Insights of the Automotive Sector

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Deliverable 2.7 Forecasting Dissemination Report

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LIST OF ABBREVIATIONS

3D	Three-dimensional
ADAS	Advanced Driver-Assistance Systems
AI	Artificial Intelligence
AVG	Average
BASE	Big Data, ADAS and After sales, Supply chain and Sharing, Electrification
BEV	Battery Electric Vehicle
CAD	Computer-Aided Design
CEO	Chief Executive Officer
CO2	Carbon Dioxide
CVET	Continuing Vocational Education and Training
D x.y	Deliverable x.y
DoC	Driver of Change
DRIVES	Development and Research on Innovative Vocational Educational Skills
EASCY	Electrified, Autonomous, Shared, Connected and Yearly updated
EPRS	European Parliamentary Research Service
EQF	European Qualifications Framework
ESCO	European Skills, Competences, qualifications and Occupations
EU	European Commission
EV	Electric Vehicle
HEV	Hybrid Electric Vehicle
HQ	Head Quarter
HR	Human Resource
IT	Information Technology
IVET	Initial Vocational Education and Training
KPI	key Performance Indicator
NACE	Nomenclature statistique des Activités économiques dans la Communauté Européenne
OEM	Original Equipment Manufacturer
R&D	Research & Development
R&D&I	Research & Development & Innovation
SME	Small Medium Enterprise

TVET	Technical and Vocational Education and Training
V2X	Vehicle to Everything
VET	Vocational Education and Training
WP	Work Package

INTRODUCTION

This report is the deliverable D2.7 Forecasting dissemination Report of the Development and Research on Innovative Vocational Educational Skills project (DRIVES), the Blueprint for Sectoral Cooperation on Skills in the Automotive sector. The report aims to provide an explanation of the evidence collected and data analysed relating to survey activity designed to collect information on the skills needs in the automotive sector and the main drivers of change influencing these changes. The work, which was undertaken from March to June 2019 covers the EU automotive sector and associated value chain.

Given the complex nature of the questionnaire and the linkages between different sections of the questionnaire, specialist Business Intelligence software was utilised to support consistent data harmonisation and maximise the potential for dynamic analysis. In particular this enables the linkages between different sections and individual questions to be fully explored and illustrated from a wide range of different perspectives. This approach will be utilised throughout the duration of the project and, where possible, new data will be included into the main database.

The Questionnaire have been analysed by the creation of different KPIs and the main GROUPS follow the structure of the Questionnaire itself:

- Sample characterisation
- Drivers of Change
- Skills
- Job Roles
- VET provision mechanisms
- Recognition and qualification
- Recruitment and attractiveness

and all the questions, and relative KPIs (where available) have been analysed by the Overall value and filtered by the selected categories of stakeholders:

- Large Enterprises
- Small and Medium Enterprises (SMEs)
- Sectoral Industrial Associations

Part or all of the survey was completed by 332 respondents. Inclusion for further analysis was based on the criteria that only those respondents completing at least the Drivers of Change section were included. Based on this, further analysis has been undertaken on a sample of 184 responses from automotive stakeholders. The profile of these stakeholders comprises 74% automotive companies and 26% automotive sector organisations.

![DRIVES logo - Development and Research on Innovative Vocational Education Skills]

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For each Driver of Change respondents were asked to comment on two key issues:

- **Importance**: The relative importance of each Driver of Change for the respondents' particular business using a ranking from 0 to 5
- **Urgency**: Respondents were asked to identify the relative importance of the impact of each specific Driver of Change over the periods up to 2020, 2025 and 2030

Based on analysis of those responses identifying the level of importance attributed to each Driver Of Change as 5, „STRUCTURAL CHANGE" is identified as the most important and also in terms of urgency, it has been indicated as 'very urgent'.

Looking at the TOP15 Overall Skills ranking, 5 of them are TECHNICAL, 3 are relate to DIGITALISATION, with other less frequent occurrences relating to "ELECTRIFICATION", "LIFE CYCLE/PROCESS CHAIN", "MANUFACTURING" and "SOFT SKILLS", meanwhile the TOP 15 Job Roles ranking, positions ranked first, second and third are all automotive specific roles, these being "AUTOMOTIVE DATA ANALYST", "POWERTRAIN ENGINEER" and "AUTOMOTIVE TECHNICIAN"; the first non- Automotive specific Job Role is ranked 4th and is "INNOVATION MANAGER".

Responses relating to VET approach underlines the importance of "TRAINING ON THE JOB" as the most used, and the most important VET strategy identified by stakeholders based on the pre-determined options, was a "BROAD DISSEMINATION OF THE RESULTS AND DEFINITION THROUGH TRAIN THE TRAINERS"; the specific focus of the survey on the apprenticeshipFigure 92 indicates that "LINKS WITH EDUCATIONAL INSTITUTES OR TRAINING PROVIDERS", *online/social networks* ("ON LINE JOB BOARDS AND WEBSITE" and "SOCIAL NETWORKS, SUCH AS FACEBOOK AND LINKEDIN") and "RECRUITMENT EVENTS" (with the possibility to have a face-to-face interaction) are relatively evenly split in terms of preferred methods and cover more than 77% of the total responses.

The necessity for "standard(s)" across the EU Automotive sector to enable movement of skilled workers between EU countries and recognition of skill levels relating to training undertaken to allow easier mobility of workers is a key focus of the DRIVES project. Even if a pre-determined list of the most recognised standard and qualification frameworks was included in the questionnaire a lot of "other" has been added. This is a clear warning of the current situation and a deep analysis in the next steps of the project will be necessary.

The Automotive sector is one of the most modern, technologically advanced and transversal sectors but it appears that it is not able to project a "MODERN IMAGE", as this is the challenge ranked as first by stakeholders in terms of future challenges facing the sector; to attract future workers into the sector, stakeholders identified a range of different solutions even if "IMPROVE WORKING ENVIRONMENT" was the most frequently suggested approach, followed by "EXPLAIN HI-TECH BACKGROUND" and "INCREASE COMPANY REPUTATION" (linked to the last Diesel Gate scandal). A

final method suggested to attract new (and young) talented workforce a strong "COOPERATION BETWEEN INDUSTRY AND EDUCATION" has been ranked first.

Report structure if follows:

Chapter 1, "THE SURVEY – MAIN GOALS AND STRATEGY" provides the background, objectives and scope of the survey strategy. The questionnaire was an essential tool to identify the skills and knowledge needed by the automotive sector in the future, together with training programmes required to ensure these sector needs are met.

Chapter 2, "THE SURVEY – STRUCTURE" provides a detailed explanation of each section of the survey and the main information collected.

As the survey was designed with a relatively large number of open questions, **Chapter 3**, "THE SURVEY – HARMONISATION PROCESS OF RESULTS" outlines the criteria followed to define the categories used for analysis.

Chapter 4 "THE SURVEY – KPIs" introduces the list of indicators used to analyse the outcomes of the survey (Key Performance Indexes).

Following the structure of the survey the next chapters are dedicated to:

Chapter 5 "SAMPLE CHARACTERISATION";

Chapter 6 "DRIVERS OF CHANGE";

Chapter 7 "SKILLS";

Chapter 8 "JOB ROLES";

Chapter 9 "VET PROVISION MECHANISMS"

Chapter 10 "SKILL RECOGNITION AND QUALIFICATION FRAMEWORKS"

Chapter 11 "RECRUITMENT AND ATTRACTIVENESS OF THE SECTOR"

Chapter 12 "COOPERATION ON THE SKILLS AGENDA"

More detailed information discussed into this report can be found in the Annexes:

- List of Skills
- List of Job Roles
- List of Apprenticeship Job Roles
- List of Qualifications Standards

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DEVELOPMENT AND RESEARCH ON INNOVATIVE VOCATIONAL EDUCATIONAL SKILLS PROJECT (DRIVES)

The Development and Research on Innovative Vocational Educational Skills project (DRIVES) delivers human capital solutions to the whole automotive supply chain through the establishment of an Automotive Sector Skills Alliance. This covers all levels of the value chain (vehicle production, automotive suppliers and automotive sales and aftermarket services). Through the network of the partners, DRIVES outcomes are disseminated EU-wide to more than 300 associations, bringing together more than 270,450 companies of all sizes, representing over 7 million workers.

The DRIVES project is part of the Blueprint for Sectoral Cooperation on Skills in the Automotive Sector.[1] The goal is to establish an Automotive Sector Skills Alliance covering all levels of the value chain and to ensure that needs of industry are reflected by education and training institutions. The Project is based on cooperation between 24 full partners from 11 EU countries[2]. The goals of the DRIVES project are to:

- **Analyse key trends** in the automotive, covering the whole value chain
- **Define the skills and job roles** needed in the future and **identify skills gaps** relating to these changes
- **Provide clear guidance for education and training providers** on the skills needs of the automotive industry
- **Create training** programmes for selected skills and job roles in the automotive sector
- **Ensure mutual recognition of the skills and job roles across the EU**
- **Provide, as a pilot, training of 1100 people across the EU** and across the education and training institutions

One of the aims of DRIVES project Work Package 2 Sectoral Intelligence and Roadmapping is the development of the strategic roadmap under the "D 2.9 Automotive Skill Strategic Roadmap" report and its yearly update for the duration of the project.

This "D2.7 Forecasting Dissemination Report" is the first complete vision of the Automotive sector from the point of view of industry stakeholders, and this is one of the two key outcomes that will be used as the basis for the development of the strategic roadmap report.

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[1]   *https://ec.europa.eu/social/main.jsp?catId=1415&langId=en*
[2]   *https://www.project-drives.eu/en/home*

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Figure 1 Scheme of activities and deliverables of DRIVES Work Package 2 Sectoral Intelligence and Roadmapping

Figure 1 shows the different activities and reports divided by Deliverables that will be used as part of DRIVES project Work Package 2 to produce the strategic roadmap (D2.9). The industry needs analysed through implementation of a questionnaire and its outcomes (D2.7) will be joined with a VET mapping and skill's offer (D2.8). The integration of these two initial reports will provide the foundation for the creation of the "D2.9 Automotive Skill Strategic Roadmap."

AUTOMOTIVE SECTOR BACKGROUND

Automotive sector is one of the strongest sectors in the EU. There are 15.8 million people employed in the sector, as set out in Figure 2, which is based on ACEA statistics[3] relating to the EU automotive sector.

EMPLOYMENT		
Manufacture of motor vehicles (EU28)	2.5 million people = 8.3% of EU employment in manufacturing	2016
Total (EU28 manufacturing, services and construction)	13.3 million people = 6.1% of total EU employment	2016

Figure 2 EU Automotive sector's employed (ACEA)

More detailed data by country is outlined in Table 1, based on Eurostat data for 2017.

Country	2016	2017
Germany	24.05%	24.11%
France	10.13%	9.94%
United Kingdom	9.89%	9.81%
Italy	8.48%	8.38%
Poland	8.09%	8.19%
Spain	7.76%	7.64%
Romania	4.79%	4.85%
Czech Republic	4.14%	4.19%
Hungary	2.72%	2.73%
Sweden	2.68%	2.70%
Netherlands	2.19%	2.19%
Austria	1.99%	2.00%
Portugal	1.92%	1.95%
Slovakia	1.71%	1.78%
Belgium	1.50%	1.50%
Bulgaria	1.46%	1.47%
Greece	1.23%	1.25%
Lithuania	0.90%	0.89%
Denmark	0.80%	0.79%
Finland	0.80%	0.79%
Ireland	0.70%	0.72%
Croatia	0.58%	0.57%
Slovenia	0.52%	0.54%

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[3]   https://www.acea.be/statistics/article/key-figures

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Country	2016	2017
Latvia	0.47%	0.46%
Estonia	0.28%	0.29%
Luxembourg	0.09%	0.12%
Cyprus	0.10%	0.10%
Malta	0.05%	0.05%

Table 1 EU Automotive sectors employed per country in 2016 and 2017 (ACEA)

The overall vision of the sector is moving from the vehicle to the integration of services around the product itself. The vehicle of the future no longer functions solely as a mode of transportation, but also as a place for work, relaxation and social interaction. Therefore, the driver can choose to drive themselves or be driven, meaning that the time spent in the car can be used for whatever the customer chooses.

One of the main outcomes of the next years scenario is that "Connectivity, and later autonomous technology, will increasingly allow the car to become a platform for drivers and passengers to use their transit time for personal activities, which could include the use of novel forms of media and services"[4]

An acronym used to explain the sector has been created by PricewaterhouseCoopers (EASCY)[5] to indicate a vehicle that is Electrified, Autonomous, Shared, Connected and "Yearly" updated.

It is evident from the desk-based research undertaken by Work Package 2[6] that the automotive sector will undergo major changes, driven by heterogeneous drivers of change. The overall importance of the automotive sector to economic activity in Europe is highlighted by Figure 3, which indicates that the automobile and parts sector in Europe is responsible for 57% of the region's total R&D spending[7] and that over 8,700 automotive patents were granted by the European Patent Office in 2017.

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[4]   *Automotive revolution – perspective towards 2030, McKinsey, 2016*
[5]   *Five trends transforming the Automotive Industry, PricewaterhouseCoopers, 2017-2018*
[6]   *DRIVES Project, Deliverable D9.2.1. Available at www.project-drives.eu*
[7]   *ACEA Pocket Guide 2018 – 2019, ACEA, 2018*
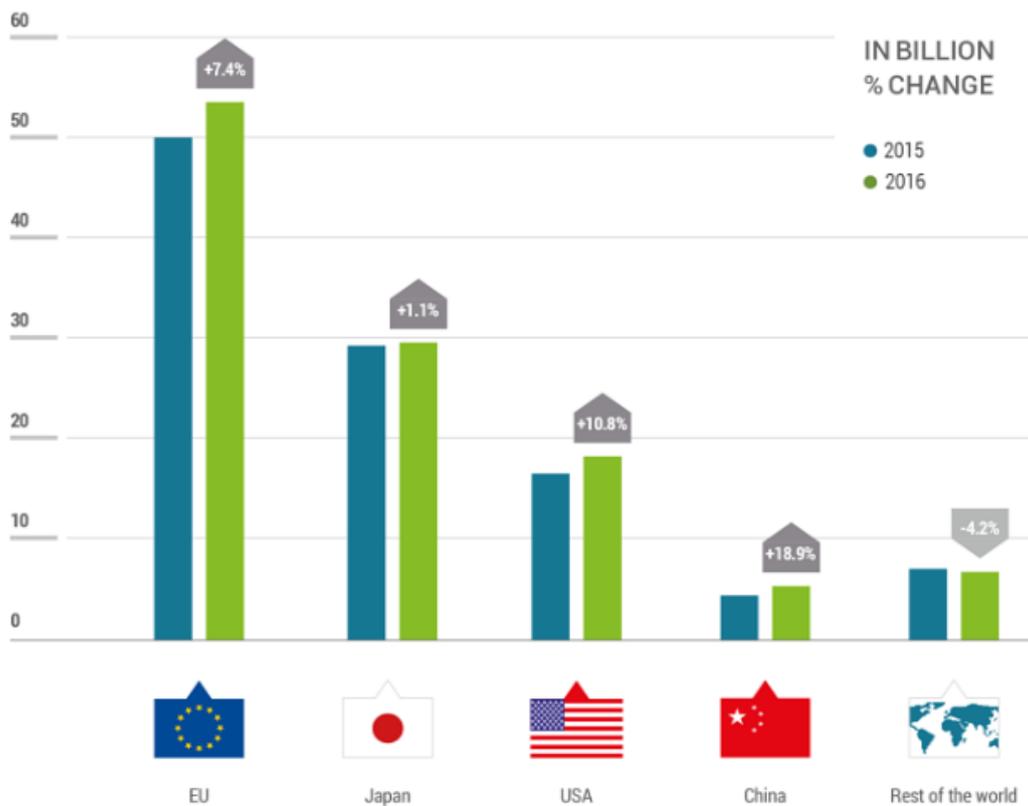
Figure 3 World investors in automotive R&D (ACEA, 2018)[8]

[9]

In a world that is evolving more rapidly towards new technologies and where the security and use of Big Data are becoming an essential element in the development of commercial strategies, the automotive sector is going to experience a new epochal change, perhaps greater than that experienced in the early 20th century with industrial automation in U.S. factories. Given this, it is necessary to anticipate the R&D needs and associated changes in the skills and competences that training institutes in Europe will have to teach (young) people who want to develop a career path in this field. Although there are a number of different future scenarios, in practice all imply the emergence of new occupations and major reskilling in relation to existing occupations.

The results of the DRIVES Project report D2.9.1 provided the foundation (**BASE**) of the insights to the automotive sector and can be summarised as:

- **B**: Big Data

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[8]   *ACEA Pocket Guide 2018 – 2019, ACEA, 2018*
[9]   *ACEA Pocket Guide 2018 – 2019, ACEA, 2018*

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- **A**: ADAS and After sales

- **S**: Supply chain and Sharing

- **E**: Electrification

- ***BIG DATA:*** refers to the possibility of collecting and managing a huge set of heterogeneous information. With the collection and analysis of data variables such as cybersecurity and transfer speed (of data) come into play, together with new ways of managing data

- ***ADAS:*** Advanced Driver-Assistance Systems will be a mandatory part of a car: By 2030 vehicles will be able to drive autonomously in safety and be covered by EU legislation[10]. The following figure shows Levels of automation and associated timelines based on information from European Parliamentary Research Service (EPRS).
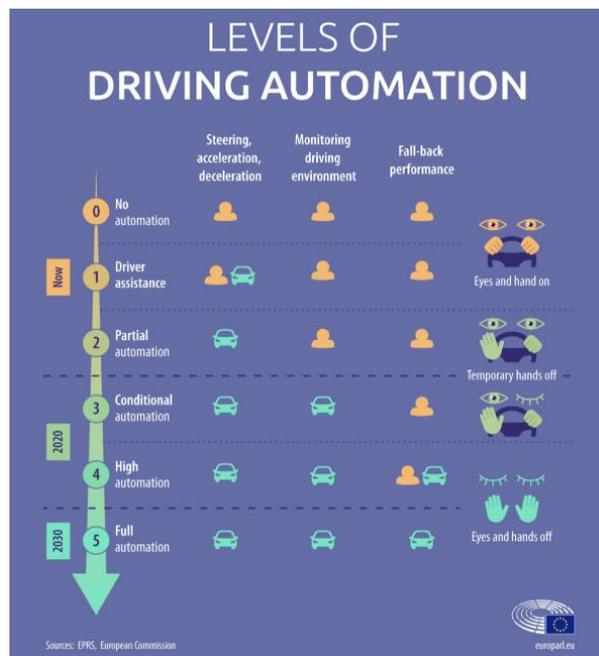
Figure 4 Levels of automation and timeline expected on the market between 2020 and 2030

- ***AFTER SALES:*** the future scenarios of the sector show a vision where AI and ADAS will be increasingly effective and efficient. It is therefore logical to presume a trend in which autonomous driving leads to fewer accidents. The after-sales activity will pass from a "passive

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10   *https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/setting-the-framework-for-car-connectivity-and-user-experience*

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![DRIVES - Development and Research on Innovative Vocational Education Skills](logo)

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repair" to an "active maintenance" service. This will also make maintenance of the vehicle more preventive, as monitoring on all systems will clarify the problems before a failure occurs.

- *SUPPLY CHAIN (DISRUPTION):* disruption along the value chain will not only be driven by existing operators in the sector, but also by new outsiders such as software component manufacturers, new electric vehicle manufacturers and multinational companies that until recently had a different core business. Moreover, the growth of e-commerce platforms will change the traditional business of spare parts distributors and workshop activities will see the proliferation of specialized players (also linked to the standardization of the product and the proliferation of Plug & Play spare parts). It is not only technical occupations and skills that will be influenced by this transformation. The role of salespeople and dealers will change: car-buying behaviour is changing in ways that will force a radical and disruptive revolution in auto sales[11].

- *SHARING*: *c*arsharing is a way to explain an emerging class of "mobility services" that draw on modern technology to enable access to car-based mobility, without the consumer owning the vehicle. In contrast to the traditional approach of selling cars to end users, this requires new value propositions, new organisational structures, and new ways of interacting with the public sector[12].

- *ELECTRIFICATION*: *it* appears to be the overriding direction for the vehicle powertrain in the future. Automakers are preparing to phase out cars powered solely by internal combustion engines as governments look to tackle fuel emissions. The growth in electric vehicles (EVs) and hybrid electric vehicles (HEVs) is set to climb. By 2025, EVs and HEVs are expected to account for an estimated 30% of all vehicle sales. By contrast, in 2016 just under 1 million vehicles or 1% of global auto sales came from plug-in electric vehicles (PEVs)[13].

