion implantation, laser treatment, and others.		
		The principles of vehicle renovation.			Complex techniques that take into account the processes of thermal and detonation spraying as well as the chemical and electrochemical deposition of coatings.		
		The basic principles of tolerance and fit in vehicles being renovated.			At an advanced level, the basics of analysing stress and systems for the numerical analysis of mechanical systems.		
		The basic functions of electrical components and systems in vehicles.					
		The principles of using parts of machinery and equipment in vehicles being renovated.					
		The principles of using measurement instruments in not very complex tasks of vehicle renovation.					
		The principles of performing activities and using tools, machines and equipment for manual and machine machining.					
		The principles of using electrical and electronic components and systems in vehicles being renovated.					

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>KNOWS AND UNDERSTANDS:</b>							
<b>in renovation (E)</b>	The principles and procedures of occupational health and safety, ergonomics, environmental protection and fire prevention in the scope of performed activities in vehicle renovation.	The principles and legal regulations on the procedures and standards of occupational health and safety, ergonomics, environmental protection and fire prevention in the scope of performed activities in vehicle renovation.		The principles of safety and the proper operation of vehicles.			
		Homologation requirements.		The principles of operating the means of transport in compliance with existing regulations.			
		The principles of conducting the quality control of renovation work.		Legal regulations on the technical standards and requirements of vehicles being renovated.			
				The principles of using the newest materials in vehicles being renovated.			
	The principles of using software for performing activities in vehicle renovation.	The typical software used to perform tasks in vehicle renovation.		Market requirements and trends relating to the offered services.			
<b>in disassembly and recycling (F)</b>	The basic properties of metals and plastics used to perform professional activities in vehicle disassembly and recycling.	The basic properties of metals and plastics used in vehicle disassembly and recycling.	Phenomena relating to direct and alternating current.				
	The most basic techniques and methods of disassembling and verifying parts, machinery and equipment.	The basic techniques and methods of disassembling and verifying parts, machinery and equipment.					
		The basic properties of structural materials and consumables used in vehicle disassembly and recycling.					
	The principles of using simple tools for manual and machine machining to perform professional activities in vehicle disassembly and recycling.	The principles of using tools for manual and machine machining to perform not very complex professional tasks in vehicle disassembly and recycling.					
	The basic processes of performing auxiliary work relating to the assembly, servicing, disassembly, cleaning, repair and maintenance of simple subassemblies, assemblies, parts of simple machinery and equipment that are disconnected from the power source.	The processes of performing work relating to the assembly, servicing, disassembly, cleaning, repair and maintenance of simple subassemblies, assemblies, parts of simple machinery and equipment that are disconnected from the power source.					

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>KNOWS AND UNDERSTANDS:</b>							
<b>in disassembly and recycling (F)</b>	The principles of using basic vehicle parts, subassemblies and assemblies.	The basic principles of using parts, subassemblies and assemblies to perform tasks in vehicle disassembly and recycling.					
		The basic characteristics of the materials used and the professional tasks performed.	The processes of wear in vehicle bodies and chassis.				
		The principles of the functioning of types of drives.					
		The basic functions of electrical components and systems in vehicles.					
		The physical parameters of direct and alternating current used in vehicle construction.					
		The principles of using parts of machinery and equipment in vehicle disassembly and recycling.	The principles of using vehicle subassemblies and assemblies.				
		Vehicle construction and the principles of vehicle operation.					
		The principles of applying the measurement instruments used in vehicle disassembly and recycling.					
		The principles of performing activities and using tools, machines and equipment for manual and machine machining.	The concepts of electrotechnology and electronics.				
		The principles of using electrical and electronic components and systems in vehicles.	The principles of the functioning of electrical and electronic components and systems used in vehicles.				
	The principles and procedures of occupational health and safety, ergonomics, environmental protection and fire prevention in the scope of performed activities in vehicle disassembly and recycling.	The principles, procedures and standards of occupational health and safety, ergonomics, environmental protection and fire prevention in the scope of performed activities in vehicle disassembly and recycling.					
		The principles of conducting the quality control of vehicle disassembly and recycling.					
	The principles of using software in performing activities in vehicle disassembly and recycling.	The typical software used in performing tasks in vehicle disassembly and recycling.					