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[11]   *The Future of Car Sales Is Omnichannel, Bain & Company, 2017*
[12]   *Carsharing: Evolution, Challenges and Opportunities, ACEA SAG report, 2014*
[13]   *Driving into 2025: The Future of Electric Vehicles, J.P.Morgan, 2018*
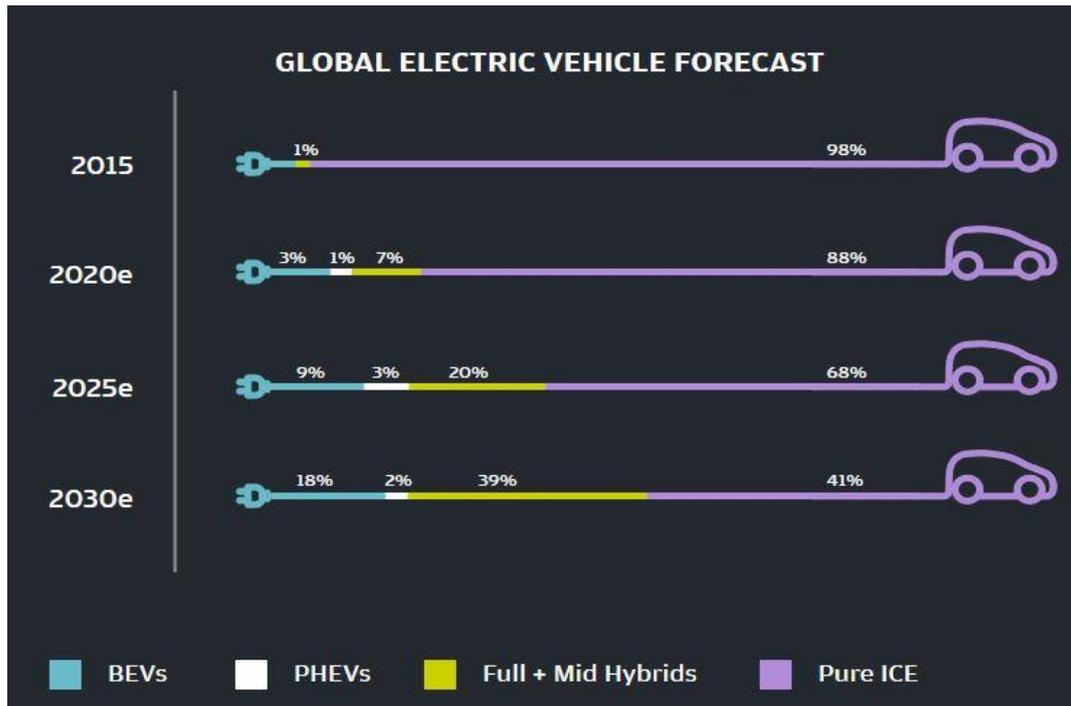
Figure 5 J.P.Morgan estimates evolution of the Global Electric vehicle market[14]

The transition to an all-electric future will require sizeable investments in R&D, the acceleration of vehicle charging infrastructure and potential legislation for the installation of charge points in new homes. Linked to this will be the necessity to create new skills for a new mobility concept, as this transition to EVs gains momentum. Whilst electric cars and lorries may account for a tiny percentage of vehicles on the road today (4 million electric vehicles versus over one billion petrol and diesel cars), adoption is accelerating fast. It took over 20 years to sell the first million electric cars. Now, more than one million electric vehicles have been sold in just one year[15]. It is important to underline that "all-electric" doesn't mean it is necessary for a vehicle to have a huge battery pack that stores energy like a fuel tank: the 2030 electric engine may also be powered by other energy sources like hydrogen as outlined under new start-up[16].

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[14]   *Driving into 2025: The Future of Electric Vehicles, J.P.Morgan, 2018*

[15]   *Strong policy and falling battery costs drive another record year for electric cars, IEA (International Energy Agency), 2018*

[16]   *Electriq~Global Says Its Water-Based Fuel Can Power Your Car, But Details Are Thin, Forbes, 2018*
        https://www.forbes.com/sites/jeffkart/2018/11/14/electriqglobal-says-its-water-based-fuel-can-power-your-car/#390a34ee45ab

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The **BASE** scenario provides an employment forecast in terms of expected number of jobs created set against the expected number of jobs lost.

A study from the European Association of electrical contractors (AIE) has assessed likely future job creation in a number of sub-sections of the electromobility production process and concludes that by 2030 a total of nearly 200,000 permanent jobs will be created. This is based on a moderate uptake of plug-in vehicles amounting to around 35% of new car sales by 2030. Of these 200,000 jobs, 57% will come from the installation, operation and maintenance of charging points[17]. It then compares this with a study by Germany's Fraunhofer research institute into the impact of electrification on jobs: an estimated 306,000 jobs in the automotive manufacturing sector will be lost in total by 2030, but only 27% of these (about 84,000) are expected to be specifically due to an increase in electromobility; the rest are expected to be the result of productivity improvements[18]. Although there are variations in some aspects of future expectations, all the reviewed literature regarding this topic is however in agreement that there will be a demand for new skills and competences and the emergence of new occupations not currently in existence[19].

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[17] *Powering a new value chain in the Automotive sector, AIE, 2018*

[18] *Wirkungen der fahrzeugelektrifizierung auf die beschäftigung am standort Deutschland, Fraunhofer-Institut, 2018*

[19] *Employers' Views of the Jobs and Skills Required for the UK Automotive Industry, Automotive Council UK, 2016*

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1   THE SURVEY - MAIN GOALS AND STRATEGY

This section describes the strategy adopted in preparation for consultation with the industry's stakeholders as part of the DRIVES project. Between March and June 2019, DRIVES launched an online survey to support the creation of a strategic roadmap for the sector. This contains information necessary for all the project's partners to analyse Automotive sector Job Roles, Skills and more generally, the attractiveness of the sector. This in turn, will also provide the basis to evaluate the current match between VET skill needs and the offer and to develop training packages for 30 job roles to be offered to the automotive sector and also, as a pilot, train 1.100 employees during the duration of the Project.

This activity and related data elaboration are essential to understand the current vision of the sector by the industry. This information will be compared with the current offer of services by VET providers. The match between skills demand and the current offer will be the starting point for the DRIVES project roadmap.
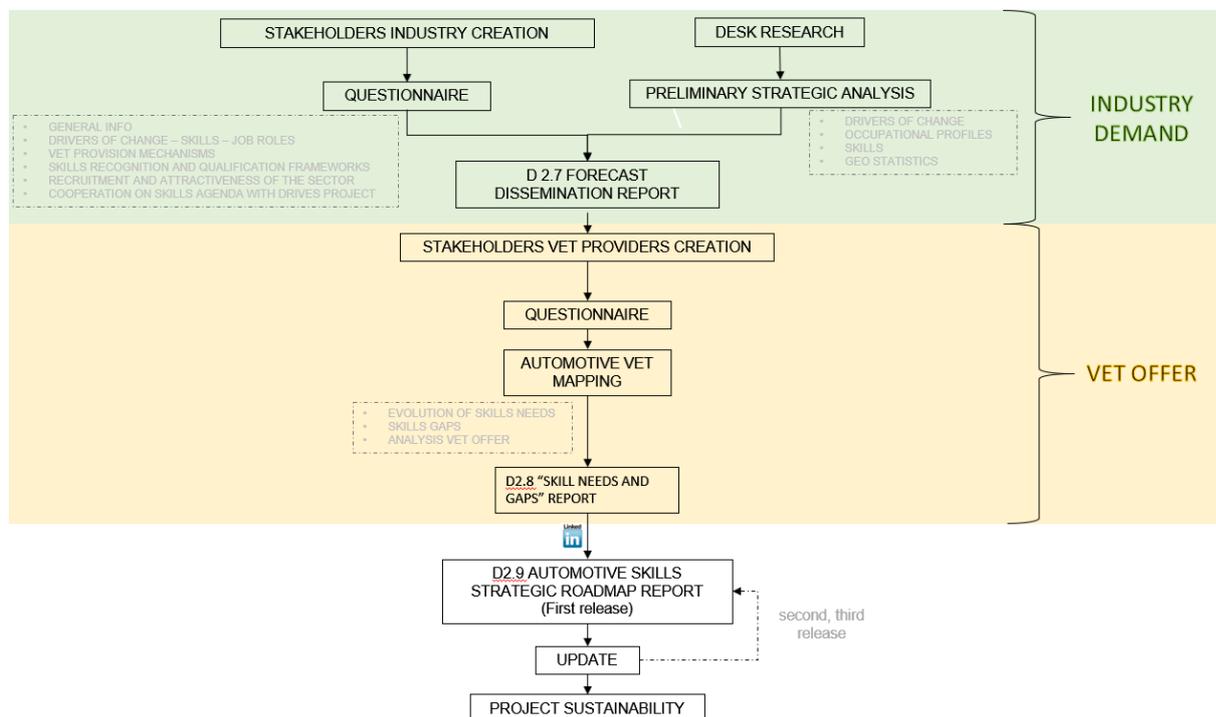

Figure 6 The structure of DRIVES project Work Package 2 Sectoral Intelligence and Roadmapping

Figure 6 represents a schematic vision of key activities relating to Work Package 2. The information collected through the industry questionnaire is essential to identify the skills and knowledge needed

by the industry to meet future requirements. A second questionnaire will be prepared to analyse and map the current VET offer in relation to the Automotive sector and identify training programmes needed to meet skill requirements of the sector. The demand survey was a self-completion questionnaire with many questions left open ended, rather than providing pre-selected options.

The questionnaire was designed to be interactive and accessible on-line, using all the most commonly used browsers. The option to request more time and go back to complete the questionnaire was incorporated in order to try and maximise the value of information obtained, given the survey tool took about 40 minutes to complete. A dedicated webinar section was created to present the project, the tool, and to explain to participants how to fill in and use all the different sections of the questionnaire.

The structure of the questionnaire was left relatively open ended in order to gather as much information as possible to support understanding and analysis of the sector's skills agenda and needs. A harmonisation process was therefore necessary to prepare a structured map to properly aggregate information and accurately reflect stakeholder responses. The questionnaire was designed for two different categories of stakeholders: Companies and Organisations, with differences in the wording of questions to reflect these two different categories of respondent.

Looking in more detail, specific categories of stakeholders involved in the DRIVES "demand" questionnaire were:

- Company:
  - SMEs
  - Large Enterprises
- Organisation:
  - Technology Centre
  - Sectoral/Industrial Association
  - Trade Union
  - Labour Market Intelligence Entities
  - Public and Private Employment Services
  - Public Authority
  - Chambers of Commerce
  - Labour Ministries
  - National Statistics Offices

The stakeholders targeted in relation to the demand survey, together with the planned VET offer survey are outlined in Figure 7.
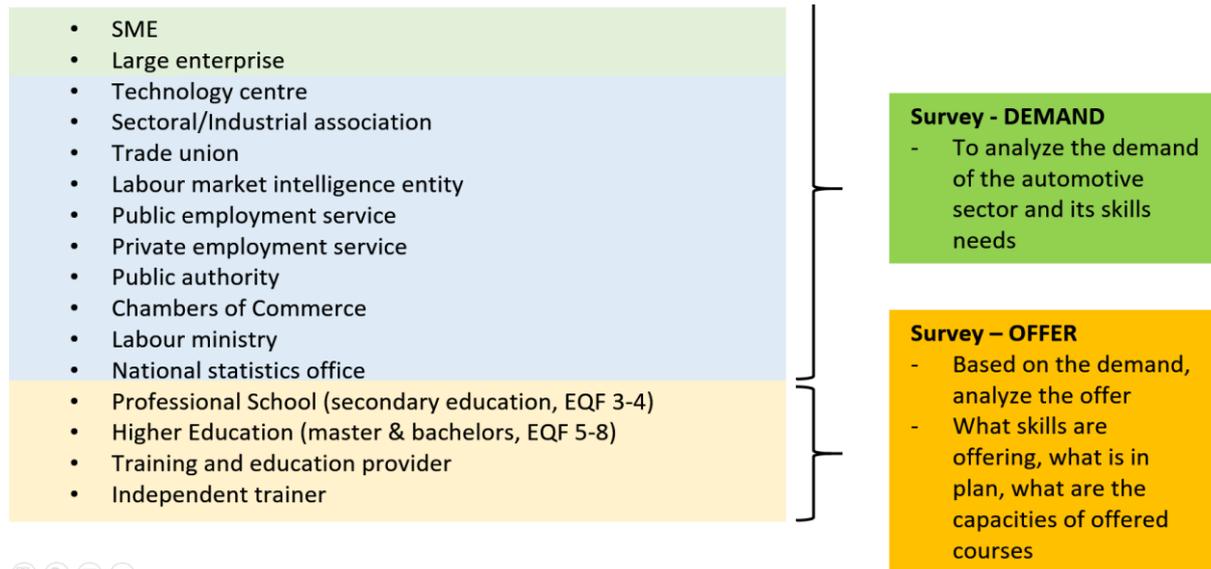
Figure 7 List of stakeholders engaged in the Work Package 2 questionnaires

As already highlighted at the start of this chapter, a different questionnaire are/will be created to capture information on the VET "offer" relating to the automotive sector and the next "D 2.9 Automotive strategic roadmap" report will integrate the findings of both the demand and offer questionnaires.

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2   THE SURVEY - STRUCTURE

This section provides information about structure of the survey "demand" and its individual parts and the structure of the demand questionnaire is outlined in the following Figure 8:

Figure 8 Questionnaire scheme

The 7 key areas covered by the questionnaire can be summarised by the following diagram (Figure 9):
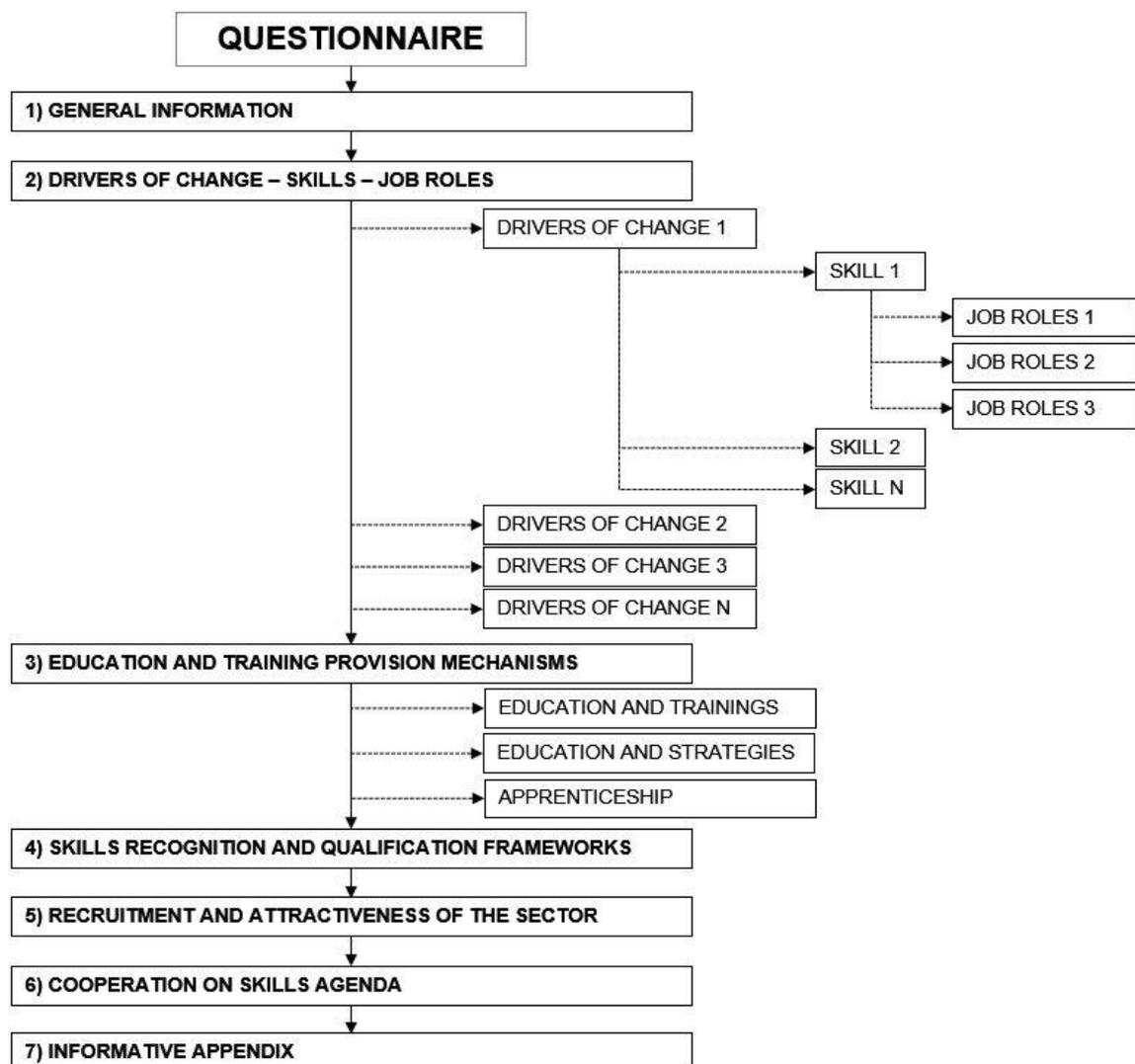
Figure 9 Flow chart of the questionnaire structure

Details per each area:

1 **GENERAL INFORMATION**:

This section is designed to gather basic information on the respondent profile.

2 **DRIVERS OF CHANGE – SKILLS – JOB ROLES**

- First stage: Enables respondents to verify, confirm, add, or amend the list of proposed Drivers of Change. This stage also allows respondents to identify the relative importance of each Driver of Change on a scale of 0 to 5 and specify over what time period this will impact (by 2020, by 2025 or by 2030 and later)

- Second stage: Enables responds to indicate which current or emerging Skills are going to be required within the workforce, based on the previous identification of Drivers of Change and therefore provides a link between these two stages.

- Third stage: Enables respondents to identify the Job Roles that will need to evolve as a result of changing skill requirements identified in stage 2. The tool also enables respondents to indicate if a particular Job Role requires one of more of the previously identified skills, the level of skill required[20] and also, based on a generalised model of company structure[21], in which area.

3 **VET PROVISION MECHANISMS**:

Understanding how Vocational Education and Training is currently provided to the sector is identified as an essential element to help define the overall skills strategy. In addition, understanding the preferences of the sector in relation to the most appropriate mechanisms for delivering VET will support the design of all project work packages.

This section is divided in 3 parts:

- Education and training approach: enables respondents to indicate which training approach will be most appropriate in the future (both for initial education and continuous training)

- Education and training strategy: enables respondents to suggest the best approach to meet identified skill requirements

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[20]   *Awareness, Working, Practitioner or Expert*

[21]   *Michael Porter Value Chain, 1985, Competitive Advantage: Creating and Sustaining Superior Performance*

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- Apprenticeships: designed to achieve a better understanding of the current and future changes to this approach to training within the automotive sector.

4   SKILLS RECOGNITION AND QUALIFICATION FRAMEWORKS:

To obtain structured information on the current use of specific Recognition and Qualification frameworks and the perceived importance of harmonisation of this activity at an EU level.

5   RECRUITMENT AND ATTRACTIVENESS OF THE SECTOR:

Targeted questions designed to understand the views of respondents with respect to the necessity to increase the attractiveness of the sector with respect to new and talented (young) potential recruits, and how best create a strategy to attract new talent to the sector.

6   COOPERATION ON SKILLS AGENDA:

This section was designed to test stakeholders' willingness to continue engagement with the DRIVES project in the future in order to meet the objective of a stable and constructive relationship with stakeholders across the automotive sector over time. This is identified as a key aspect of the of the project in order to guarantee its success and sustainability.

7   ORGANISATION AND CONTACT DETAILS:

This section was designed to collect further valuable information relating to respondents and allow easy and accurate data harmonisation.

3 THE SURVEY - HARMONISATION PROCESS OF RESULTS

This section describes the harmonisation process used to ensure clear and useable data for analysis. Given the 'open ended' nature of many of the questions, the harmonisation process was an essential step of the questionnaire analysis.

Given the complex nature of the questionnaire and the linkages between different sections of the questionnaire, specialist Business Intelligence software was utilised to support consistent data harmonisation and maximise the potential for dynamic analysis. In particular this enables the linkages between different sections and individual questions to be fully explored and illustrated from a wide range of different perspectives. This approach will be utilised throughout the duration of the project and, where possible, new data will be included into the main database.

Detailed harmonisation of each category of questionnaire is described in the following subsections.

3.1   NORMALISATION OF DRIVERS OF CHANGE

Drivers of Change are those factors which are key to transforming an industry. Desk-based research was undertaken as the basis for this aspect of Work Package activities[22]. Specifically, a literature review of available automotive reports and market analysis was undertaken in order to create an overview of current Drivers of Change and their relevance. The analysis compares the outcomes of the European Automotive Skill Council[23] report and GEAR 2030 report[24], with other available intelligence/reports related to the EU automotive sector in order to identify the main Drivers of Change within the European automotive sector.   After identifying the key Drivers of Change using the European Automotive Skill Council report and GEAR 2030 report, the wider literature review was undertaken in order to validate, review and add new Drivers of Change to this initial list. Through this approach five main 'macro' Drivers of Change have been identified, these being:

- New technologies and business models
- Climate goals, environmental and health challenges
- Societal changes and changes in the way that consumers access, purchase and use cars

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[22]   *D2.9.1. Preliminary strategic analysis, 2019, DRIVES Project, Available at www.project-drives.eu*
[23]   *European Sector Skill Council: Report, Eu Skill Council Automotive Industry, 2013*

[24]   *GEAR 2030, High Level Group on the Competitiveness and Sustainable Growth of the Automotive Industry in the European Union, 2017*

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- Structural change
- Globalisation and the rise of new players

Drivers of Change normalisation followed a holistic approach in which new Drivers of Change identified by respondents were compared with the results of desk-based analysis; in almost all cases the normalisation has involved matching of "new" Drivers with those already identified.

3.2 NORMALISATION OF SKILLS

The Skills normalisation was a complicated activity requiring several steps and iterations. Responses in relation to skills were often not identified as action verbs[25] but, more commonly, as a group of jobs, or complex activities.

The first iteration allowed separation of TRANSVERSAL so called "SOFT SKILLS" from other types of skills[26]. For those skills identified as 'soft skills' the process has simply involved classification into a number of different discrete 'soft' skill types. For the remaining skills, (transversal hard-skills, cross-sectoral, sector-specific and occupation-specific skills)[27], the activity has involved categorisation of the different sets of Technical skills identified through the survey. This has been achieved by use of "high level descriptors" as a mechanism to identify the main technical feature linked to each particular skillset identified by respondents. This process has involved identifying the word or concept, that best describes the particular technical skill set (e.g. "digitalization", or "communication").

The third level of harmonisation further divided the above skillsets, by describing homogeneous subsets of skills according to a minimum of three and a maximum of five combinations of "Action Verb" + "Object", in line with the ESCO approach. To do this, the following information (coming from the survey) is analysed through use of the BI tool developed, starting with skills related to the most important Occupations/Job Roles identified through the project.

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[25]   *According to ESCO: a skill is the basic talent (described with action verb) necessary to categorise all the Occupations [https://europass.cedefop.europa.eu/documents/european-skills-passport/certificate-supplement/action-verbs-glossary]*

[26]   *https://ec.europa.eu/esco/portal/escopedia/Skill_reusability_level*

[27]   *For the purpose of this activities all these skill levels are indicated as "technical skills"*

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3.2.1 Criteria followed to define the categories and normalised skills

Through intensive discussions with those partners involved in the normalisation process, 5 main categories, or clusters of skills have been identified: 4 of these being "technical" and the 5th related to previously identified "soft skills". Specific job roles comprise different combinations of these skills.

1. **Technical knowledge profiles**: This category refers to the background of people in terms of education and expertise (at high level (engineer) or medium level (technician)). It includes the following normalised skills (in alphabetical order): electrical / electronic, electrochemical, material sciences, mechanical, mechatronics, software development, sustainability and technical knowledge (generic). This final normalised skill refers to the technical knowledge requested for positions that do not require a high specialisation level.

2. **Vehicle systems**: This category refers to knowledge and expertise relating to the different new systems and functions in the vehicle as a product (in alphabetical order): alternative ICE powertrains and fuels, automated driving, connectivity, drivetrain, electrification, functional safety, system architecture. For electrification, several subcategories have been identified (2A, alphabetical order): batteries, electric motors, energy management, power electronics, system integration, thermal management.

3. **Life cycle / product – process chain**: This category refers to the different steps in the vehicle life cycle, covering the whole product and process chain (in sequential order): market analysis, R&D&I, design, product development, simulation, testing / validation, process engineering, production / manufacturing, internal logistics, sales, after-sales service, mobility services. For production / manufacturing, several subcategories have been identified (3A, alphabetical order): automation / robotics, maintenance, production organisation, specific manufacturing processes (for those cases where they were indicated).

4. **Digitalization**: This category refers to the specific digital enablers and the digital skills (in alphabetical order): 3D printing, artificial intelligence, big data / data analytics, cybersecurity, digital networks, digital skills (generic, other than technical and or management skills), digital twins, IoT & cloud, predictive maintenance, virtual product development & virtual testing.

5. **Soft skills**: (in alphabetical order): adaptability / flexibility, behavioural agility, change management, communication, continuous improvement, creativity, critical thinking, entrepreneurship,

foreign languages, learnability, management & leadership, networking, problem solving, project management, resilience, teamwork.

3.2.2 Skills categories and normalised skills

1. Technical knowledge profiles
Electrical / Electronic
Electrochemical
Material sciences
Mechanical
Mechatronics
Software development
Sustainability
Technical knowledge (generic)
2. Vehicle systems
Alternative ICE powertrains (alternative fuels)
Automated driving
Connectivity
Drivetrain
Electrification (See sub-categories below)
Functional safety
System architecture
2A. Electrification
Batteries
Electric motors
Energy management
Power electronics
System integration
Thermal management
3. Life cycle / product - process chain
Market analysis
R&D&I
Design
Product development
Simulation
Testing / Validation
Process engineering
Production / manufacturing *(see sub-categories below)*
Internal Logistics
Sales
After-sales service
Mobility services
3A. Production / Manufacturing
Automation / Robotics
Maintenance

| Production organization |
| Specific manufacturing processes (Casting, Injection moulding, Paint spraying, Precision machining, Textile processes, …) |
| **4. Digitalization** |
| 3D printing |
| Artificial Intelligence |
| Big data / Data Analytics |
| Cybersecurity |
| Digital networks |
| Digital skills (generic) |
| Digital twins |
| IoT & Cloud |
| Predictive maintenance |
| Virtual product development & virtual testing |
| **5. Soft skills** |
| Adaptability /Flexibility |
| Behavioural agility |
| Change management |
| Communication |
| Continuous improvement |
| Creativity |
| Critical thinking |
| Entrepreneurship |
| Foreign languages |
| Learnability |
| Management & Leadership |
| Networking |
| Problem solving |
| Project management |
| Resilience |
| Teamwork |

Table 2 Complete skills categories with related normalised skills

3.3 NORMALISATION OF JOB ROLES

The normalisation process of job roles followed 2 consecutive steps.

The first activity involved normalisation of the English language through related/used term correction, a step necessary to transform different languages used by those interviewed, or correct mistakes relating to typos and acronyms.

Correlation between job roles/ drivers of change: The second activity was based on the Occupational ESCO classification[28]. Using the Business Intelligence tool, it was possible to verify, foreach Job, the relative Drivers of Change and skills identified through completed survey returns. By applying these correlations to those jobs indicated by respondents that were not clear, a deductive process enabled through use of the BI tool, allowed categorisation of each response into a normalised Job Role using the ESCO taxonomy.

3.4 NORMALISATION OF VET PROVISION MECHANISMS

The normalisation of this section of the survey has been undertaken with reference to a pre-selected list of possible training approaches and is divided into 3 separate areas:

- APPROACHES
- STRATEGIES
- APPRENTICESHIPS

3.4.1 Education and Training Provision Mechanisms - Approaches

The existing list was:

- Classroom based training
- Dual system apprenticeship
- Training on the job
- Mentoring
- Online training
- Blended learning

Most of the time the normalisation activity related to typing mistakes, as almost all the new proposed approaches could be categorised using the pre-defined list and simply provides additional commentary. When a comment was not clear enough to permit immediate normalisation, the BI tool was utilised to enable normalisation based on analysis of responses to all the other sections of the survey.

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[28]   https://ec.europa.eu/esco/portal/occupation

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3.4.2   Education and Training Provision Mechanisms - Strategies

In relation to the development of VET strategies, it is important to understand if emerging skill needs can be addressed through current training practice, or if new innovative approaches are required. The questionnaire explored the importance of two differing approaches:

- **Creation of a restricted group of highly specialised trainers with flexible reallocation**: a limited number of highly trained "teachers" available to travel around the EU and disseminate knowledge. This strategy ensures that know-how is disseminated by the same people, ensuring standard outputs, even if different EU languages can create communication challenges and trainers might be not always be available.

- **Dissemination of the results by "TRAIN THE TRAINERS" programmes:** this strategy focuses on a possible standardisation of the programme through the development of local/national trainers. This would support a broader range and larger number of trainers, with the possibility to teach in each country, respective native language, but might result in the potential dilution of quality and consistency in the delivery of training across EU.

Even where most respondents agreed on one of these approaches, the new suggestions were normalised starting with "typographic normalisation" in order to verify if each new response could be assimilated to one of the pre-existing categories. If this was not the case, a new approach has been introduced and used as part of the normalisation process for other responses, when there is alignment.

3.4.3   Education and Training Provision Mechanisms - Apprenticeship

In relation to the apprenticeship section, the normalisation process was undertaken for those job roles relating to apprenticeships (both currently and in the next 5 years). The process followed the same rules applied in the previous job role section, but in this case with the added potential to cross-check with responses relating to Drivers of Change, Skills and Job roles in previous sections of the questionnaire.

The question relating to the main methods used to recruit apprentices was based on 8 possible choices and an "Other" category.

The 8 pre-defined methods were:
- Online job boards and websites

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- Advertising in newspapers/other press
- Recruitment events
- Social network such as Facebook and LinkedIn
- Word of mouth
- A national apprenticeship service
- Links with education institutes or training providers
- Use of Drop'pin@EURES[29] or other EU recruitment services

Most of the time the normalisation activity relating to the "other" category involved typographic normalisation, as almost all new proposed approaches could be assigned to one of the pre-defined options, with some additional commentary added. When a comment was not clear enough to permit immediate normalisation, the BI tool was utilised to enable normalisation based on analysis of all the other sections of the survey.

3.5 NORMALISATION OF SKILL RECOGNITION AND QUALIFICATION FRAMEWORKS

The activity has been undertaken with reference to 5 key qualification frameworks listed in the questionnaire:

- VDA-QMC[30]
- ECQA[31]
- TUV SUD[32]
- BUREAU VERITAS[33]
- IATF[34]

In this case the normalisation activity with respect to the "other" category, for the most part, simply involved adding additional named qualification frameworks to the existing list.

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[29]   *Drop'pin@EURES is a project led by the European Commission that aims to help young people boost their employability and skills by connecting them with a range of opportunities across Europe.*
https://ec.europa.eu/eures/public/en/help-and-support/opportunities
[30]   *https://vda-qmc.de/en/*
[31]   *https://www.ecqa.org/*
[32]   *https://www.tuvsud.com/en*
[33]   *https://group.bureauveritas.com/*
[34]   *https://www.iatfglobaloversight.org/*

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3.6   NORMALISATION OF RECRUITMENT AND ATTRACTIVENESS OF THE SECTOR

This section was completely 'open ended' where respondents could share information and ideas in the absence of pre-defined categories, with the aim to gather extra information not previously included on the questionnaire.

The normalisation process followed a logical approach by identifying the main concept outlined in each response.

As a first step each 'main concept' described in open text was listed; the second step aligned all the main concepts into a condensed list where similar concepts were assigned to one of a smaller number of broader categories.

This area of the questionnaire is divided into 3 separate sub-sections:

- Recruitment Challenges
- Recruitment Approaches
- Recruitment Methods

3.6.1   Recruitment Challenges

The final normalised list comprises the following list of concepts:

- **Big corporation vs start-up company**: This concept is related to the recruitment appeal of new start-ups compared with the big brand (considered "old" and "static")
- **Complexity and precise timing**: This concept is related to the complexity of the sector, linked to time pressures and associated stress of the workforce
- **Cooperation of industry and education**: lack of cooperation currently within the sector discourages the introduction of young talent into the sector
- **Globalization**: This concept is linked to the necessity to communicate and work on different sites, and be ready to relocate for work and communicate in different time zones, different culture, etc.
- **Lack of interest in technical education**: indicating the shortage of people interested in technical education, often preferring other studies and careers
- **Modern image of the sector**: it is not attractive for young people, and it appears as an old sector; with a male/female imbalance.

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- **Need for standardisation**: This concept is linked to globalisation, in particular, the need for recognition of qualifications and courses across international boundaries and the complexities of evaluating different skills and competences around the world.

- **Precise working procedures and processes**: In comparison to a number of other sectors, a lack of creativity and an old-style management approach is identified.

- **Rapid changes of the sector**: (electrification has often been mentioned as an example) where employees are not aware of the nature and impacts of future change in the sector, linked to major internal restructuring, fear of disruption and general job insecurity

- **Salary attractiveness/Working environment**: in comparison to other sectors, such as IT, the salary is not attractive for workers.

- **Sustainability**: environmental thinking is not considered important enough within the sector to attract people to "change the planet in better way". 'Diesel-gate' was often mentioned

- **Work based training**: this is related to the fact that there is often not enough time to send people for training given the pressures the sector faces.

3.6.2 Recruitment Approaches

The Approaches section is linked to the challenges indicated in the previous section. The final normalised list comprises the following list of concepts:

- **Cooperation of industry and education**: the education sector has been identified as one of the most important ways to recruit (young) talent

- **Explain hi-tech background and growing potential of the sector**: it is necessary to explain how technological and interesting the sector is

- **Improve working environment**: general comments were linked to the pressures within companies, complexity of operations and low salaries.

- **Increase company reputation**: to attract more (young) people

- **Interdisciplinary teams and skills**: to permit a "cross-fertilisation" of skills and competences between workers and increase curiosity in the sector

- **Online / social networks**: better use of modern tools to increase awareness and attract more workers

- **Standardization of education and training**: to increase international workforce mobility

- **Support engineering topics in education**: to increase skills and competence

- **Work base training** (Dual training / Training on the job / Rotation / Apprenticeship /): to increase flexibility and show that this is a dynamic sector

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3.6.3 Recruitment Methods

Finally, the suggested methods to recruit people into the automotive sector comprised the following normalised list:

- **Cooperation of industry and education**: education, as outlined previously, has been identified as one of the most important methods to recruit young workers, therefore cooperation between the two was identified as a priority

- **Improve working environment**: the main additional comments related to the possibility to offer flexible work, a better salary, more prospects for development and the use the latest technological trends in the company

- **Increase company reputation:** using referral, word of mouth, company visits, etc.

- **No possible method**: some respondents indicated, rather negatively, there is no potential to recruit workers.

- **Online / social networks**: linked to the potential for increasing the user base and approach new audiences

- **Support engineering topics in education**: to increase the technical background and skills / competence of workers and attract new workers.

- **Work based training** (Dual training / Training on the job / Rotation / Apprenticeship / Apprenticeship): the adoption of different "training" approaches needs to be increased

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The Questionnaire have been analysed by the creation of different KPIs as indicated in Table 3.

The eight main GROUPS follow the structure of the Questionnaire:

- Sample characterisation
- Drivers of Change
- Skills
- Job Roles
- VET provision mechanisms
- Recognition and qualification
- Recruitment and attractiveness

#	CATEGORY	KPI	INDICATOR TITLE	UOM	DESCRIPTION
1	SAMPLE CHARACTERISATION	1.1	N° OF RESPONDENTS	N°	COUNT OF THE REPLIES
1	SAMPLE CHARACTERISATION	1.2	CATEGORY	%	CATEGORIES OF STAKEHOLDES
1	SAMPLE CHARACTERISATION	1.3	CATEGORY BY NACE CODES	%	CATEGORIES OF STAKEHOLDERS BY NORMALISED NACE CODES OF COMPANIES
1	SAMPLE CHARACTERISATION	1.4	RESPONDENTS PER COUNTRY	%	RESPONSES PER COUNTRY
1	SAMPLE CHARACTERISATION	1.5	RESPONDENTS JOB TITLE	%	NORMALISED JOB ROLES OF THE RESPONDENTS
2	DRIVERS OF CHANGE	2.1	IMPORTANCE OF DRIVERS OF CHANGE GROUPS	%	"IMPORTANCE" OF THE REPLIES ON DRIVES OF CHANGE GROUPS
2	DRIVERS OF CHANGE	2.2	URGENCY OF DRIVERS OF CHANGE GROUPS	%	"URGENCY" OF THE REPLIES ON DRIVES OF CHANGE GROUPS
2	DRIVERS OF CHANGE	2.3	DoC NEW TECHNOLOGIES AND BUSINESS MODELS: IMPORTANCE	%	"IMPORTANCE" OF THE REPLIES ON SINGLE DoC
2	DRIVERS OF CHANGE	2.4	DoC NEW TECHNOLOGIES AND BUSINESS MODELS: URGENCY	%	"URGENCY" OF THE REPLIES ON SINGLE DoC
2	DRIVERS OF CHANGE	2.5	DoC CLIMATE GOALS, ENVIRONMENTAL […]: IMPORTANCE	%	"IMPORTANCE" OF THE REPLIES ON SINGLE DoC
2	DRIVERS OF CHANGE	2.6	DoC CLIMATE GOALS, ENVIRONMENTAL […]: URGENCY	%	"URGENCY" OF THE REPLIES ON SINGLE DoC
2	DRIVERS OF CHANGE	2.7	DoC SOCIETAL CHANGES AND [...]: IMPORTANCE	%	"IMPORTANCE" OF THE REPLIES ON SINGLE DoC
2	DRIVERS OF CHANGE	2.8	DoC SOCIETAL CHANGES AND […]: URGENCY	%	"URGENCY" OF THE REPLIES ON SINGLE DoC

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#	CATEGORY	KPI	INDICATOR TITLE	UOM	DESCRIPTION
2	DRIVERS OF CHANGE	2.9	DoC STRUCTURAL CHANGES: IMPORTANCE	%	"IMPORTANCE" OF THE REPLIES ON SINGLE DoC
2	DRIVERS OF CHANGE	2.10	DoC STRUCTURAL CHANGES: URGENCY	%	"URGENCY" OF THE REPLIES ON SINGLE DoC
2	DRIVERS OF CHANGE	2.11	DoC GLOBALISATION AND RISE OF NEW PLAYERS: IMPORTANCE	%	"IMPORTANCE" OF THE REPLIES ON SINGLE DoC
2	DRIVERS OF CHANGE	2.12	DoC GLOBALISATION AND RISE OF NEW PLAYERS: URGENCY	%	"URGENCY" OF THE REPLIES ON SINGLE DoC
2	DRIVERS OF CHANGE	2.13	DRIVERS OF CHANGE PRIORITY INDEX	N°	IMPORTANCE X URGENCY
3	SKILLS	3.1	SKILL INDEX	N°	N° OF TIMES THE SKILL IS NOMINATED) X PRIORITY DoC INDEX (RELATED TO THE SKILL)
4	JOB ROLES	4.1	JOB ROLE INDEX	N°	N° OF TIMES THE JOB ROLE IS NOMINATED) X PRIORITY DoC INDEX (RELATED TO THE JOB ROLE)
5	VET PROVISION MECHANISMS	5.1	VET APPROACH	%	NORMALISED REPLIES
5	VET PROVISION MECHANISMS	5.2	VET STRATEGY	%	NORMALISED REPLIES
5	VET PROVISION MECHANISMS	5.3	APPRENTICESHIP: JOB ROLES CURRENT RANKING	%	NORMALISED REPLIES (NORMALISED JOB ROLES)
5	VET PROVISION MECHANISMS	5.4	APPRENTICESHIP: JOB ROLES IN FIVE YEARS	%	NORMALISED REPLIES (NORMALISED JOB ROLES)
5	VET PROVISION MECHANISMS	5.5	APPRENTICESHIP: RECRUITMENT STRATEGIES	%	COUNT OF NORMALISED REPLIES
6	RECOGNITION AND QUALIFICATION	6.1	SKILLS RECOGNITION AND QUALIFICATION FRAMEWORKS	%	COUNT OF NORMALISED REPLIES
7	RECRUITMENT AND ATTRACTIVENESS	7.1	CHALLENGES	%	COUNT OF NORMALISED REPLIES
7	RECRUITMENT AND ATTRACTIVENESS	7.2	APPROACH	%	COUNT OF NORMALISED REPLIES
7	RECRUITMENT AND ATTRACTIVENESS	7.3	METHODS	%	COUNT OF NORMALISED REPLIES

Table 3 KPI groups

All the questions, and relative KPIs (where available) have been analysed by the Overall value and filtered by the selected categories of stakeholders:

- Large Enterprises
- Small and Medium Enterprises (SMEs)
- Sectoral Industrial Associations

The result of this activity is shown in Table 4.

#	CATEGORY	KPI	INDICATOR TITLE	OVERALL	LARGE ENTERPRISE	SMEs	SECTORAL INDUSTRIAL ASSOCIATION
1	SAMPLE CHARACTERISATION	1.1	N° OF RESPONDENTS	X			
1	SAMPLE CHARACTERISATION	1.2	CATEGORY	X			
1	SAMPLE CHARACTERISATION	1.3	WORKFORCE REPRESENTED BY NACE CODE	X			
1	SAMPLE CHARACTERISATION	1.4	RESPONDENTS PER COUNTRY	X	X	X	X
1	SAMPLE CHARACTERISATION	1.5	RESPONDENTS JOB TITLE	X			
2	DRIVERS OF CHANGE	2.1	IMPORTANCE OF DRIVERS OF CHANGE GROUPS	X	X	X	X
2	DRIVERS OF CHANGE	2.2	URGENCY OF DRIVERS OF CHANGE GROUPS	X	X	X	X
2	DRIVERS OF CHANGE	2.3	DoC NEW TECHNOLOGIES AND BUSINESS MODELS: IMPORTANCE	X	X	X	X
2	DRIVERS OF CHANGE	2.4	DoC NEW TECHNOLOGIES AND BUSINESS MODELS: URGENCY	X	X	X	X
2	DRIVERS OF CHANGE	2.5	DoC CLIMATE GOALS, ENVIRONMENTAL […]: IMPORTANCE	X	X	X	X
2	DRIVERS OF CHANGE	2.6	DoC CLIMATE GOALS, ENVIRONMENTAL […]: URGENCY	X	X	X	X
2	DRIVERS OF CHANGE	2.7	DoC SOCIETAL CHANGES AND […]: IMPORTANCE	X	X	X	X
2	DRIVERS OF CHANGE	2.8	DoC SOCIETAL CHANGES AND […]: URGENCY	X	X	X	X
2	DRIVERS OF CHANGE	2.9	DoC STRUCTURAL CHANGES: IMPORTANCE	X	X	X	X
2	DRIVERS OF CHANGE	2.10	DoC STRUCTURAL CHANGES: URGENCY	X	X	X	X
2	DRIVERS OF CHANGE	2.11	DoC GLOBALISATION AND RISE OF NEW PLAYERS: IMPORTANCE	X	X	X	X

#	CATEGORY	KPI	INDICATOR TITLE	OVERALL	LARGE ENTERPRISE	SMEs	SECTORAL INDUSTRIAL ASSOCIATION
2	DRIVERS OF CHANGE	2.12	DoC GLOBALISATION AND RISE OF NEW PLAYERS: URGENCY	X	X	X	X
2	DRIVERS OF CHANGE	2.13	DRIVERS OF CHANGE PRIORITY INDEX	X	X	X	X
3	SKILLS	3.1	SKILL INDEX	X	X	X	X
4	JOB ROLES	4.1	JOB ROLE INDEX	X	X	X	X
5	VET PROVISION MECHANISMS	5.1	VET APPROACH	X	X	X	X
5	VET PROVISION MECHANISMS	5.2	VET STRATEGY	X	X	X	X
5	VET PROVISION MECHANISMS	5.3	APPRENTICESHIP: JOB ROLES CURRENT RANKING	X	X	X	
5	VET PROVISION MECHANISMS	5.4	APPRENTICESHIP: JOB ROLES IN FIVE YEARS	X	X	X	
5	VET PROVISION MECHANISMS	5.5	APPRENTICESHIP: RECRUITMENT STRATEGIES	X	X	X	
7	RECOGNITION AND QUALIFICATION	6.1	SKILLS RECOGNITION AND QUALIFICATION FRAMEWORKS	X	X	X	X
8	RECRUITMENT AND ATTRACTIVENESS	7.1	CHALLENGES	X	X	X	X
8	RECRUITMENT AND ATTRACTIVENESS	7.2	APPROACH	X	X	X	X
8	RECRUITMENT AND ATTRACTIVENESS	7.3	METHODS	X	X	X	X

Table 4 Detailed KPI filters

5 RESULT OF THE SURVEY - SAMPLE CHARACTERISATION BASED ON GENERAL INFORMATION

This section outlines the questionnaire results based on the general information provided by respondents. The following sections analyse different aspects of the survey results.