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>IS READY TO:</b>							
<b>in design (A)</b>				Prepare the technical documentation relating to mechatronic devices and systems.			
				Analyse and optimise costs in terms of vehicle prices and all related processes from the stages of design to disassembly and recycling.			Shape the principles in the workplace relating to automation, technology development, the application of innovative products and solutions in the automotive industry.
					Develop strategic plans to optimise processes and products in operation, production, renovation, sales, disassembly and recycling as well as design.		
				Determine the impact of the parameters of individual components and subassemblies on the operation of electrical and electronic systems.	Design noiseless structures.	Develop vibroacoustic models of machines.	Develop innovative and interdisciplinary solutions for vehicle design and production processes.
				Apply the laws of electrotechnology to calculate and estimate the value of the electrical parameters in electrical circuits and electronic systems.	Design the powertrain systems of vehicles.	Optimise the processes of vehicle design.	Develop new elements of scientific knowledge on vehicle design.
					Design the structural and load-bearing elements of machines and vehicles.		
				Operate mechatronic modules and systems.			
				Program mechatronic modules and systems.			
					Use computer-aided engineering in vehicle design.	Develop software and use computer-aided modelling methods for processes in mechanics.	Develop the principles of the software supporting advanced 3D computer modelling.
					Apply the potential of computerised design and geometric modelling systems.		Develop the principles for integrating the software (algorithms) used to manage the mechanical and electronic components of vehicles.
					Perform object-oriented, conceptual programming using declarative, basic languages.		Develop the principles for integrating the software (algorithms) used in the communication of vehicles with external systems (e.g. autonomous vehicles, safety, navigation).
					Model engineering problems in the areas of automation, the introduction of new technologies and innovative materials.		

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>IS READY TO:</b>							
<b>in design (A)</b>					Assess the production processes of vehicles, assemblies and sub-assemblies and their impact on the natural environment.		
					Apply methods limiting the impact of the automotive industry on the environment.		Develop innovative technologies that minimise harmful effects on the natural environment.
				Introduce changes resulting from innovations in the professional tasks performed in vehicle design.			
				Diagnose and solve problems that may occur during vehicle design relating to the optimisation of production processes, the use of innovative materials and products as well as the application of modern technologies in the automotive industry.	Design solutions to solve technical problems occurring in the stages of production, operation, sales, renovation, disassembly and recycling as well as relating to use by the final customer.	Integrate the principles of general mechanics and elements of analytical mechanics in the vehicle design process.	Develop the principles of the statistical control of processes relating to production, operation, renovation, disassembly and recycling of vehicles based on the latest research.
				Cooperate with internal and/or external customers in vehicle design.	Establish and maintain relations with customers in the area of design in the automotive industry.		Develop the principles of research methodology and the principles of organising research processes in the automotive industry.
				Select innovative materials.	Apply information on the thermal treatment of metals and alloys for adaptation to working conditions.	Develop models for the application of smart materials.	Develop innovative methods for use in recycling, disassembly, production and the operation of vehicles.
					Generate conditions enabling the creative search for new solutions, above all to take actions that minimise the negative effects of failures (on individuals, teams and institutions).	Participate in the exchange of experiences and ideas, also in the international community, on vehicle design and production processes.	
				Update knowledge and skills on technological developments and innovations.			
<b>in production (B)</b>		Use technical documentation on not very complex processes of vehicle production.		Prepare documentation on performed work in vehicle production.			
				Prepare technical documentation on mechatronic modules and systems.			
		Search for, compare, assess and analyse information on the vehicle production process.		Analyse the statistical indicators used to assess the effectiveness of production processes.	Model engineering problems based on production data.		