5.1 NUMBERS OF RESPONDENTS AND CATEGORIES

Part or all of the survey was completed by **332 respondents**. Inclusion for further analysis was based on the criteria that only those respondents completing at least the Drivers of Change section were included. Based on this, further analysis has been undertaken on a sample of 184 responses from automotive stakeholders. The profile of these stakeholders comprises 74% automotive companies and 26% automotive sector organisations.

Figure 10 provides an overview of the overall sample divided by categories of Companies (Large Enterprise, Medium Enterprise, Small Enterprise, Micro Enterprise) and Organisations (Sectoral Industrial Association, Technology Centre, Trade Union, Education, Employment Service, Training and Consulting).

Sectoral associations and trade unions comprise 19.1% of total responses. However, it should be noted that this set of stakeholders represent their entire membership, which in many cases comprises hundreds of members from the automotive sector. Large enterprises, which are companies employing more than 250 people, represent 52.7% of questionnaire responses. SMEs (Small and Medium-sized Enterprises), which comprise enterprises employing less than 250 persons and with an annual turnover not exceeding EUR 50 million comprise 22.3% of total responses. These are further sub divided into

Micro Enterprises (Less than 10 employees) as, Small Enterprises (10 to 49 employees) and Medium Enterprises (50 up to 249 employees).
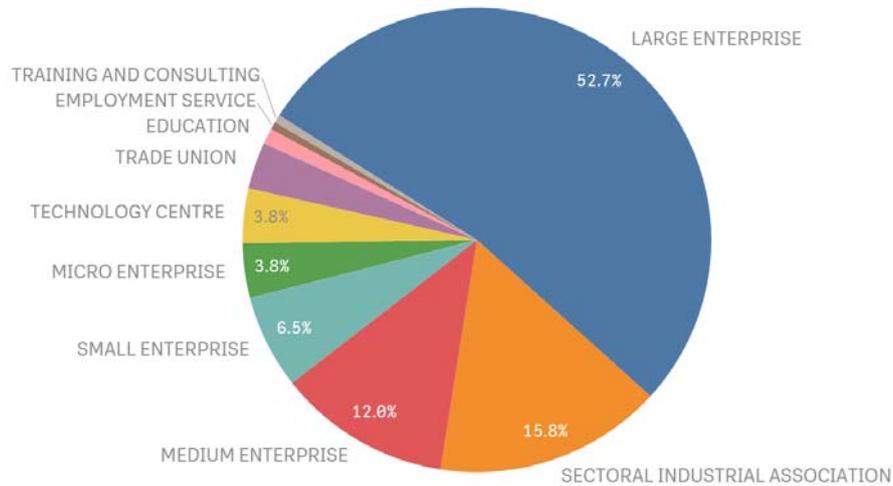

Figure 10 KPI 1.2 Categories of Stakeholders

5.2 NACE CODE REPRESENTED

Nomenclature statistique des activités économiques dans la Communauté européenne (NACE) is the "statistical classification of economic activities in the European Community" and is the subject of legislation at the European Union level, which imposes the use a uniform classification across the EU[35]. The main set of NACE codes defined by the project[36] is described and mapped to categories in the supply chain in Figure 11.

Figure 11 Aggregation of NACE codes per Automotive supply chain steps

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[35]   https://ec.europa.eu/eurostat/web/nace-rev2/overview

[36]   DRIVES report "D2.9.1 Automotive Skills strategic Roadmap: preliminary strategic analysis"

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Responses from Companies were analysed by NACE code. The different categories of Company responses by NACE code are outlined in Table 5. The table contains predefined NACE codes and also additional NACE codes identified by respondents themselves. The Table indicates that Manufacturers of motor vehicles (grey colour, referring to Figure 11) comprise 10.87% of total responses. The Automotive supplier group (light blue) comprises 52% of all responses, the largest major group of respondents. The Sales (yellow) category comprises 3.81% of total responses with Aftermarket (green) representing less than 1% of responses. Engineering activities and related technical consultancy together with computer programming and consultancy activities (orange) represents almost 6% of responses.

NACE Code	NACE Name	Percentage
C29.3	MANUFACTURE OF PARTS AND ACCESSORIES FOR MOTOR VEHICLES	42.39%
NONE	ORGANISATIONS	25.54%
C29.1	MANUFACTURE OF MOTOR VEHICLES	10.87%
M71.1.2	ENGINEERING ACTIVITIES AND RELATED TECHNICAL CONSULTANCY	4.89%
C29.2	MANUFACTURE OF BODIES (COACHWORK) FOR MOTOR VEHICLES; MANUFACTURE OF TRAILERS AND SEMI-TRAILERS	3.80%
G45.3	SALE OF MOTOR VEHICLE PARTS AND ACCESSORIES	2.72%
C22.1.1	MANUFACTURE OF RUBBER TYRES AND TUBES; RETREADING AND REBUILDING OF RUBBER TYRES	2.17%
C29.3.2	MANUFACTURE OF OTHER PARTS AND ACCESSORIES FOR MOTOR VEHICLES	1.63%
G45.1	SALE OF MOTOR VEHICLES	1.09%
C22.1.9	MANUFACTURE OF OTHER RUBBER PRODUCTS	0.54%
C25.1.1	MANUFACTURE OF METAL STRUCTURES AND PARTS OF STRUCTURES	0.54%
C25.5.0	FORGING, PRESSING, STAMPING AND ROLL-FORMING OF METAL; POWDER METALLURGY	0.54%
C26.5.1	MANUFACTURE OF INSTRUMENTS AND APPLIANCES FOR MEASURING, TESTING AND NAVIGATION	0.54%
G45.2	MAINTENANCE AND REPAIR OF MOTOR VEHICLES	0.54%
J62.0.1	COMPUTER PROGRAMMING ACTIVITIES	0.54%
J62.0.2	COMPUTER CONSULTANCY ACTIVITIES	0.54%
M72.1.9	OTHER RESEARCH AND EXPERIMENTAL DEVELOPMENT ON NATURAL SCIENCES AND ENGINEERING	0.54%
P85.3.2	TECHNICAL AND VOCATIONAL SECONDARY EDUCATION	0.54%

Table 5 NACE Codes Represented

5.3 RESPONDERS PER COUNTRY

The survey was targeted at EU partner countries, by dissemination through project channels and partners networks, such as European umbrella associations and national associations and its members.

As is depicted in Figure 12 (worldwide view) and Figure 13 (European focus), survey responses cover the majority of EU partner countries, including those with high involvement in automotive sector, as indicated by numbers employed in the sector.

According to ACEA, 15.8 million people (7.3% of the EU employed population) work directly and indirectly in the sector. The 3.4 million jobs in automotive manufacturing represent over 11% of total EU manufacturing employment. Motor vehicles account for some €413 billion in tax contributions in the EU15 alone – almost three times the total EU budget. The automobile industry exported 5.9 million motor vehicles in 2017, generating a trade surplus of €90.3 billion for the EU[37].

Two types of replies were considered, either based on facility location or headquarter location. Respondents indicated the country where the Headquarters (HQ) of the Company or Organisation they represent were located. If they were replying on behalf of a specific facility or department, the facility country location was also identified. The value of the country presented in this KPI and views is composed from country of HQ and from country of facility or department. If the country of facility or department is filled in, then it is the value of country. If the respondent was replying for overall HQ and filled in only HQ country, then the value of country is HQ.
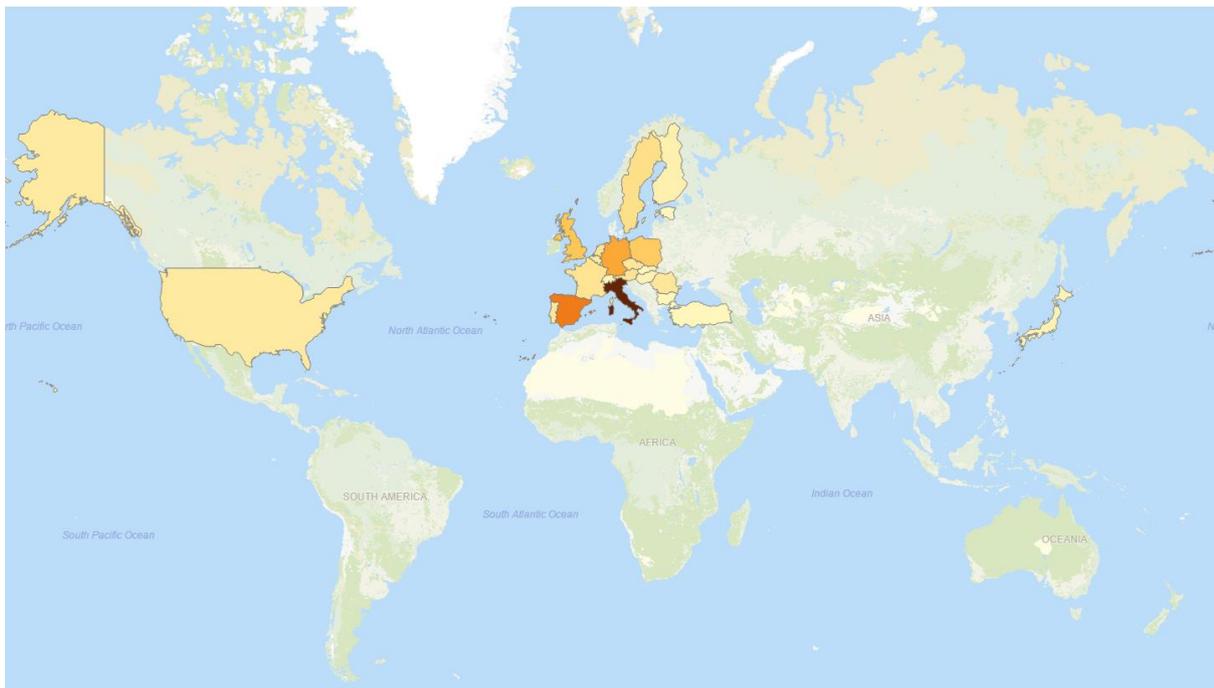

Figure 12 KPI 1.4 Responders per country – World – Overall sample

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[37]   DRIVES report "D2.9.1 Automotive Skills strategic Roadmap: preliminary strategic analysis"

The survey is focused on the countries where the companies and organisations replying to the questionnaire are located, not on the location of the person providing the information. Taking the example of a respondent located in a company facility or department in Germany, but replying not for this facility or department, but for whole company, which has an HQ in France, then the value of the country applied in the analysis is France. Using the same example, in case of a respondent replying for the facility or department of the company or organisation only, then the HQ is indicated in France, but the value of the country applied is Germany.
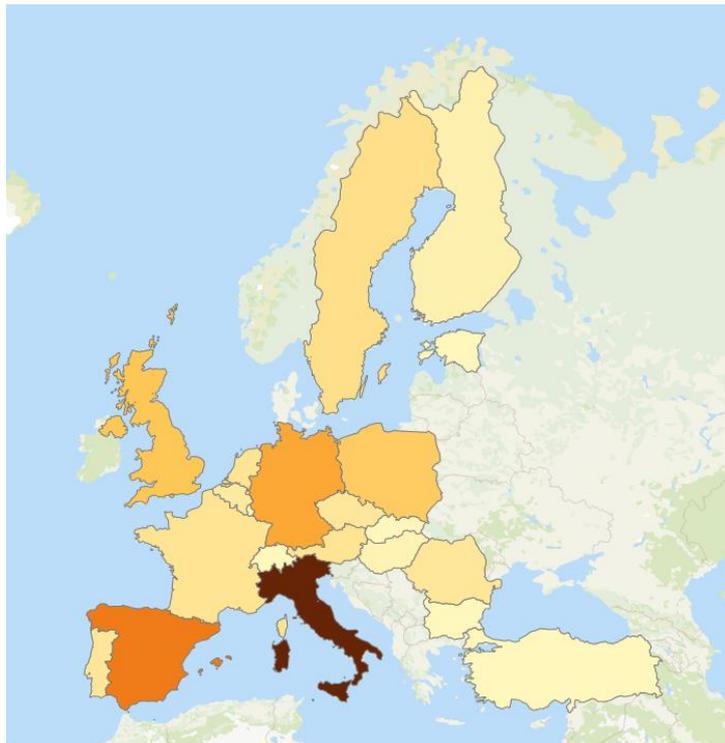

Figure 13 KPI 1.4 Responders per country – Europe – Overall sample

The scale from light to dark colour in Figure 12 and Figure 13 represents the percentage coverage of respondents per country. The actual percentage is described in detail in Table 6. The geographical profile of questionnaire responses from companies or organisations indicate a particularly high proportion from Italy, with 25%, followed by Spain (14%) and Germany (10%). However, this analysis is focused solely on number of responses. As is described in section 5.1 NUMBERS OF RESPONDENTS AND CATEGORIES, one of the major categories of respondents is Sectoral Industrial Associations, which

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reflects inputs from their membership. This naturally brings need of weighting the results, which is provided by different views, which follows categories of stakeholders and elaboration of its results.

Country	Percentage
Italy	25.0%
Spain	13.6%
Germany	9.8%
United Kingdom	7.1%
Poland	6.5%
Sweden	4.3%
Austria	3.8%
France	3.8%
Netherlands	3.8%
Czech Republic	3.3%
Portugal	3.3%
Romania	3.3%
Belgium	2.7%
United States of America	2.7%
Finland	1.6%
Hungary	1.1%
Japan	1.1%
Bulgaria	0.5%
Estonia	0.5%
Luxembourg	0.5%
Slovakia	0.5%
Switzerland	0.5%
Turkey	0.5%

Table 6 KPI 1.4 Respondents per country – Overall sample

Figure 14 KPI 1.4 Responders per country – Large Enterprises sample

Figure 14 shows the KPI 1.4 by Large Enterprises. The situation is quite similar to patterns outlined in the previous Figure 12. Table 7 indicates that the 3 top countries are the same in both cases with slight differences in the relative ranking of these top 3, with Germany ranked second in Table 7, rather than Spain in the previous analysis.

Country	Percentage
Italy	25.8%
Germany	15.5%
Spain	12.4%
Poland	7.2%
United Kingdom	7.2%
Sweden	5.2%
United States of America	5.2%
France	4.1%
Netherlands	4.1%
Austria	3.1%
Belgium	2.1%
Czech Republic	2.1%
Portugal	2.1%
Romania	2.1%
Finland	1.0%
Turkey	1.0%

Table 7 Respondents per country – Large Enterprise sample

Figure 15 KPI 1.4 Responders per country – SMEs sample

Figure 15 and related Table 8 represent KPI 1.4 for by SMEs. A markedly different geographical profile of SME respondents is evident, with Germany no longer reflected in the TOP3 in terms of number of responses, with Poland moving to the ranking of 3rd. Some EU countries such as France and Germany are not directly represented in this category at all, although indirectly represented through their respective national associations.

Country	Percentage
Italy	48.8%
Spain	12.2%
Poland	7.3%
Japan	4.9%
Netherlands	4.9%
Romania	4.9%
Austria	2.4%
Bulgaria	2.4%
Czech Republic	2.4%
Finland	2.4%
Sweden	2.4%
Switzerland	2.4%
United Kingdom	2.4%

Table 8 Respondents per country – SMEs
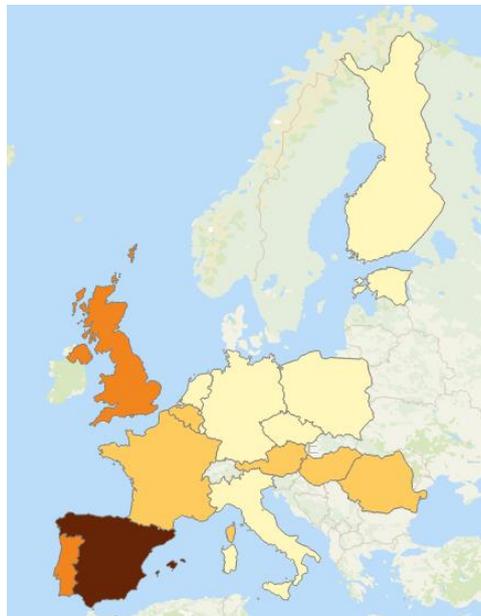
Figure 16 KPI 1.4 Responders per country – Sectoral Industrial Associations sample

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The Associations' KPI 1.4 analysis is outlined in Figure 16 and Table 9. The analysis includes both National and Regional Associations. As it was described also in previous text, this analysis is focused solely on number of responses. The analysis from viewpoint of Sectoral Industrial Associations reflects inputs from their membership, which they represent. The figure shows coverage of replies from Sectoral Industrial Associations across the Europe.

Country	Percentage
Spain	17.2%
Portugal	10.3%
United Kingdom	10.3%
Austria	6.9%
Belgium	6.9%
France	6.9%
Hungary	6.9%
Romania	6.9%
Czech Republic	3.4%
Estonia	3.4%
Finland	3.4%
Germany	3.4%
Italy	3.4%
Luxembourg	3.4%
Netherlands	3.4%
Poland	3.4%

Table 9 Respondents per country – Sectoral Industrial Associations sample

5.4 RESPONDENTS JOB TITLE

The normalisation process of JOB TITLES followed 3 consecutive steps. The first activity comprised typographical normalisation: a step necessary to transform different languages used by respondents or mistakes relating typographical errors or acronyms into a normalised English language. The second activity was based on the Occupational ESCO classification[38]. The last step involved aggregation of similar JOB TITLES into broader categories to enable easy and functional mapping of the relative rankings.

Details of the specific categories used are outlined below:

- **CEO/DIRECTOR:** CEO, Director, Chairman, C levels, General Manager, Vice President, Owner, Plant manager, Secretary General

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[38] *https://ec.europa.eu/esco/portal/occupation*

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- **CLERICAL SUPPORT WORKERS**: Assistant, Communication, CSR Analyst, Graduate, Employee

- **CHIEF ENGINEER**: Chief Engineer, Chief Expert

- **CONSULTANT**: Advisor, Consultant

- **DIRECTOR (HR)**: Director Human Resource, HR Director, HR Corporate Director

- **ENGINEER**: all Engineers not included in the Chief Engineer category

- **MANAGER**: Manager, CSR, Marketing, Public Affairs, R&D Department

- **MANAGER (HR)**: HR Manager, HR Specialist, HR Technician, Talent Manager

- **PROFESSOR/TRAINER**: Assistant Professor, Head of Academy, Scientist, Vice-rector

- **OTHER**: not specified field
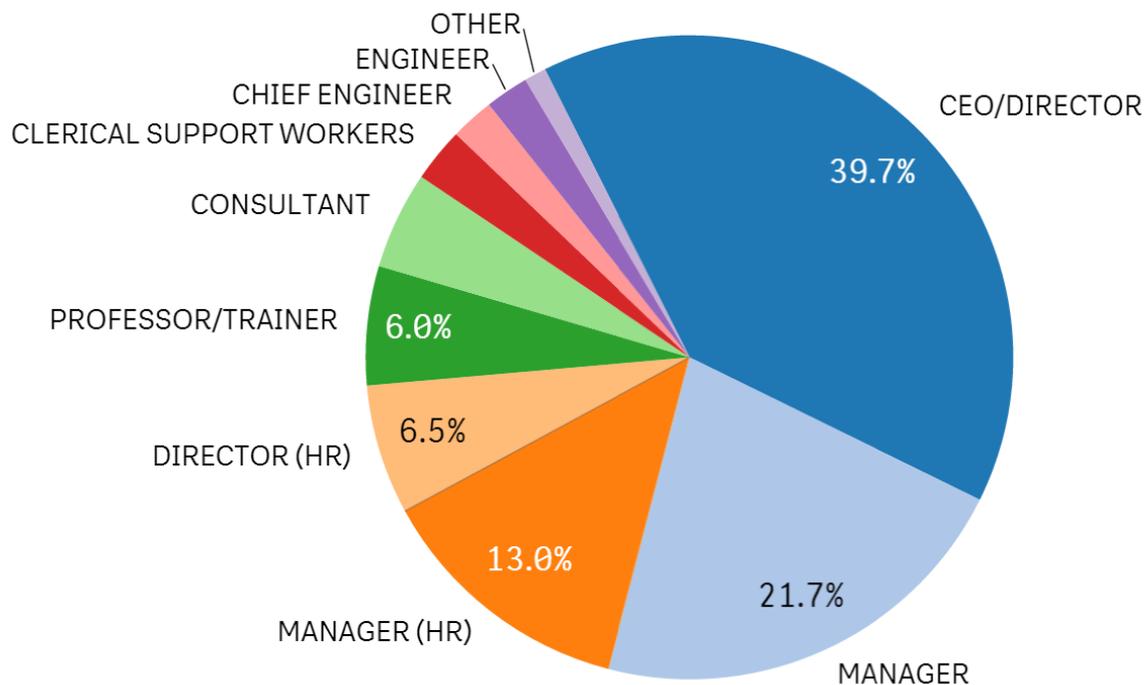
Figure 17 KPI 1.5 Respondents Job Title

Figure 17 provides an overview of respondents by job title. The analysis points to a high incidence of CEO/DIRECTOR and MANAGER job titles, accounting for about 90% of total respondents (of which MANAGER comprises 35%). The remainder of respondents (10%) comprise Professor/Trainer, Consultant, Clerical support workers, Chief Engineer, Engineer and others.

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6 RESULT OF THE SURVEY - DRIVERS OF CHANGE

For each Driver of Change respondents were asked to comment on two key issues:

- **Importance**: The relative importance of each Driver of Change for the respondents' particular business using a ranking from 0 to 5
    - o 0 = not applicable
    - o 1 = not important
    - o 2 = Slightly important
    - o 3 = Moderately Important
    - o 4 = Important
    - o 5 = very important

- **Urgency**: Respondents were asked to identify the relative importance of the impact of each specific Driver of Change over the periods up to 2020, 2025 and 2030
    - o by 2020: 5 = very urgent
    - o by 2025, 3 = urgent
    - o by 2030 and later, 1 = not urgent

6.1   IMPORTANCE OF DRIVERS OF CHANGE GROUPS
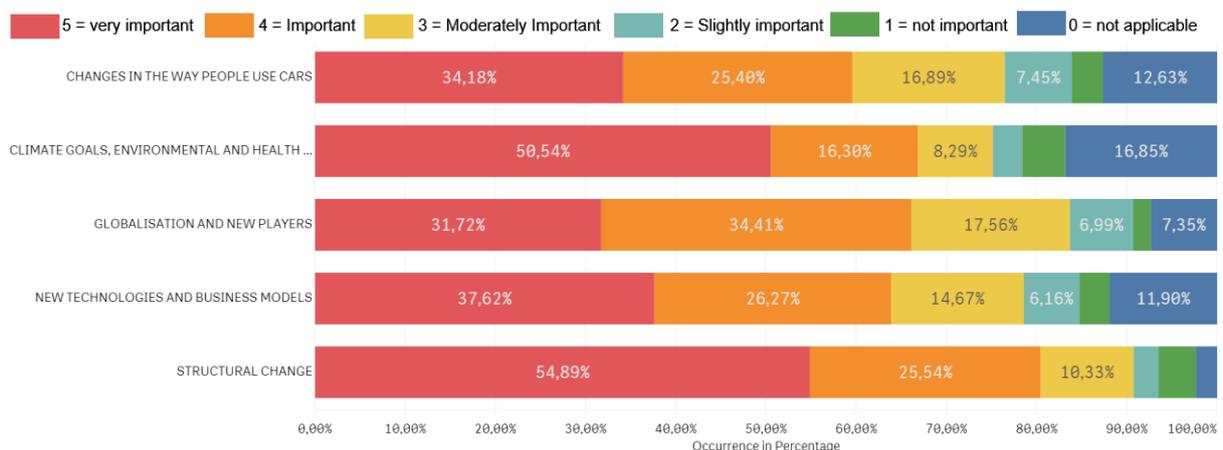
Figure 18 KPI 2.1: DRIVERS OF CHANGE Groups: IMPORTANCE – Overall sample

Based on analysis of those responses identifying the level of importance attributed to each Driver Of Change as 5, Figure 18 indicates that „STRUCTURAL CHANGE" is identified as the most important with 55% of respondents scoring this Driver of Change as 5. This is followed by „CLIMATE GOALS,

MODELS" (38%). If all responses scoring each Driver of Change between 3-5 are included, the relative importance of each Driver changes. Based on this criteria, „STRUCTURAL CHANGE" remains ranked first on this basis with 91%, with „GLOBALISATION AND THE RISE OF NEW PLAYERS" ranked second (84%) and „NEW TECHNOLOGIES AND BUSINESS MODELS" third (79%).

„CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES" was the Driver of Change associated with the highest number of respondents scoring 0 (not applicable), but was also ranked second in relation to those giving a score of 5 (very important).
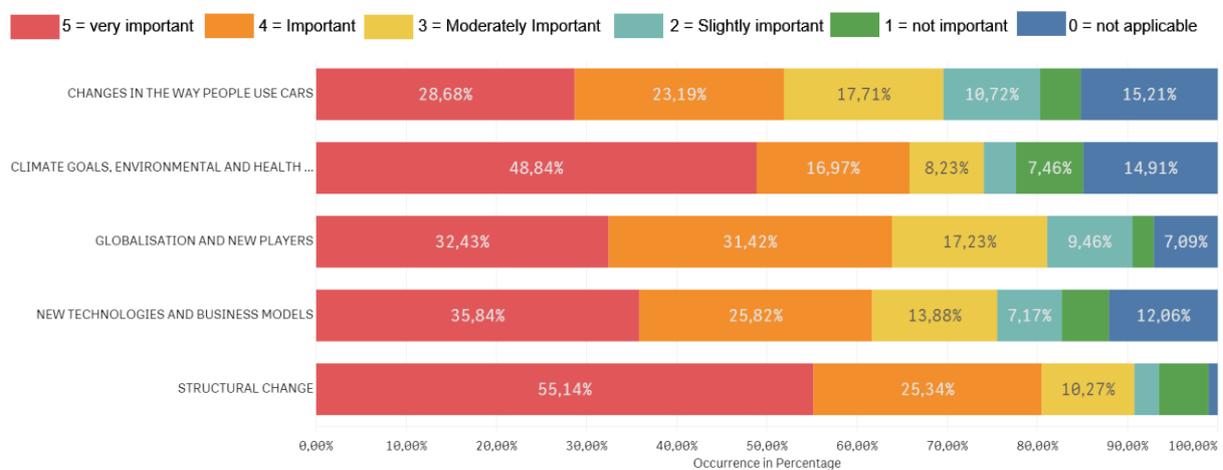
Figure 19 KPI 2.1: DRIVERS OF CHANGE Groups: IMPORTANCE – Large Enterprise sample

Figure 19 outlines the same analysis for KPI 2.1 but just in relation to Large Enterprises. The analysis points to a similar pattern to that outlined in the previous Figure 18. Based on inclusion of all those scoring 3-5, patterns of responses are broadly similar to that of all respondents, although the difference between the 3rd and 4th ranked positions are minimal.
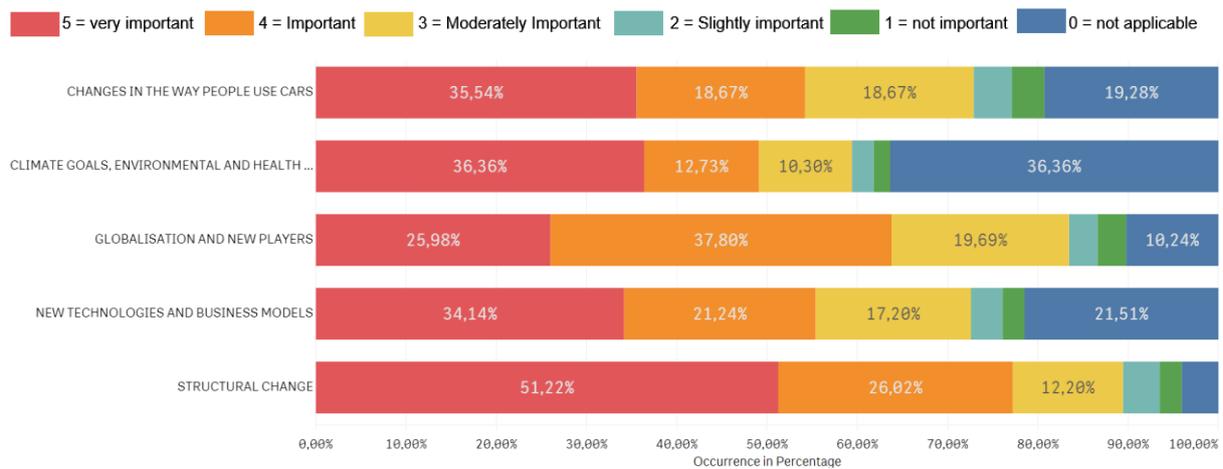
Figure 20 KPI 2.1: DRIVERS OF CHANGE Groups: IMPORTANCE – SMEs sample

Figure 20 outlines analysis related to KPI 2.1 but for responses from SMEs. The analysis points to some significant differences in patterns of response. While "STRUCTURAL CHANGE" remains ranked first in importance amongst SME's, "CHANGES IN THE WAY PEOPLE USE CARS" (72.88%) is ranked 2nd, closely followed by „NEW TECHNOLOGIES AND BUSINESS MODELS" (72.58%). Amongst SMEs an increased proportion of "not applicable" responses is evident for all five Drivers of Change, with this accounting for 36.36% of responses in relation to "CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES"
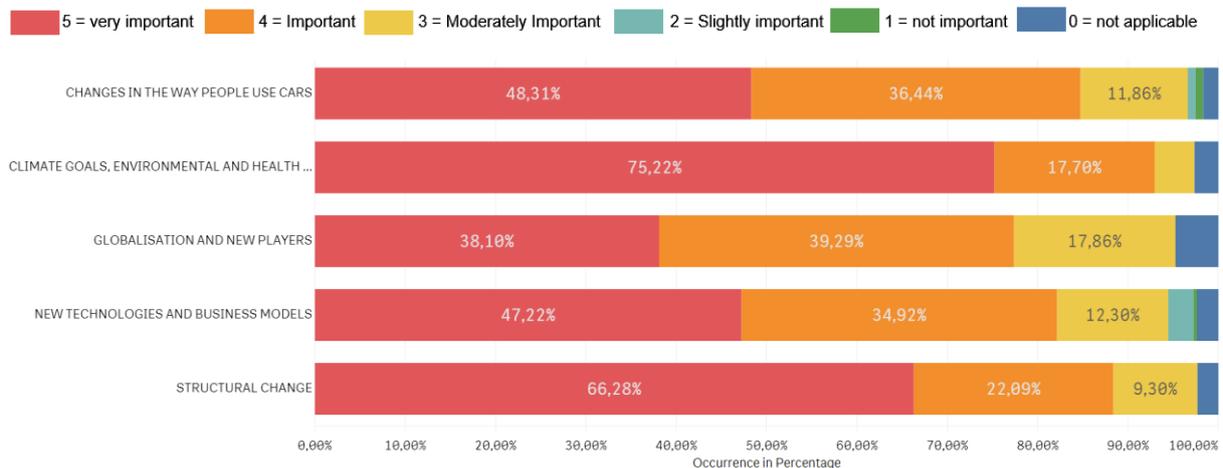

Figure 21 KPI 2.1 DRIVERS OF CHANGE Groups: IMPORTANCE - Sectoral Industrial Associations sample

Analysis of responses from Sectoral Industrial Associations indicates that scores between 3 and 5 in terms of levels of importance have in general accounted for more than 90% of all responses across all Drivers of Change, with minimal "not applicable" responses. Amongst Sectoral Industrial Associations "CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES" is considered 'very important' by 75%

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of those responding and considered the most important Driver of Change within the sector, followed by "STRUCTURAL CHANGE" and "CHANGES IN THE WAY PEOPLE USE CARS".

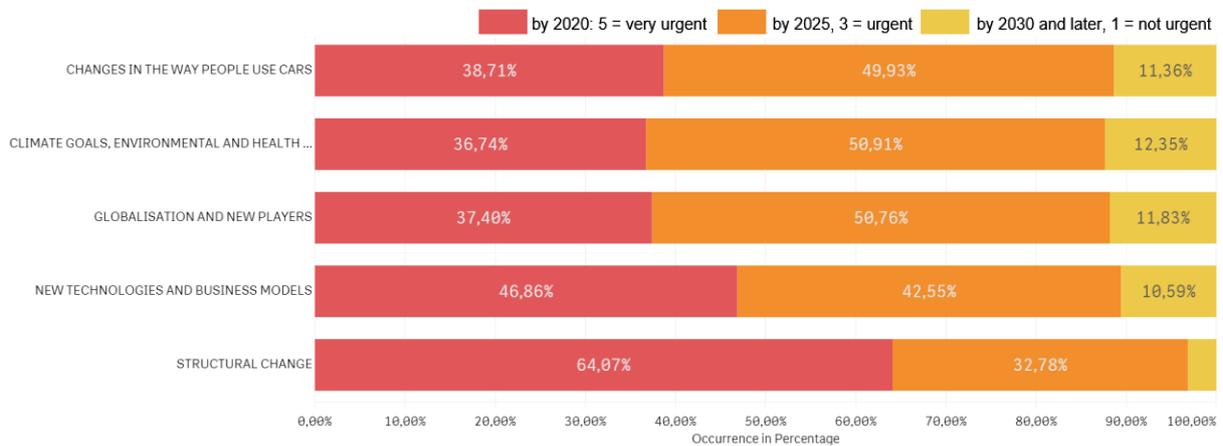## 6.2 URGENCY OF DRIVERS OF CHANGE GROUPS

Figure 22 KPI 2.2: DRIVERS OF CHANGE Groups: URGENCY – Overall sample

Figure 22 outlines analysis of the relative urgency of Drivers of Change split into three options: by 2020 (very urgent), by 2025 (moderately urgent) and by 2030 and later (not urgent).

The analysis indicates that most respondents identify that each Driver of Change as either urgent (by 2020) or moderately urgent (by 2025). Looking at respondents identifying each Driver as 'very urgent' it is evident that the "STRUCTURAL CHANGE" with 64% of responses in this category is the most urgent Driver of Change, followed by "NEW TECHNOLOGIES AND BUSINESS MODELS"(47%) and "CHANGES IN THE WAY PEOPLE USE CARS" (38.71%). Examining the most frequent response in terms of level of urgency for each Driver of Change, "STRUCTURAL CHANGE" (scored very urgent by 64% of respondents) is followed by "CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES" (moderately urgent 50.91%), "GLOBALISATION AND NEW PLAYERS" (moderately urgent by 50.76%) and "CHANGES IN THE WAY PEOPLE USE CARS" (moderately urgent by 49.93%).
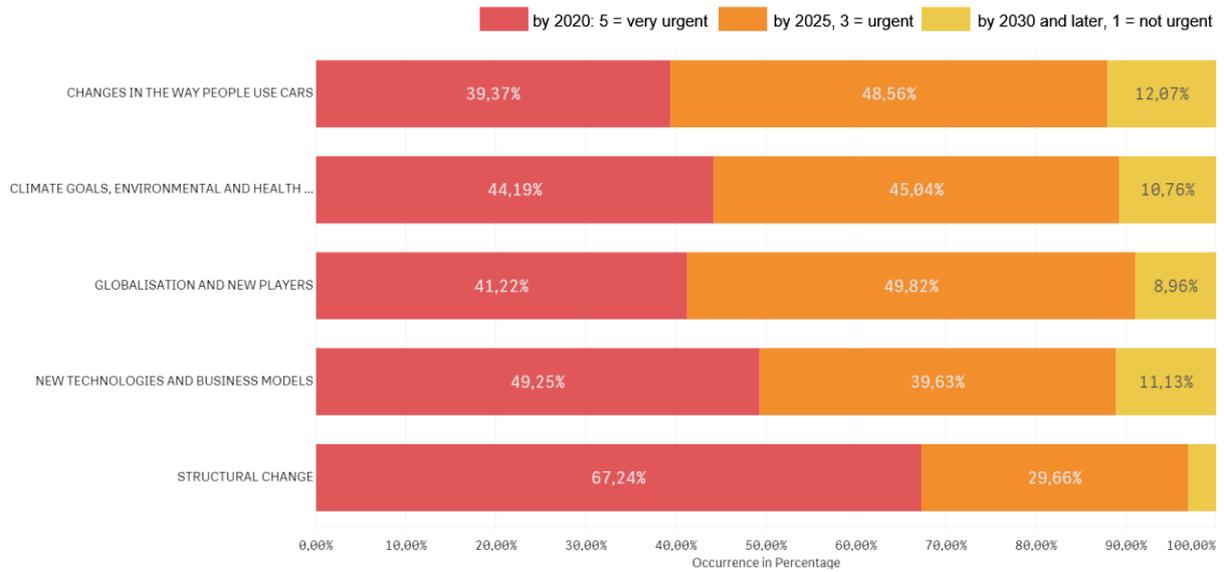
Figure 23 KPI 2.2: DRIVERS OF CHANGE Groups: URGENCY – Large Enterprise sample

Applying the same analysis for KPI 2.2, but only for Large Enterprises, points to somewhat different perceptions in terms of the relative levels of urgency of each Driver. While "STRUCTURAL CHANGE" (very urgent by 67.24%) is still ranked first in terms of those identifying the issue as 'very urgent', with NEW TECHNOLOGIES AND BUSINESS MODEL (very urgent by 49.25%) still second on this basis, the relative urgency attached to "CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES" increases (with 44% indicating this is 'very urgent').
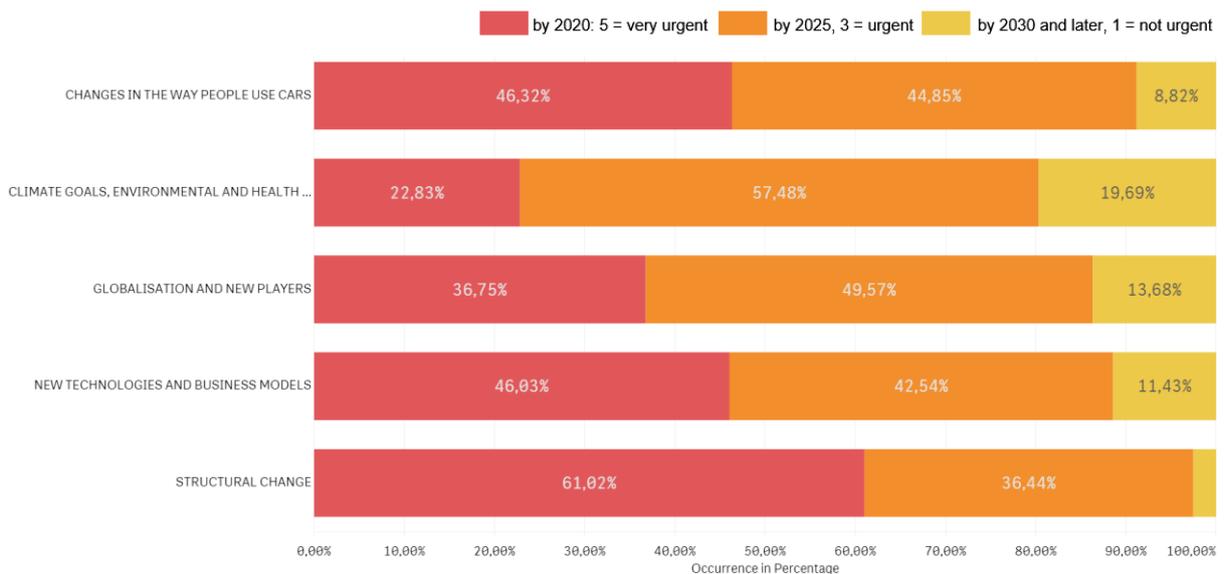

Figure 24 KPI 2.2: DRIVERS OF CHANGE Groups: URGENCY – SMEs sample

Patterns of responses are again slightly different amongst SME's with "STRUCTURAL CHANGE" remaining the most urgent (61.02% indicating 'very urgent'). With respect to "CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES" 23% indicated this was 'very urgent' but 57.48% (moderately urgent) and with respect to "GLOBALISATION AND NEW PLAYERS" 49.57% indicated this was moderately urgent.
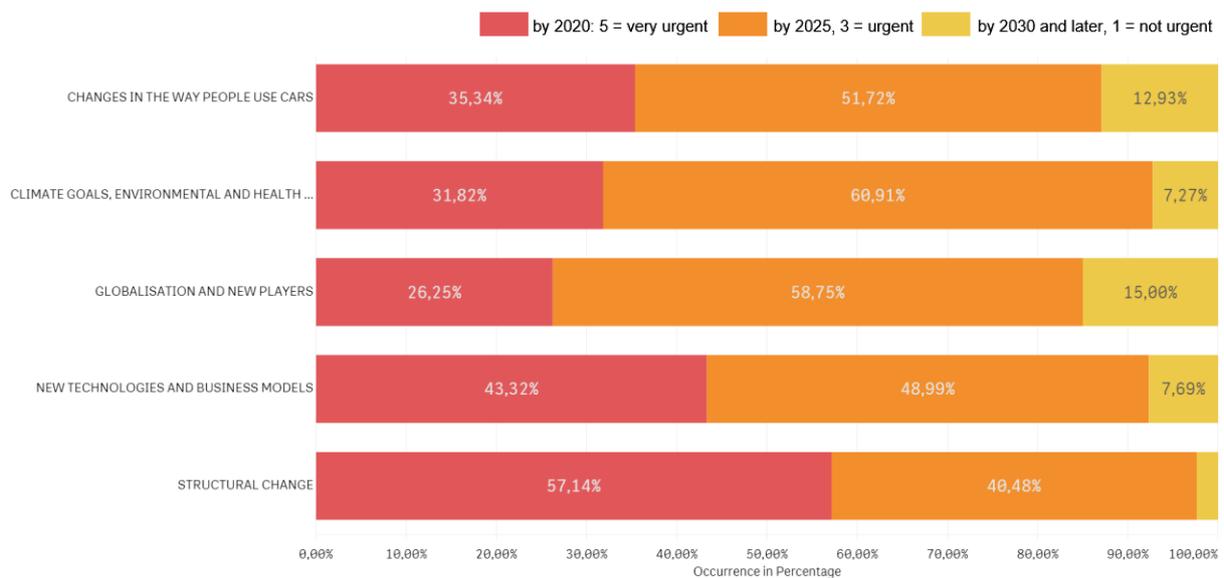

Figure 25 KPI 2.2: DRIVERS OF CHANGE Groups: URGENCY – Sectoral Industrial Association sample

Responses from Sectoral Industrial Associations with respect to KPI 2.2 are outlined in Figure 25 and indicate somewhat less urgency in relation to "CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES" (58.75% indicate this is moderately urgent), and "GLOBALISATION AND NEW PLAYERS" (58.75% indicate this is moderately urgent). STRUCTURAL CHANGE remains the Driver of Change most likely to be identified as 'very urgent' (57.14% of response).