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>IS READY TO:</b>							
<b>in production (B)</b>		Perform not very complex calculations required for vehicle production.	Present the results of measurements and calculations in the form of tables and graphs.	Analyse and optimise the costs of production sub-processes and processes of vehicle assembly as well as of all parts, subassemblies and components.			
	Prepare and correct, as appropriate, a plan for simple vehicle production activities.	Prepare and correct, as appropriate, a plan for not very complex vehicle production activities.	Prepare and correct, as appropriate, a plan for one's own moderately complex tasks as well as those of a subordinate team in vehicle production.	Prepare a plan for one's own vehicle production activities and those of the team one directs taking into account variable, predictable conditions and correct the plan as appropriate.	Prepare strategic plans optimising vehicle production processes and products.	Develop vehicle production control strategies.	
	Perform auxiliary work in assembling, servicing, cleaning and maintaining simple subassemblies, assemblies, parts of simple machinery and equipment that are disconnected from the power source.	Perform activities that are part of not very complex tasks in vehicle production.	Lead and supervise part of the process of producing vehicles or components, parts and semi-finished products.	Introduce changes resulting from innovations in professional tasks.	Integrate the principles of general mechanics and elements of analytical mechanics in the vehicle production process.	Ensure the quality of vehicle production processes through the integration of planning and production.	
		Organise the work of a small team performing not very complex vehicle production tasks.					
	Apply basic quality control methods in the production work performed.	Apply quality control methods in production work.					
	Perform basic measurements of components and parts.	Perform measurements of components and parts.	Perform workshop measurements.				
			Perform measurements of the parameters of electrical and electronic components and systems.				
			Select the methods and instruments for measuring the parameters of electrical and electronic systems.				
		Service automotive assemblies and subassemblies as well as electrical and electronic systems.	Prepare schematic and assembly diagrams of electrical and electronic systems.	Determine the impact of the parameters of specific components and subassemblies on the work of electrical and electronic systems.			
				Apply the laws of electrotechnology to calculate and estimate the electrical parameters of electrical circuits and electronic systems.			
				Program mechatronic equipment and systems, CNC machines.			
				Implement and operate mechatronic modules and systems on production lines.			

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>IS READY TO:</b>							
<b>in production (B)</b>				Start up mechatronic modules and systems.			
			Prepare technical diagrams using computer techniques.	Program the work of robots and cobots.	Apply computer-aided engineering in vehicle production.	Develop solutions in computer-aided production processes.	
					Perform object-oriented, conceptual programming using declarative, basic languages.		
					Assess processes and their impact on the natural environment, especially relating to waste management at the workstation.		
					Apply methods limiting the impact of the automotive industry on the environment.		
	Identify basic irregularities and report them to superiors.	Identify irregularities and report them to superiors.	Anticipate the effects of one's own activities and those of one's co-workers.	Solve non-routine technical problems occurring in production, at assembly stations in relation to persons performing professional production tasks.	Generate conditions enabling the creative search for new solutions, above all to take actions that minimise the negative effects of failures (on individuals, teams and institutions).		
		Diagnose vehicle assemblies and subassemblies as well as electrical and electronic systems as the result of the quality control of a workstation.	Diagnose the technical condition of vehicles.	Diagnose and solve problems that may occur during vehicle production relating to the optimisation of production processes, the use of innovative materials and products as well as the application of modern technologies in the automotive industry.			
		Receive and transmit information required for vehicle production processes.		Cooperate with internal and/or external customers in vehicle production.	Establish and maintain relations with customers in the area of producing vehicles and their parts.		
	Prepare the workstation for simple mechanical, metalworking, bodywork and painting activities.	Prepare the workstation for mechanical, metalworking, bodywork and painting tasks.					
	Select typical measurement instruments.	Select measurement instruments.					
	Perform auxiliary work in properly maintaining workstations, typical work tools, typical machines and mechanical equipment.						
			Update knowledge and skills on technological developments and innovations.				



SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>IS READY TO:</b>							
<b>in sales (C)</b>		Use technical documentation on not very complex processes of vehicle sales and services.		Analyse the technical documentation on equipment and systems.			
				Prepare the documentation on completed sales transactions or other forms of vehicle availability.			
		Prepare not very complex calculations needed to estimate the costs of operating vehicles.	Present the results of measurements and calculations in the form of tables and graphs.	Analyse the statistical indicators used to assess the effectiveness of sales processes.	Model engineering problems based on data about individual, corporate and institutional customers.		
		Search for, compare, assess and analyse information on the activities of competing sales entities.		Analyse and optimise costs for individual and corporate customers while maintaining the expected level of sales and service support.		Use advanced Business Intelligence tools to optimise vehicle sales and services.	
		Prepare and correct, as appropriate, a plan for not very complex tasks in the sale of vehicles and their parts.	Prepare and correct, as appropriate, a plan for one's own moderately complex tasks as well as those of a subordinate team in vehicle sales.	Prepare a plan for one's own vehicle sales activities and those of the team one directs taking into account variable, predictable conditions and correct the plan as appropriate.	Develop strategic plans to optimise processes and products in vehicle sales.	Develop sales strategies for products and services in the automotive industry.	
						Implement development strategies in subordinate units.	
		Perform the activities of not very complex tasks in vehicle sales or servicing.	Organise and supervise a small team in the process of servicing the sales of vehicles and parts.		Introduce changes resulting from innovations in the professional activities of other sectors, e.g. banking, insurance.	Manage the global geographical structure in vehicle sales and related services (in the areas typical for specific vehicle brands).	
		Organise the work of a small team performing not very complex tasks in vehicle sales or services.				Manage a fleet and new forms of vehicle availability.	
		Apply quality control methods in displaying vehicles.					
			Perform workshop measurements.				
		Distinguish types of vehicles.	Diagnose the technical condition of vehicles.	Apply information on the thermal treatment of metals and alloys in the context of vehicle sales and services.			
		Identify vehicle assemblies and subassemblies as well as electrical and electronic systems.	Perform measurements of the parameters of electrical and electronic components and systems.				
		Diagnose and read the markings on vehicle assemblies and subassemblies as well as electrical and electronic systems.					

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>IS READY TO:</b>							
<b>in sales (C)</b>			Use computerised sales support systems.	Program mechatronic components and systems as well as other digital systems implemented to enhance the use value of vehicles.			
					Assess the processes taking place in the automotive industry and their impact on the natural environment.		
					Advise on the use of methods reducing the impact of motoring on the environment.		
		Solve simple problems occurring in repetitive situations relating to the operation of vehicles.	Anticipate the effects of one's own actions and those of one's co-workers and vehicle users.	Diagnose and solve problems that may occur during vehicle sales, the use of innovative materials and products as well as the application of modern technologies in the automotive industry.	Generate conditions enabling the creative search for new solutions, above all to take actions that minimise the negative effects of failures (on individuals, teams and institutions).		
		Receive and transmit information required for sales processes.		Cooperate with internal and/or external customers in vehicle sales.	Establish and maintain relations with customers in the sales of vehicles and parts.	Establish and control the standards of customer services.	
			Select the methods and instruments for measuring the parameters of electrical and electronic systems.				
				Update knowledge and skills on technological developments and innovations.			
<b>in operation (D)</b>		Use technical documentation on not very complex processes in vehicle servicing and repairs.	Prepare the documentation on completed work in vehicle servicing and repairs.	Prepare workstation procedures based on the documentation of vehicles, machinery, equipment and legal regulations.			
		Perform not very complex calculations required for vehicle diagnosis, servicing and repairs.	Present the results of measurements and calculations in the form of tables and graphs.	Analyse servicing and repair costs and optimise them.			
		Search for, compare, assess and analyse information on the offered ways of providing services and repairs.		Analyse the statistical indicators used to assess the effectiveness of vehicle servicing and repair processes.	Model engineering problems based on data about the operation of vehicles.	Design the processes of vehicle servicing and repairs.	
		Prepare and correct, as appropriate, a plan for not very complex tasks in providing vehicle servicing and repairs.	Prepare and correct, as appropriate, a plan for one's own moderately complex tasks as well as those of a subordinate team in vehicle servicing and repairs.	Prepare a plan for one's own vehicle servicing and repair activities and those of the team one directs taking into account variable, predictable conditions and correct the plan as appropriate.	Develop strategic plans to optimise processes and products in the operation of vehicles.	Design solutions to complex problems relating to the logistical cooperation among entities in and outside of the sector.	
	Perform auxiliary work in assembling, servicing, disassembling, cleaning, repairing and maintaining simple subassemblies.	Perform the activities of not very complex tasks in vehicle servicing.	Organise and supervise the process of servicing automobiles in such entities as automotive repair shops, inspection stations and others.	Introduce changes resulting from innovations in professional tasks performed in workshop workstations as well as in the selection of modern machines and servicing equipment.		Modify the methods for selecting replacement materials, taking into account the most innovative ones.	