6.3   NEW TECHNOLOGIES AND BUSINESS MODELS

These developments will lead to changes in the production and capability of vehicles. They will require substantial funding and/or financial support. Public authorities will have a key role to play in facilitating the roll-out of automated driving and alternative powertrains by putting in place relevant policies that will allow the sector to accommodate new requirements in a timely manner, together with the necessary financing frameworks to support these changes.

Companies in the automotive sector are facing constant developments in the area of; advanced manufacturing, materials and the complexity of global supply chains. This will result in many jobs and

Individual Drivers of Change in this category are:

- **Connected and Automated Driving (CAD), Advanced Driver Assistance Systems (ADAS)**

  These are aspects related to the assistance and automation of the driving activities to reduce road fatalities by minimising human errors, providing new services and accessibility, improving traffic flow and moving a vehicle without active driver interventions

- **Electrification**

  It is clear that running out of crude oil and the need for CO_2 global reduction are both critical issues in Europe. Electrification in the whole powertrain is a possible strategy to tackle this issue.

  Electrification has been identified as one of the possible solutions to help achieve CO_2 global reduction and improve local air quality.

- **Handling of / access to, vehicle data**

  Increasing technology inside a vehicle and the relative necessity to be connected drive the needs to manage and access huge quantities of data quickly. Big data and analytics will allow players to optimise vehicle usage and forecast maintenance requirements (predictive maintenance).

- **Advanced manufacturing, digitalisation and robotization of the manufacturing process**

  Firms in the automotive sector are facing constant developments in the area of advanced manufacturing and integrating the results of technological research into manufacturing processes. Moreover, Manufacturing 4.0 can create efficiency and reduce (indirect) costs.

- **Alternative powertrains:**

  The variation from internal combustion to a CO_2 neutral mobility is directly connected to changes in powertrains.

- **New communications technologies:**

  In the near future the vehicle will be connected, with digital technologies changing the way data is transferred and utilised. These new communication technologies have a key strategic importance in relation to changes in the sector.

- **3D printing:**

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It is a technology that can lead to a reduction in the costs of production as well as a reduction in defects and will also have an impact on jobs and skill requirements. Moreover, it is useful for rapid prototyping and advanced manufacturing and enables prototypes to be 'moved' between different players within the supply chain very quickly and efficiently.

- **New / advanced materials**

Modern car parts are increasingly made of lighter materials and these new / advanced materials are driving the strategies for future evolution in terms of product, design and performance.

- **OEM products standardisation and plug&play**

The car assembly process will be performed by robots with higher IA and the tendency will be to use ready-built and plug & play parts to make activities more efficient and faster; moreover, OEMs will improve process and cost efficiency and might be able to set the standards in a market where brand attractiveness will diminish (due to the shift between car-owner to car-user). Common online platforms might connect supply and demand globally to increase the efficiency of players across the supply chain.

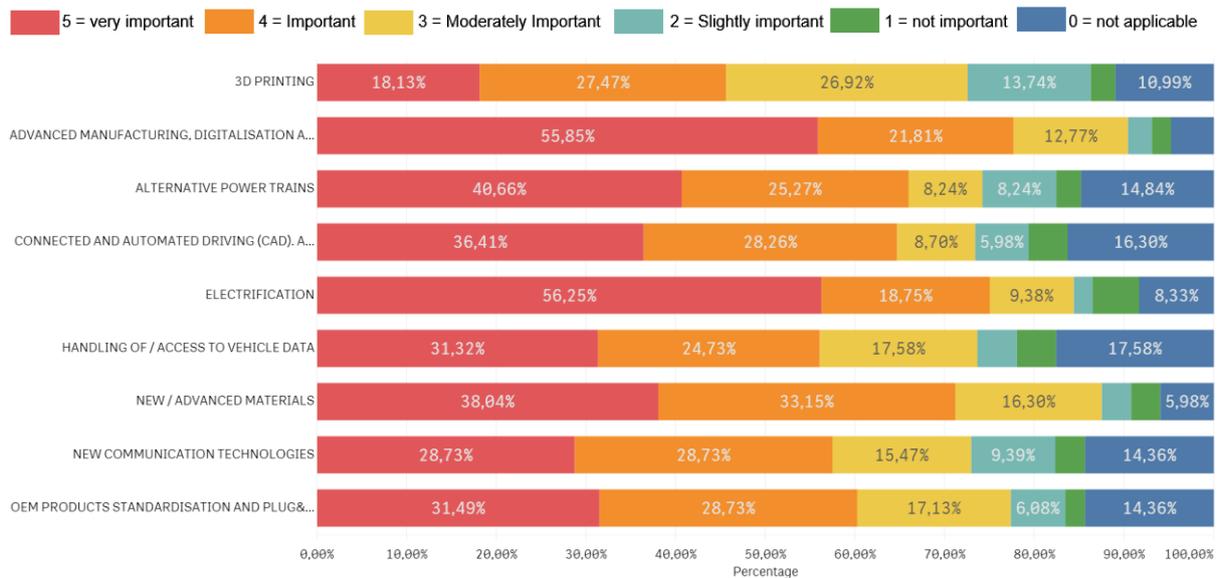### 6.3.1   New Technologies and Business Models: Importance

Figure 26 KPI 2.3 Drivers of Change – Group NEW TECHNOLOGIES AND BUSINESS MODELS – IMPORTANCE – Overall sample

Figure 26 outlines the relative importance of each specific Driver of Change within the overall "NEW TECHNOLOGIES AND BUSINESS MODEL GROUP" of Drivers of Change. In relation to analysis of those responses scored as 'very important' (5), "ELECTRIFICATION" (56.25%) and "ADVANCED MANUFACTURING, DIGITALISATION AND ROBOTIZATION OF THE MANUFACTURING PROCESS" (55.85%) are ranked first and second respectively. When all scores of 3 or higher are included, these two specific Drivers of Change remain on the TOP3 ranking in relation to importance, together with "NEW ADVANCED MATERIALS".

With the exception of "3D PRINTING" 'very important' (score of 5) is the most frequent score for all specific Drivers of Change in this Group, underlining the overall importance attached to the "NEW TECHNOLOGIES AND BUSINESS MODEL GROUP" in terms of driving change in the sector.

Figure 27 KPI 2.3 Drivers of Change – Group NEW TECHNOLOGIES AND BUSINESS MODELS - IMPORTANCE - Large Enterprise sample

Figure 27 is focussing now only on Large Enterprises, a similar pattern is evident in terms of the relative importance of each KPI 2.3 Driver of Change, although the proportion of responses with a 'very important' score (5) is somewhat higher in the case of both "ELECTRIFICATION" and "NEW/ADVANCED MATERIALS". 3D PRINTING" is the specific Driver of Change with the lowest proportion of responses scored as' very important' at 13,54%. With respect to the proportion of responses with a zero score (not relevant), by comparison with the scores for all enterprise sizes, the percentage for "HANDLING / ACCESS TO VEHICLE DATA" increases from 17,58% to 20,62%.
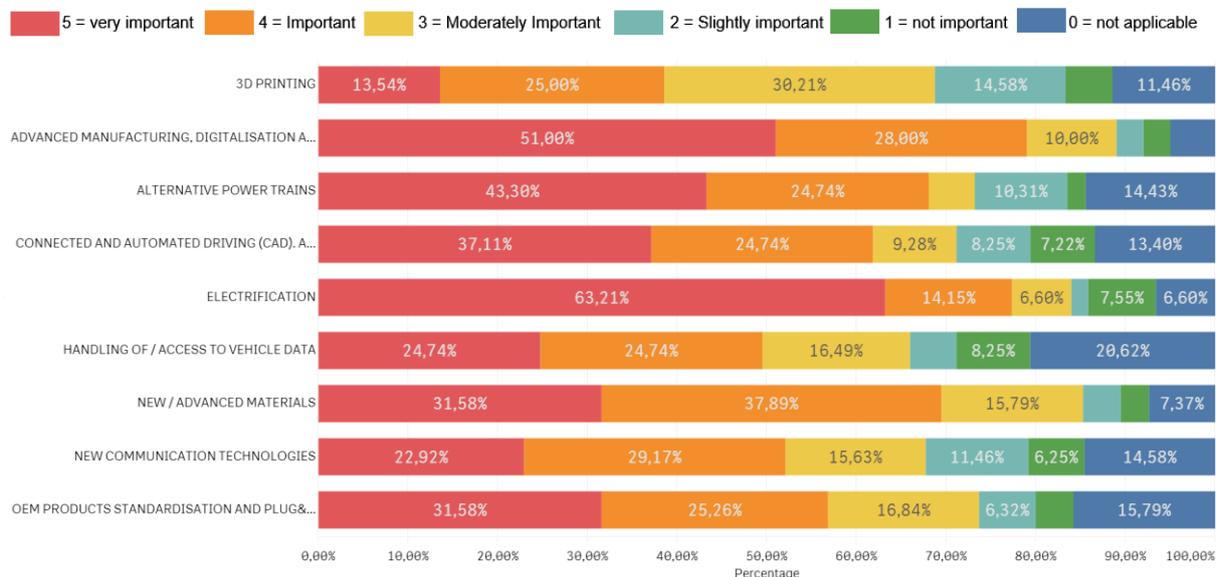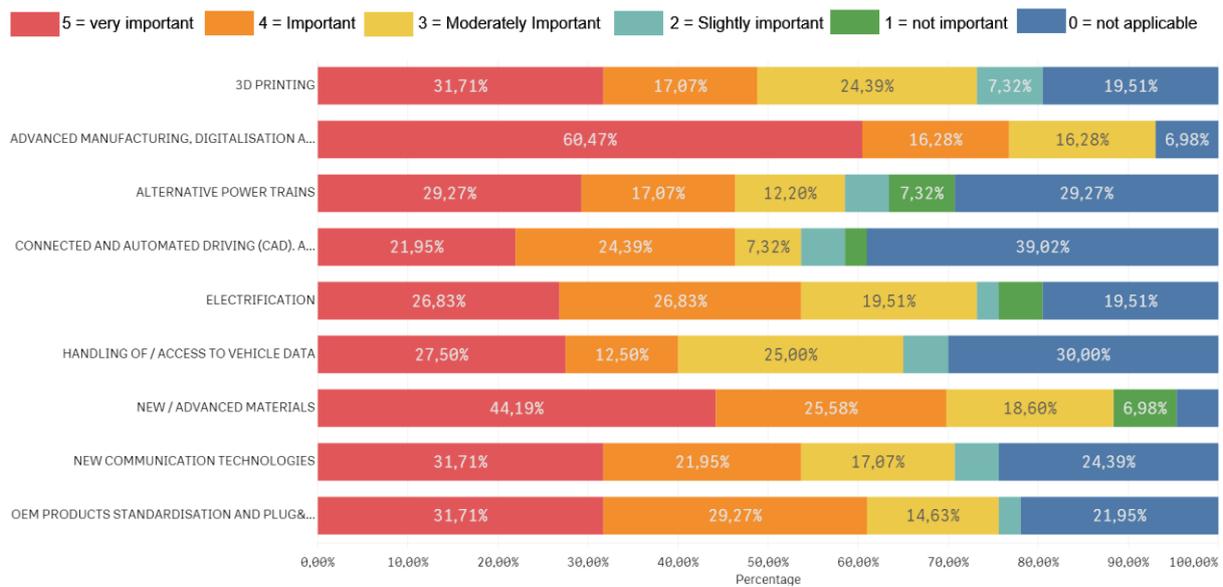
Figure 28 KPI 2.3 Drivers of Change – Group NEW TECHNOLOGIES AND BUSINESS MODELS - IMPORTANCE – SMEs sample

Focussing only on SME's, slightly different patterns are evident in relation to the relative importance attached to each specific Driver of Change, when compared with responses for all enterprises. In particular, "ELECTRIFICATION" is not considered as important measured in terms of the proportion of responses with a score of 'very important', with a decrease of about 30%, as outlined in Figure 28.

By contrast, "3D PRINTING", "NEW / ADVANCED MATERIALS" and "ADVANCED MANUFACTURING, DIGITALISATION AND ROBOTIZATION OF THE MANUFACTURING PROCESS", all increased in terms of the proportion of responses (when measured on the same basis) by 13.58%, 6.15%, and 4.62% respectively. This points to a greater emphasis placed by SME's on the importance of technical improvements and manufacturing process changes relating to products and processes than is the case for Large Enterprises.
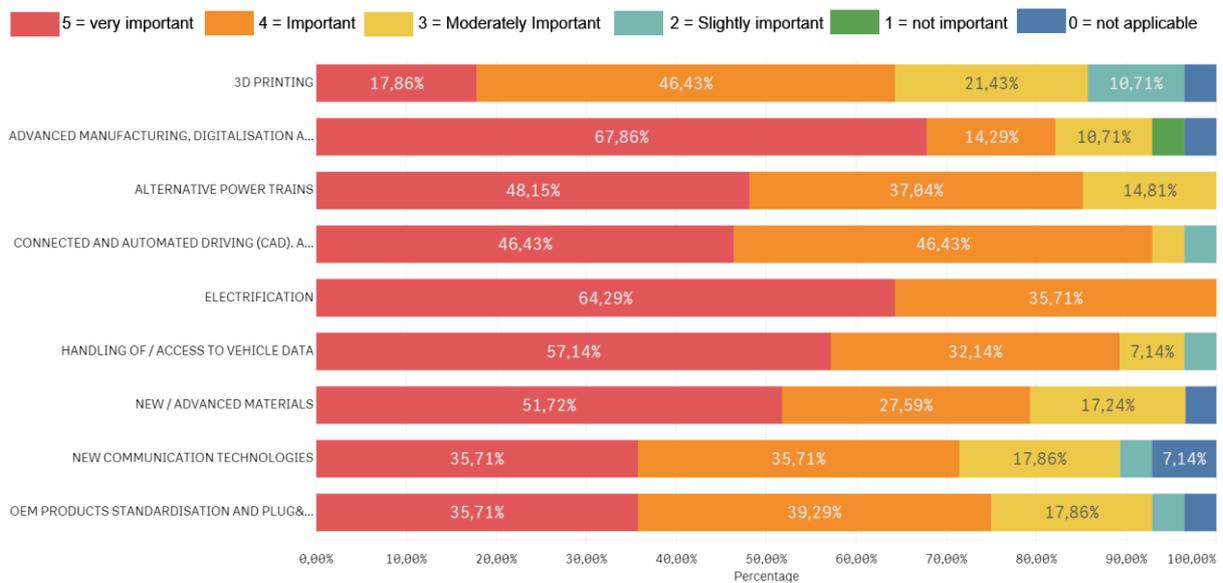
Figure 29 KPI 2.3 Drivers of Change – Group NEW TECHNOLOGIES AND BUSINESS MODELS - IMPORTANCE - Sectoral Industrial Associations sample

Figure 29 sets out the same analysis from the point of view of Sectoral and Industrial Associations. The analysis indicates that for almost all specific Drivers of Change 'very important' is the most frequently cited responses, with minimal responses indicating 'not relevant (0).

6.3.2 New Technologies and Business Models: Urgency

Figure 30 KPI 2.4 Drivers of Change – Group NEW TECHNOLOGIES AND BUSINESS MODELS - URGENCY - Overall

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Figure 30 outlines the relative impact of each Drivers of Change over time, or 'urgency'. The analysis points to a split between "very urgent" (by 2020) and "urgent" (by 2025).

"ADVANCED MANUFACTURING, DIGITALISATION AND ROBOTIZATION OF THE MANUFACTURING PROCESS" is most likely to be ranked as very urgent (by 2020), highlighting the importance of this as a Driver of Change in the short term.; "CONNECTED AND AUTOMATED DRIVING (CAD) AND ADVANCED DRIVER ASSISTANCE SYSTEMS (ADAS)" is ranked first as urgent (by 2025) linked to the increasing introduction of this technology and related infrastructure over the next few years.
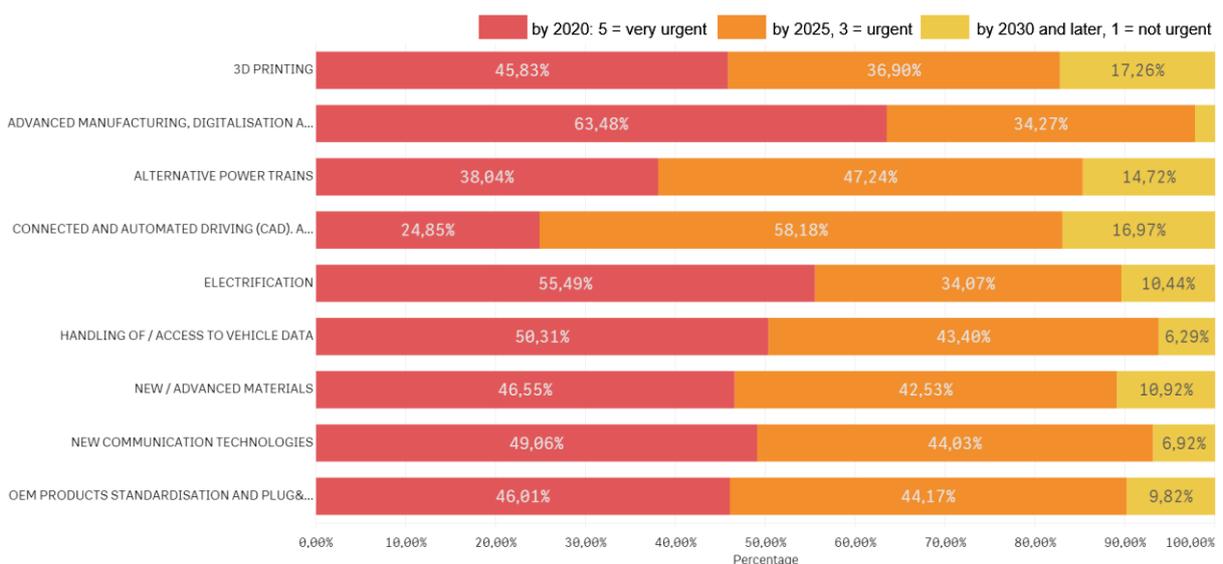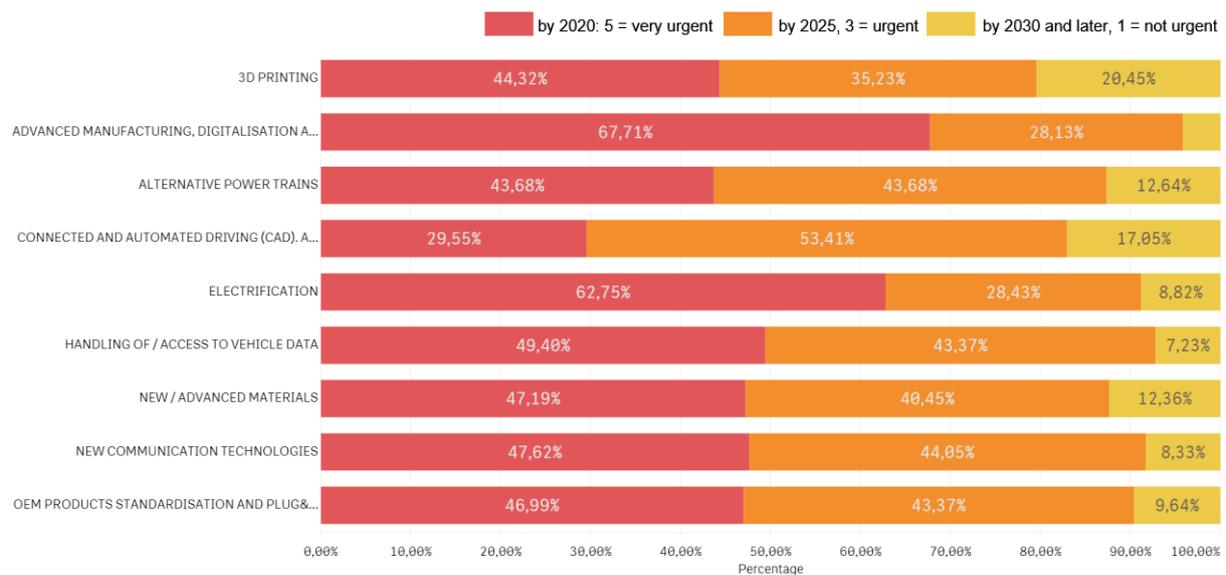

Figure 31 KPI 2.4 Drivers of Change – Group NEW TECHNOLOGIES AND BUSINESS MODELS - URGENCY – Large Enterprises sample

Analysis of the above results for Large Enterprises confirms that the most frequently cited 'very urgent' KPI 2.4 Drivers of Change in this Group and for these enterprises was "ADVANCED MANUFACTURING, DIGITALISATION AND ROBOTIZATION OF THE MANUFACTURING PROCESS" (68%) and "ELECTRIFICATION" (63%).

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Figure 32 KPI 2.4 Drivers of Change – Group NEW TECHNOLOGIES AND BUSINESS MODELS - URGENCY – SMEs sample

Some notable differences are evident in Figure 32, which focusses on KPI 2.4 with respect to SMEs.

The most frequently cited 'very urgent' Drivers of Change for SME's is "3D PRINTING" (61% of responses relating to 3D Printing), probably linked to how this technology is able to increase flexibility[39] and reduce the time to market of products in the context of disruptions to complex supply chains. For SME's the "CONNECTED AND AUTOMATED DRIVING (CAD), ADVANCED DRIVER ASSISTANCE SYSTEMS (ADAS)" is a less 'urgent' Driver of Change by comparison with all enterprises, with 77% of responses identifying this as urgent (by 2025) or not urgent (by 2030 and later).

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[39]   https://hbr.org/2017/02/how-manufacturers-can-get-faster-more-flexible-and-cheaper

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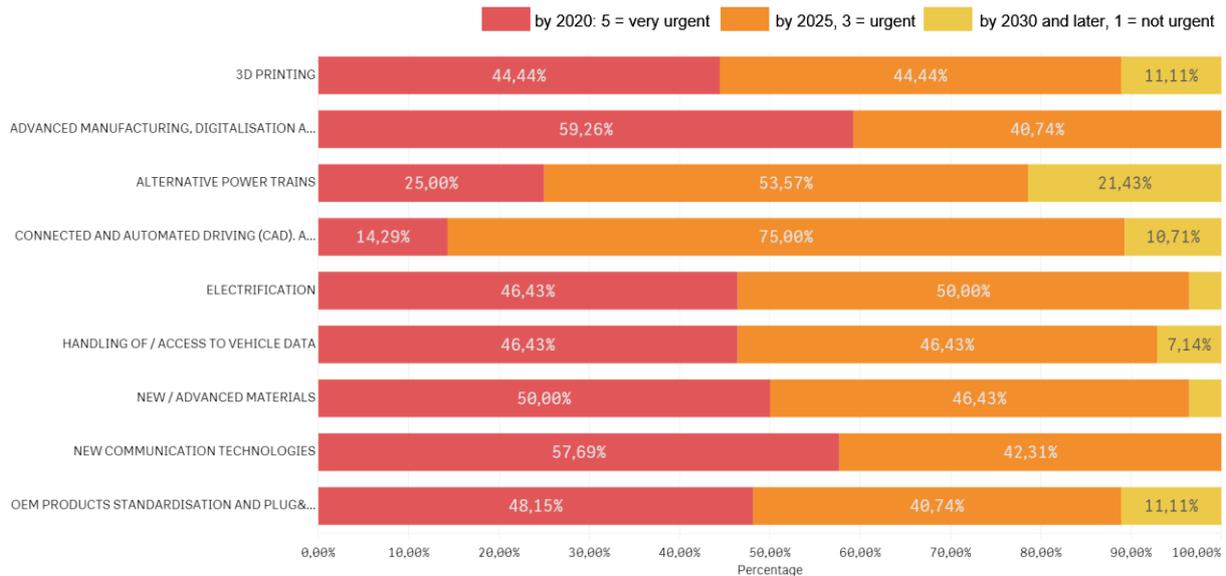Co-funded by the
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Figure 33 KPI 2.4 Drivers of Change – Group NEW TECHNOLOGIES AND BUSINESS MODELS - URGENCY – Sectoral Industrial Associations sample

Figure 33 shows responses to KPI 2.4 from Sectoral Industrial Associations confirms the strategic vision of this group of stakeholders in relation to the near term importance of investing in "ADVANCED MANUFACTURING, DIGITALISATION AND ROBOTIZATION OF THE MANUFACTURING PROCESS" (with no responses in the not urgent timeframe (by 2030 and later)) and "CONNECTED AND AUTOMATED DRIVING (CAD), ADVANCED DRIVER ASSISTANCE SYSTEMS (ADAS)" (identified as urgent (by 2025) by 75% of these respondents).

6.4 CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES

The 2030 climate targets will require a significantly larger proportion of new cars to be low- and zero-emission. Encouraged by both consumer demand and public action, the automotive industry is stepping-up its efforts to find viable alternatives that can reduce the negative effect of car pollution in the run up to 2030 and beyond. The process of managing the complete lifecycle of a product from concept to design, manufacture, service and disposal of manufactured products supports a reduction in waste and pollution, whilst at the same time providing opportunities for significant cost reductions and a need for new skills in different areas.

Individual Drivers of Change in this category are:

- **Batteries efficiency**

    The necessity to store electric energy within a vehicle is an intrinsic necessity of a car. In the case of an electric vehicle, the battery can be compared to the gasoline/diesel tank of an

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internal combustion engine car: it is the place where the energy to move the vehicle is stored. An increase in its efficiency means more range for the vehicle and a rapid refuelling.

● **Low and Zero-emission vehicles**

The automotive market is being challenged to develop more energy-efficient engines and alternative powertrains to comply with the evolving standards in terms of pollution and CO_2 emissions. Due to new international regulations, consumers will have the possibility to choose from a mix of powertrains that best meet their lifestyle needs, for example, more efficient internal combustion engines, battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), Plug-in Hybrid Electric Vehicle (PHEVs), fuel cells and vehicles powered by natural gas.

● **Improved charging/refuelling infrastructure**

The needs for a widespread refuelling infrastructure is a key driver to boost the commercialisation of a technology based on a new energy carriers. The easier the access to a rapid refuelling and recharging infrastructure the quicker will be the development of such new technologies.

● **Greater range autonomy**

The range autonomy of a vehicle is an essential factor to be considered when a new powertrain technology arises and innovations relating to this are a key driver of change in the sector.

6.4.1 Climate Goals, Environmental and Health Challenges: Importance

Figure 34 KPI 2.5 Drivers of Change – Group CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES - IMPORTANCE – Overall sample

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Figure 34 outlines the relative importance of each specific Driver of Change in relation to "CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES". The analysis underlines the importance of "CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES" across the Automotive sector given that 'very important' is the most frequent response in relation to all specific Drivers of change within this category   Looking in more detail, "LOW AND ZERO-EMISSION VEHICLES" has been ranked first in importance on this basis, followed by "BATTERY EFFICIENCY", "IMPROVED CHARGING/REFUELLING INFRASTRUCTURE" and "GREAT RANGE AUTONOMY".

Figure 35 KPI 2.5 Drivers of Change – Group CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES - IMPORTANCE – Large Enterprise sample

A similar pattern is evident in relation to KPI 2.5 responses solely from Large Enterprises, as outlined in Figure 35. Again, based on those responses identifying each Driver of Change as 'very important', first and second ranked positions remain the same as in the previous Figure 34, with GREATER RANGE AUTONOMY ranked third and "IMPROVED CHARGING/REFUELLING INFRASTRUCTURE" fourth.

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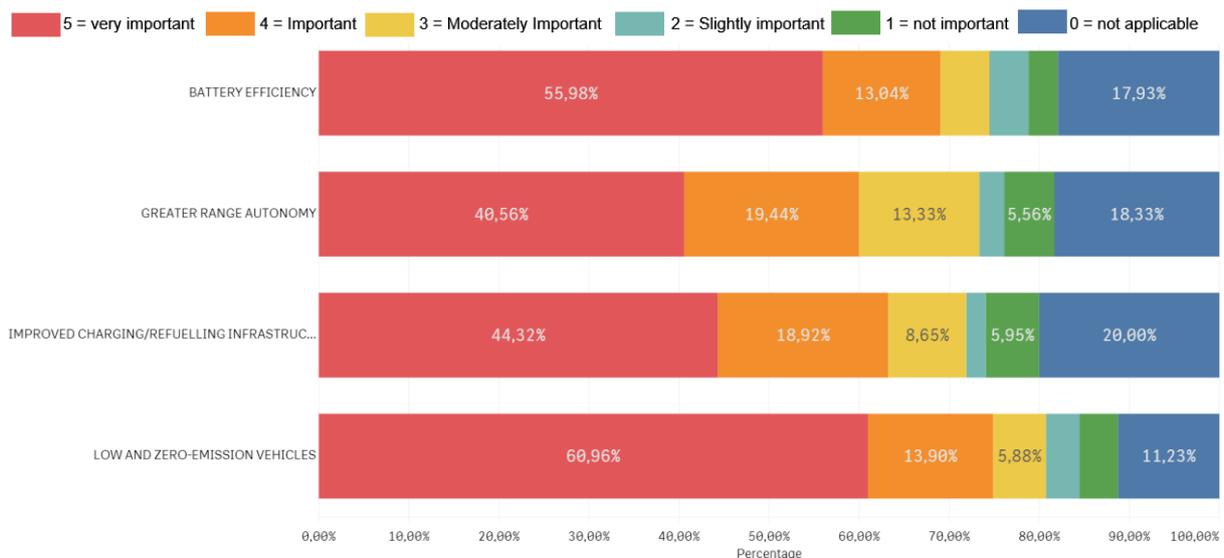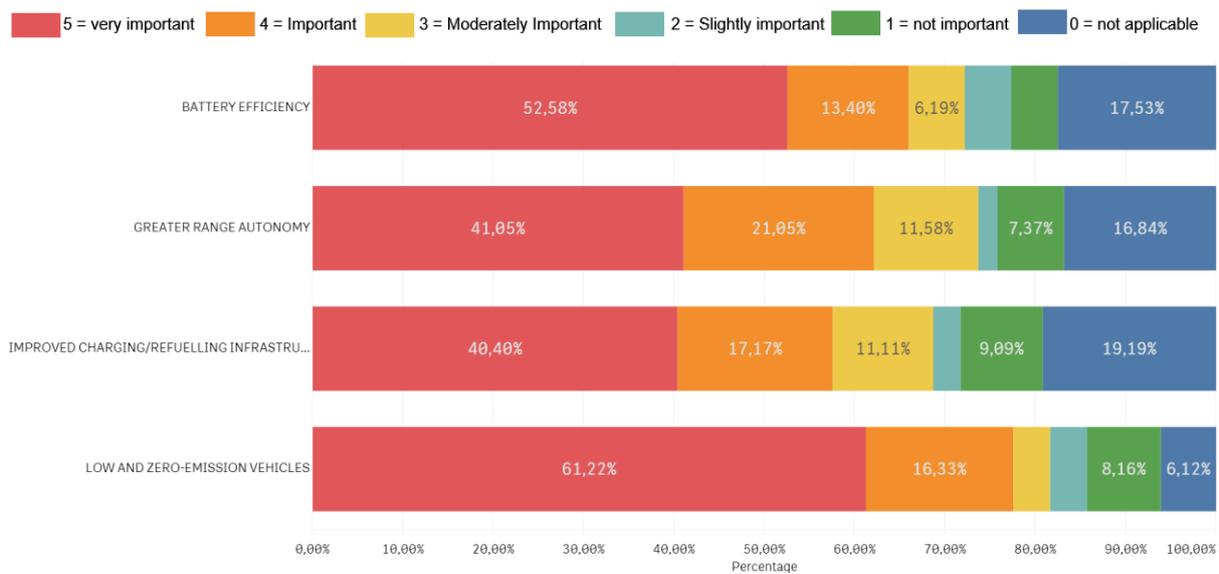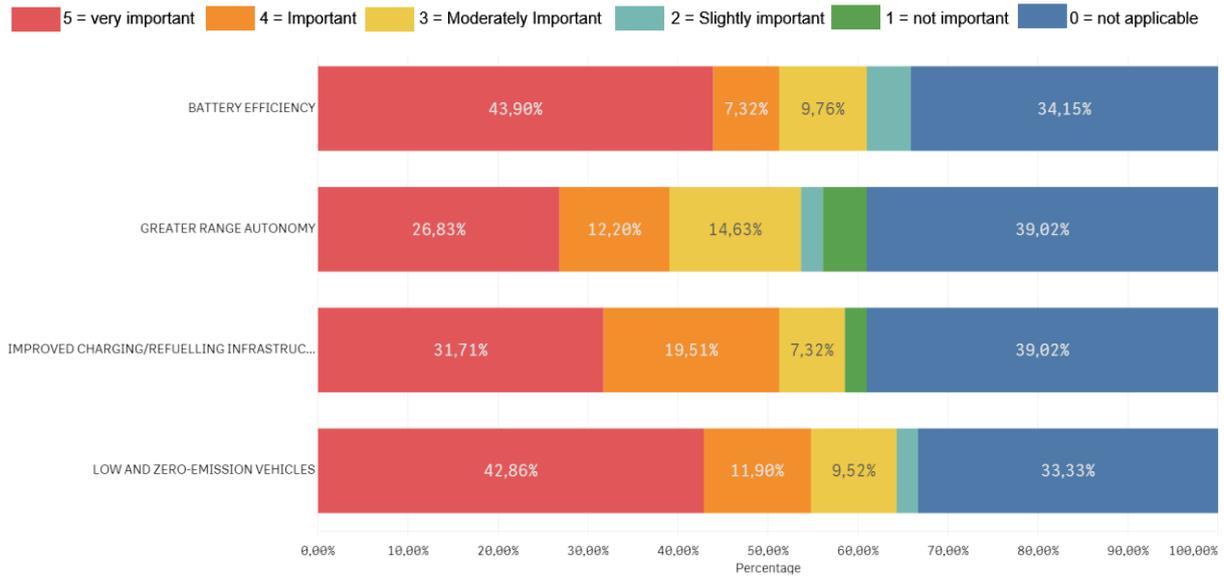
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Figure 36 KPI 2.5 Drivers of Change – Group CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES - IMPORTANCE – SMEs sample

Figure 36 outlines the analysis of responses from SMEs and highlights how, for these enterprises, 'not relevant' is much more likely to be cited for all specific "CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES" Drivers of Change. This is likely to be linked to the overriding importance of SMEs to conform to the requirements of Large Enterprises in terms of products and associated alignment of their production and supply chains to new business models required.
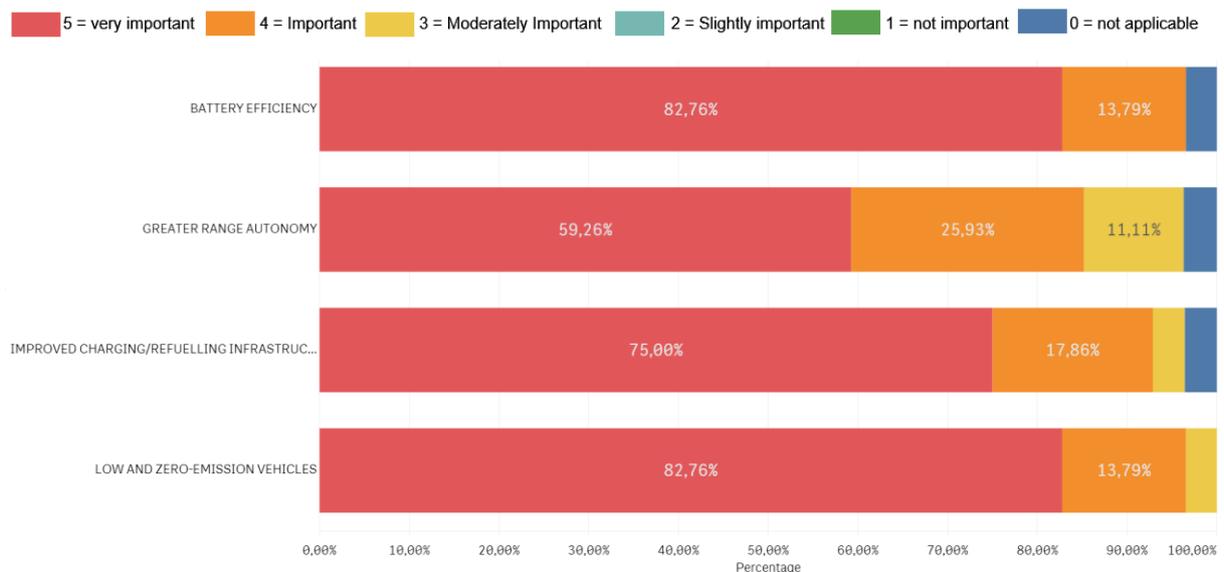

Figure 37 KPI 2.5 Drivers of Change – Group CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES - IMPORTANCE – Sectoral Industrial Associations sample

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As is the case with other Drivers of Change, Sectoral Industrial Associations tend to have a more strategic focus and recognise the need to change, and when possible, anticipate the need for change. Given this, all specific Drivers of Change in this category are considered 'very important' by a clear majority of respondents, with minimal 'not relevant' responses in each case. Looking in more detail, it is evident from Figure 37 that for Sectoral Industrial Associations "LOW AND ZERO-EMISSION VEHICLES" together with "BATTERY EFFICIENCY" are the most important factors Driving Change (82.76% of respondents identifying as very important in each case), followed by the infrastructure related Drivers (IMPROVED CHARGING/REFUELLING INFRASTRUCTURE) and "GREATER RANGE AUTONOMY".

6.4.2 Climate Goals, Environmental and Health Challenges: Urgency

Figure 38 KPI 2.6 Drivers of Change – Group CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES - URGENCY – Overall sample

In term of urgency, with the exception of "LOW AND ZERO-EMISSION VEHICLES", 'by 2025' was the most likely timeframe to be identified, probably linked to recognition of the of the intrinsic technical difficulties associated with this set of Drivers of Change. "LOW AND ZERO-EMISSION VEHICLES" is the only specific Driver of Change where 'by 2020' is the most frequently cited time period, as outlined in Figure 38.

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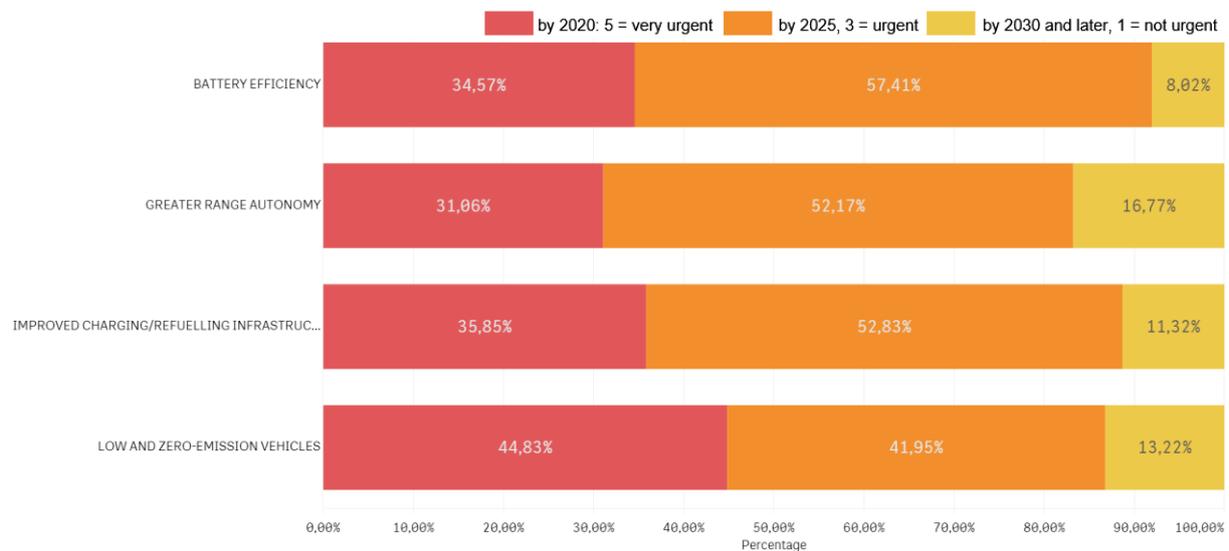
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Figure 39 KPI 2.6 Drivers of Change – Group CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES - URGENCY – Large Enterprises sample

Figure 39 outlines responses relating to KPI 2.6 for Large Enterprises. The main difference when compared with responses from all enterprises is the greater urgency assigned to "GREATER RANGE AUTONOMY" as a Driver of Change by Large Enterprises – 16.77%, of all respondents indicated "by 2030 and later", while for Large Enterprises this figure decreased by 6.43%, with almost the same corresponding increase in those identifying the relevant time period as "by 2020". This Driver of Change clearly has a relatively high priority amongst Large Enterprises.