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>IS READY TO:</b>							
<b>in operation (D)</b>		Organise the work of a small team performing not very complex tasks in vehicle servicing and repairs, including the ordering of required parts and components.					
		Perform the activities of not very complex tasks in ordering required parts and components.					
	Apply basic quality control methods in the servicing-repair work performed.	Apply quality control methods in diagnostic and servicing-repair work.					
	Perform basic measurements of components and parts.	Perform measurements of vehicle components and parts.	Perform workshop measurements.				
			Perform measurements of the parameters of electrical and electronic components and systems.				
			Select the methods and instruments for measuring the parameters of electrical and electronic systems.				
		Service automobile assemblies and subassemblies as well as electrical and electronic systems.	Prepare schematic and assembly diagrams of electrical and electronic systems.	Determine the impact of the parameters of individual components and subassemblies on the operation of electrical and electronic systems.			
				Apply the laws of electrotechnology to calculate and estimate the value of the electrical parameters in electrical circuits and electronic systems.			
				Program mechatronic components and systems.			
				Start up mechatronic modules and systems.			
				Operate mechatronic equipment and systems.			
			Prepare technical diagrams using computer techniques.		Apply and adapt the potential of computer design and geometric modelling systems in the vehicle servicing and repair work performed.		
			Use computer systems supporting vehicle servicing and repair work.		Perform object-oriented, conceptual programming using declarative, basic languages.	Develop service and maintenance systems for the IT systems used in vehicles.	

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>IS READY TO:</b>							
<b>in operation (D)</b>					Assess processes and their impact on the natural environment in the context of the parts and power sources used and the recommended maintenance of systems functioning in vehicles.		
					Apply service methods limiting the impact of motoring on the environment.		
	Identify basic irregularities and report them to superiors.		Anticipate the effects of one's own actions and those of one's co-workers and vehicle users and their impact on the value of repair work and vehicle safety.	Solve non-routine technical problems occurring during the service period and when it becomes necessary to perform repairs, bodywork, painting and other work.			
		Diagnose and repair vehicle assemblies and subassemblies as well as electrical and electronic systems.	Diagnose the technical condition of vehicles.	Diagnose and solve problems that may occur during the operation of vehicles relating to the use of innovative materials and products as well as the application of modern technologies in the automotive industry.			
		Receive and transmit information required for servicing and repair processes.	Provide information about services in the form of an offer covering the repair or servicing process, monitor the distribution of this information.	Cooperate with internal and/or external customers in matters relating to the operation of vehicles.	Establish and maintain relations with customers in matters relating to the operation of vehicles.		
	Prepare the workstation for simple mechanical, metalworking, bodywork, painting, servicing and repair activities.	Prepare the workstation for mechanical, metalworking, bodywork, painting, servicing and repair tasks.					
	Select typical measurement instruments.	Select measurement instruments.	Select the equipment and tools to be used at vehicle servicing and repair workstations.				
	Use materials and equipment in accordance with their intended use and principles of homologation.		Recognise materials and equipment that are not homologated.				
	Perform auxiliary work in properly maintaining workstations, typical work tools, typical machines and mechanical equipment as well as vehicles and the area around the vehicles being serviced.						
				Update knowledge and skills on the technological developments used in vehicles.			

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>IS READY TO:</b>							
<b>in renovation (E)</b>		Use technical documentation on not very complex processes of vehicle services.	Prepare the technical documentation relating to vehicle renovation.				
		Search for, compare, assess and analyse information on available, original parts and subassemblies.					
		Perform not very complex calculations required for vehicle renovation and repairs.	Present the results of measurements and calculations in the form of tables and graphs.				
		Prepare and correct, as appropriate, a plan for not very complex tasks in vehicle renovation.					
	Perform auxiliary work in assembling, servicing, disassembling, cleaning, regenerating, repairing and maintaining simple subassemblies.	Perform the activities of not very complex tasks in recreating the optimal state of a vehicle being renovated.	Organise and supervise the processes of vehicle renovation.	Introduce changes resulting from innovations in professional tasks performed in vehicle renovation.			
		Organise the work of a small team performing tasks in recreating the optimal state of a vehicle being renovated.	Anticipate the effects of one's own actions and those of one's co-workers and the users of renovated vehicles.				
	Apply basic quality control methods in the vehicle renovation work performed.	Apply quality control methods in vehicle renovation.					
	Perform the basic measurements of vehicle components and parts.	Perform the measurements of vehicle components and parts.	Perform workshop measurements.				
		Service automotive assemblies and subassemblies as well as electrical and electronic systems.	Perform measurements of the parameters of electrical and electronic components and systems.				
	Select typical measurement instruments.	Select measurement instruments.	Select the methods and instruments for measuring the parameters of electrical and electronic systems.				
		Perform bodywork and painting tasks.					
		Select the methods, materials and tools to perform the corrosion protection of vehicle bodies after repair/renovation.	Identify and use innovative materials in novel applications.				
		Determine the cost of repairs, restoration.					
		Restore the functionality of electrical and electronic vehicle systems after renovation work.	Prepare schematic and assembly diagrams of electrical and electronic systems.				

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>IS READY TO:</b>							
<b>in renovation (E)</b>			Prepare technical diagrams using computer techniques.				
		Diagnose and repair vehicle assemblies and subassemblies as well as electrical and electronic systems.	Diagnose the technical condition of vehicles.	Diagnose and solve problems that may occur during vehicle renovation relating to optimising the use of innovative materials and products as well as the application of modern technologies in the automotive industry.			
		Receive and transmit information required for service processes.		Cooperate with internal and/or external customers in vehicle renovation.			
	Prepare the workstation for simple mechanical, metalworking, bodywork, painting, servicing and repair activities.	Prepare the workstation for mechanical, metalworking, bodywork, painting, servicing and repair tasks.					
	Perform auxiliary work in properly maintaining workstations, typical work tools, typical machines and mechanical equipment.						
				Update knowledge and skills on technological developments and the potential for their use in renovation work.			
<b>in disassembly and recycling (F)</b>		Use the technical documentation on the vehicles being disassembled and recycled.	Prepare and maintain elements of the documentation on the vehicles being disassembled and recycled.	Prepare and maintain required technical documentation on the vehicles being disassembled and recycled.			
		Perform not very complex calculations required for diagnosing the technical condition of vehicles and assessing the possibilities of their subsequent use.	Present the results of measurements and calculations in the form of tables and graphs.				
		Prepare and correct, as appropriate, a plan for not very complex tasks in vehicle disassembly and recycling.					
	Perform auxiliary work in disassembling, segregating, cleaning and verifying simple subassemblies.	Perform the activities of not very complex tasks in disassembly and recycling.	Organise and supervise the process of vehicle disassembly and recycling.	Disassemble mechatronic equipment and systems.			
		Organise the work of a small team performing not very complex tasks in disassembly and recycling.					
		Apply quality control methods in the work performed at workstations and the processes of segregation.					
	Perform basic measurements of elements and parts.	Perform the measurements required for the segregation of elements and parts.	Design and perform methods of taking workshop measurements relating to vehicle disassembly.				

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>IS READY TO:</b>							
<b>in disassembly and recycling (F)</b>			Perform measurements of the parameters of electrical and electronic components and systems.				
	Select typical measurement instruments.	Select measurement instruments.	Select the methods and instruments for measuring the parameters of electrical and electronic systems used in vehicle disassembly and their subsequent use.				
			Prepare schematic and assembly diagrams of electrical and electronic systems.	Determine the impact of the parameters of individual components and subassemblies on the operation of electrical and electronic systems.			
			Prepare technical diagrams using computer techniques.				
		Use the materials and disassembled elements in accordance with environmental protection guidelines.	Use the materials and disassembled elements in accordance with environmental protection guidelines and homologation requirements.				
			Anticipate the effects of one's own actions and those of one's co-workers and vehicle users.				
		Diagnose subassemblies and assemblies as well as electrical and electronic systems in the context of their further use.	Diagnose the technical condition of vehicles.	Diagnose and solve problems that may occur during vehicle disassembly and recycling relating to the optimisation of production processes, the use of innovative materials and products as well as the application of modern technologies in the automotive industry.			
		Receive and transmit information required for vehicle disassembly and recycling processes.		Cooperate with internal and/or external customers in vehicle disassembly and recycling.			
	Prepare the workstation for simple vehicle disassembly activities.	Prepare the workstation for vehicle disassembly work.					
	Perform auxiliary work in properly maintaining workstations, typical work tools, typical machines and mechanical equipment.						
			Update knowledge and skills on technological developments.				

SQF AUTO	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
<b>IS READY TO:</b>							
<b>Principles, instructions and responsibility</b>	Act responsibly to safely perform simple professional activities in vehicle production, operation, renovation, disassembly and recycling in accordance with the principles, instructions and orders in force, strictly following guidelines and under supervision.	Act in accordance with instructions, principles and legal regulations on occupational health and safety, fire prevention, environmental protection and ergonomics in the automotive industry.	Comply with instructions, principles and legal regulations on occupational health and safety, fire prevention, environmental protection and ergonomics in work processes.	Comply with the rules of conduct in force that guarantee the proper quality and safety of activities undertaken in the automotive industry.			Shape models of the rational and economic management of human and material resources in the international community of the automotive industry.
		Act in accordance with the regulations on the automotive sector.					
<b>Cooperation</b>	Establish and maintain essential relationships and communicate effectively with team co-workers and superiors to enable simple workstation activities to be performed in vehicle production, operation, renovation, disassembly and recycling.	Communicate in the work team in a manner that does not interfere with the flow of information on the professional tasks being performed at servicing and sales workstations and in automotive production plants.	Take responsibility for organising a small team and controlling the quality of its work.	Maintain positive relations with local workshops, production and sales facilities, suppliers of parts, products, components, equipment, etc.	Maintain positive relations with local workshops, production and sales facilities, suppliers of parts, products, components, equipment, etc. in the entire automotive area.	Shape and maintain long-term relationships in automotive-related communities, establishing the conditions for the development and promotion of a culture of quality.	Shape and maintain relationships in the international community of the sector, establishing the conditions for the development and promotion of a culture of quality.
		Diligently perform assigned tasks in the automotive industry.	Autonomously perform the tasks assigned by one's superior, taking full responsibility for the entrusted professional area in sales, workshop and production workstations.				Initiate changes in the working environment relating to the development of automotive products and services and changing trends in the automotive industry.
			Introduce elements of creative decision making relating to tasks being performed within the context of entire processes.				Take into consideration ethical and environmental issues when developing innovative solutions in the automotive industry.
<b>Workstation and responsibility</b>		Take responsibility for professional tasks, including the rational use of raw materials and resources in workshop workstations, production plants and sales showrooms of the automotive industry.	Take responsibility for the autonomous tasks performed in the automotive industry.			Take responsibility for long-term forecasts and the consequences of the innovations implemented in the automotive industry.	Set directions for the responsible development of the automotive sector in the areas of power sources, design, applied technologies and materials, autonomous systems as well as in the processes of vehicle production, operation, sales, renovation, disassembly and recycling.
			Be open to changes in the work environment relating to automation and changing trends in the automotive industry.				
<b>Ethics, impact on the industry</b>			Act ethically towards one's co-workers and customers in the automotive industry.	Promote the principles of fair competition in the community of the automotive industry.			



**The Sectoral Qualifications Framework for the Automotive Sector** is a tool to support automotive industry employers and employees in developing competences. Its aim is to improve human resource processes in companies and to help employees independently determine their career and learning pathways. It can also be a useful tool for education and training institutions.

Information is presented on the design of the Sectoral Qualifications Framework for the Automotive Sector (SQF Auto), such as: the development context, how the work was conducted and the methodology used, the framework structure and instructions for reading it, recommendations for implementing and using SQF Auto in Poland, as well as a glossary of key terms. The annex contains the SQF Auto level descriptors – the set of general descriptions characterising the knowledge, skills and social competence required of qualifications at a given level.

**SQF Auto may be used in a number of ways:**

- to develop educational programmes for the automotive sector, both in formal and non-formal education
- to assess and validate the individual competences actually used in production, services and sales relating to specific work tasks or job positions
- to enable HR departments to clearly define the requirements to be met for specific job positions within a company
- to support self-learning by automotive sector employees at various stages of their professional career

**Instytut Badań Edukacyjnych  
Educational Research Institute**

ul. Górczewska 8  
01-180 Warsaw, Poland  
tel. + 48 22 241 71 00  
[www.ibe.edu.pl](http://www.ibe.edu.pl)  
[www.kwalifikacje.edu.pl](http://www.kwalifikacje.edu.pl)

ISBN 978-83-66612-19-8

This publication is co-financed by the European Social Fund of the European Union.

Free copy