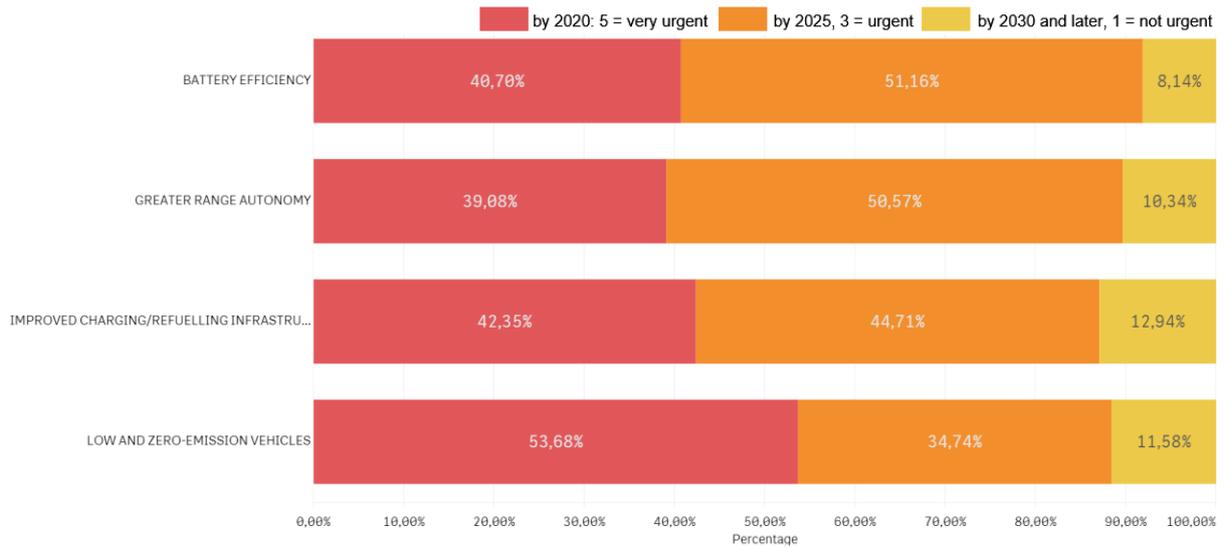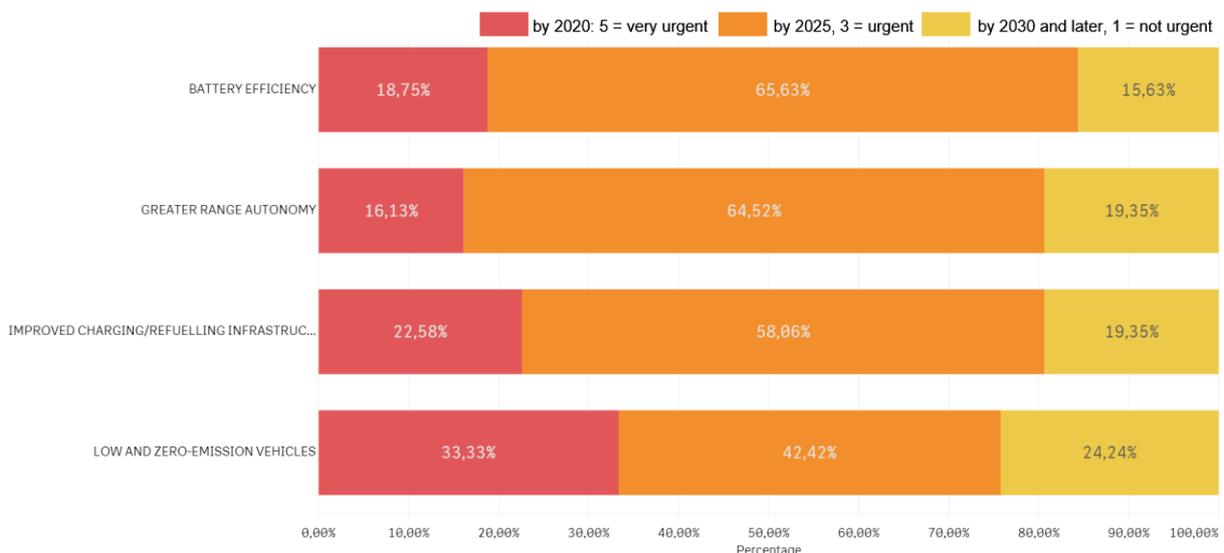**Figure 40 KPI 2.6 Drivers of Change – Group CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES - URGENCY – SMEs sample**

A lower overall 'urgency' in terms of the importance of different time periods is evident in relation to responses from SMEs for this category of Drivers of Change, as outlined in Figure 40. For this group 'by 2025' rather than 'by 2020' is the most likely response for all specific Drivers of Change.
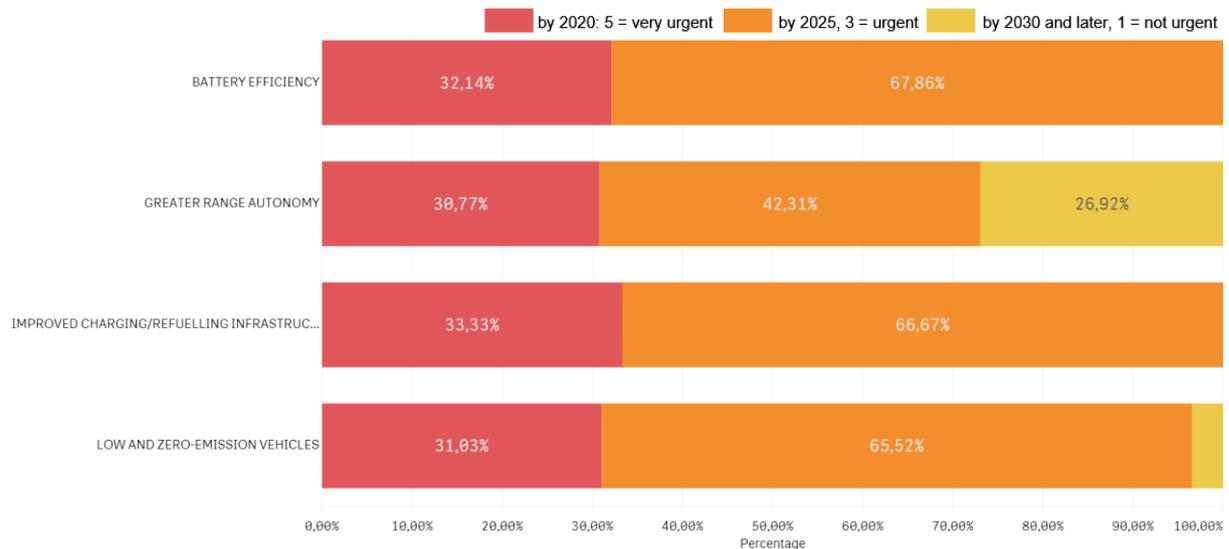

Figure 41 KPI 2.6 Drivers of Change – Group CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES - URGENCY – Sectoral Industrial Associations sample

In relation to responses from Sectoral Industrial Associations there is a clear message in terms of the urgency of "CLIMATE GOALS, ENVIRONMENTAL AND HEALTH CHALLENGES". With the exception of "GREATER RANGE AUTONOMY" (this is related to Figure 37 where other specific Drivers of Change are considered more important than GREATER RANGE AUTONOMY) 'by 2025' is identified as the most important time period for each specific Driver of Change.

6.5 SOCIETAL CHANGES AND CHANGE IN THE WAY THAT CONSUMER ACCESS, PURCHASE AND USE THE CARS

The way that consumers access, purchase and use cars and other modes of transport is changing due to increasing connectivity and the greater use of e-commerce. New technologies and the massive use of the internet will have a huge impact on the use and concept of mobility (less product and more service oriented). There is also growing public expectation that greater automation will lead to even higher standards of road safety and higher connectivity of vehicles, opening a wide range of new services. This development will also generate large amounts of new data and issues around Cyber Security. The demand for horizontal skills and occupations coming from other sectors will be influenced by these changes.

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Individual Drivers of Change in this category are:

- **Mobility as a Service (MaaS)**

Car-sharing and ride-hailing mobile apps are a couple of examples of how the concept of mobility is changing, with consumers more and more interested in the "final service" than in the product. Using instead of owning might be an important driver to change the approach to product, market and services within the automotive sector.

- **Increased connectivity / infrastructure (V2X)**

A vehicle is a connected entity able to monitor, in real time, its own parts and safety conditions around it. This trend is growing, and the car of the future will be connected to other vehicles (V2V- vehicle to Vehicle) and to any entity (V2X- Vehicle to Everything) that may affect the vehicle itself. The acronyms V2X refers to a form of technology that allows vehicles to communicate with moving parts of the traffic system around them and vice-versa. In this context, different communication technologies such as 5G (long-range) and/or ITS-G5 (short-range system) infrastructure will be deployed along major terrestrial transport paths.

- **Data Access**

Higher connectivity of vehicles will also generate large amounts of new data. This will need to be considered as appropriate policy and legal solutions are found for the problems of vehicle integrity, security, road safety and liability. These will support the emergence of new business models and it is likely that this will include provision for direct, safe and secure access to a wide set of vehicle data for the provision of connected services.

- **Cybersecurity**

There will also be an impact from evolving legal requirements, consumer demands and acceptance of new technologies.

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6.5.1 Societal Changes and Change in the Way that Consumer Access, Purchase and Use the Cars: Importance

Figure 42 KPI 2.7: Drivers of Change – Group SOCIETAL CHANGES AND CHANGE IN THE WAY THAT CONSUMER ACCESS, PURCHASE AND USE THE CARS: IMPORTANCE – Overall sample

Figure 42 outlines the relative importance of each specific Driver of Change within the overall "SOCIETAL CHANGES AND CHANGE IN THE WAY THAT CONSUMER ACCESS, PURCHASE AND USE THE CARS" category. Based on analysis of responses scored as 'very important' (5), "CYBERSECURITY" is the most important specific Driver of Change, followed by "DATA ACCESS" and "INCREASED CONNECTIVITY / INFRASTRUCTURE (V2X)", with "MOBILITY AS A SERVICE" ranked last on this basis. Taking all responses scored between 3-5, a different ranking is evident. Based on this analysis, "MOBILITY AS A SERVICE" is ranked first, accounting for 77.61% of responses, "DATA ACCESS" ranked second (77.42%) and "CYBERSECURITY" third (76.37%). "INCREASED CONNECTIVITY / INFRASTRUCTURE (V2X)" is ranked last (74.31%).

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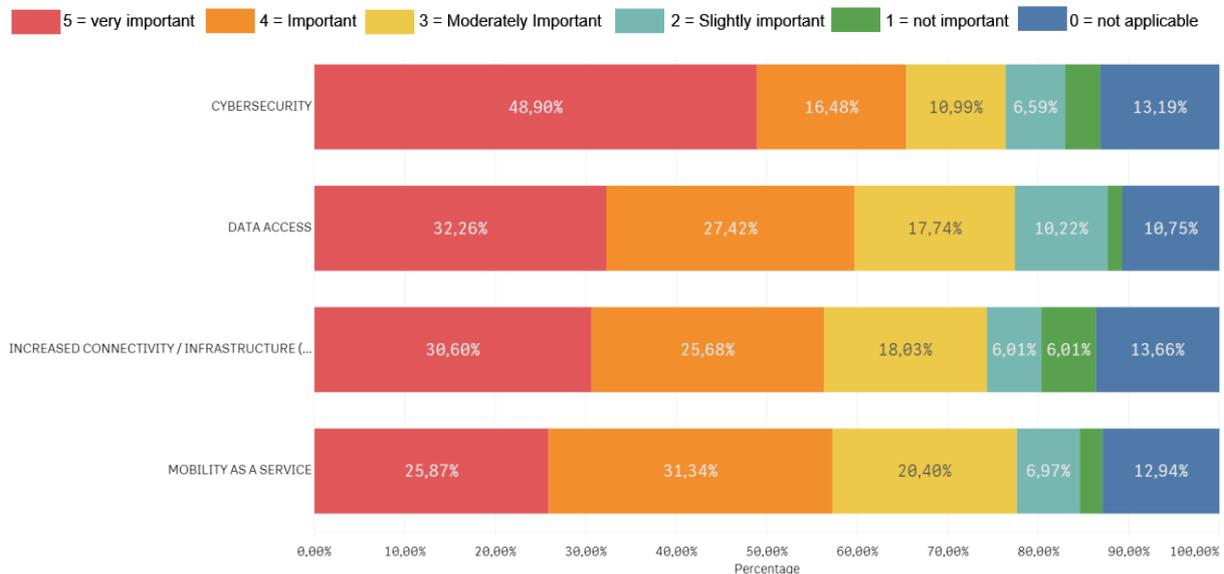
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Figure 43 KPI 2.7: Drivers of Change – Group SOCIETAL CHANGES AND CHANGE IN THE WAY THAT CONSUMER ACCESS, PURCHASE AND USE THE CARS: IMPORTANCE – Large Enterprise sample

Focussing only on KPI 2.7 responses in relation to Large Enterprises, as it is described in Figure 43, if all scores of 3 or above are included, "MOBILITY AS A SERVICE" is identified as of greater importance followed by "CYBERSECURITY".
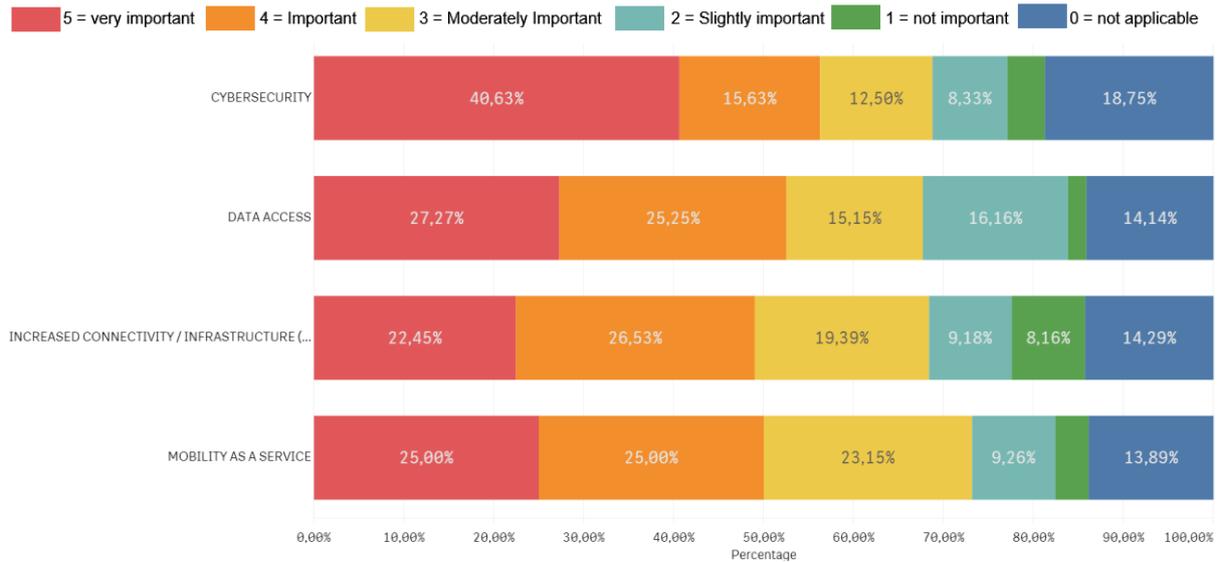

Figure 44 KPI 2.7: Drivers of Change – Group SOCIETAL CHANGES AND CHANGE IN THE WAY THAT CONSUMER ACCESS, PURCHASE AND USE THE CARS: IMPORTANCE – SMEs sample

Undertaking the same analysis but for SMEs underlines the growth of "not relevant" responses as outlined in Figure 44 area. CYBERSECURITY" and "DATA ACCESS" are identified as the most important specific Drivers of Change by SME's. Compared with analysis of all responses as outlined in Figure 42, "MOBILITY AS A SERVICE" AND "INCREASED CONNECTIVITY / INFRASTRUCTURE (V2X)" increased in

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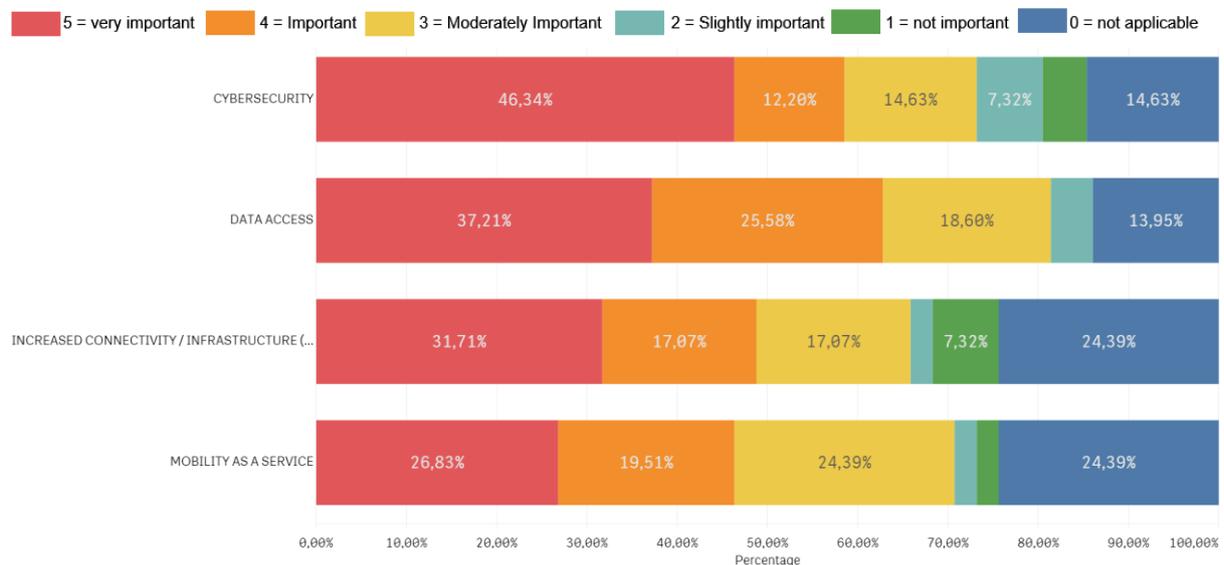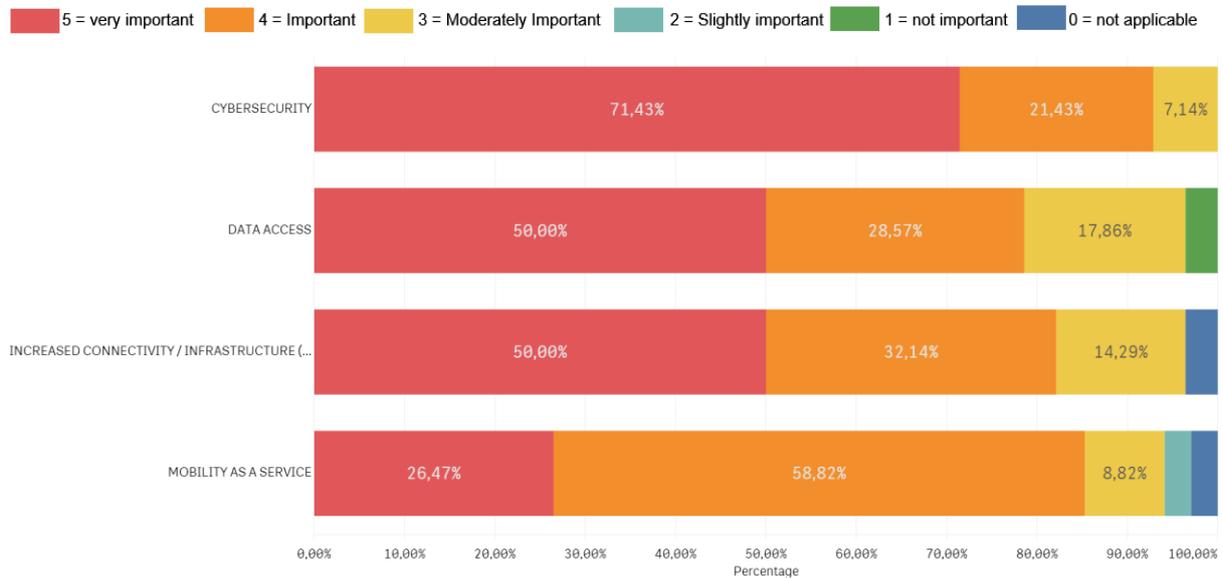
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Figure 45 KPI 2.7: Drivers of Change – Group SOCIETAL CHANGES AND CHANGE IN THE WAY THAT CONSUMER ACCESS, PURCHASE AND USE THE CARS: IMPORTANCE – Sectoral Industrial Associations sample

Figure 45 sets out the same analysis for KPI 2.7 with respect to the responses from Sectoral Industrial Associations. All responses in relation to "CYBERSECURITY" are rated as 3 or above in terms of level of importance, with similar results with respect to "DATA ACCESS" and "INCREASED CONNECTIVITY / INFRASTRUCTURE (V2X)". In relation to "MOBILITY AS SERVICE" a relatively high proportion of responses were rated as 'important' (4) at 59%.

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6.5.2 Societal Changes and Change in the Way that Consumer Access, Purchase and Use the Cars: Urgency

Figure 46 KPI 2.8 Drivers of Change – Group SOCIETAL CHANGES AND CHANGE IN THE WAY THAT CONSUMER ACCESS, PURCHASE AND USE THE CARS - URGENCY - Overall

In terms of the 'urgency' of each specific Driver of Change Figure 46 indicates that, with the exception of "CYBERSECURITY", the most frequent time period identified was "by 2025".
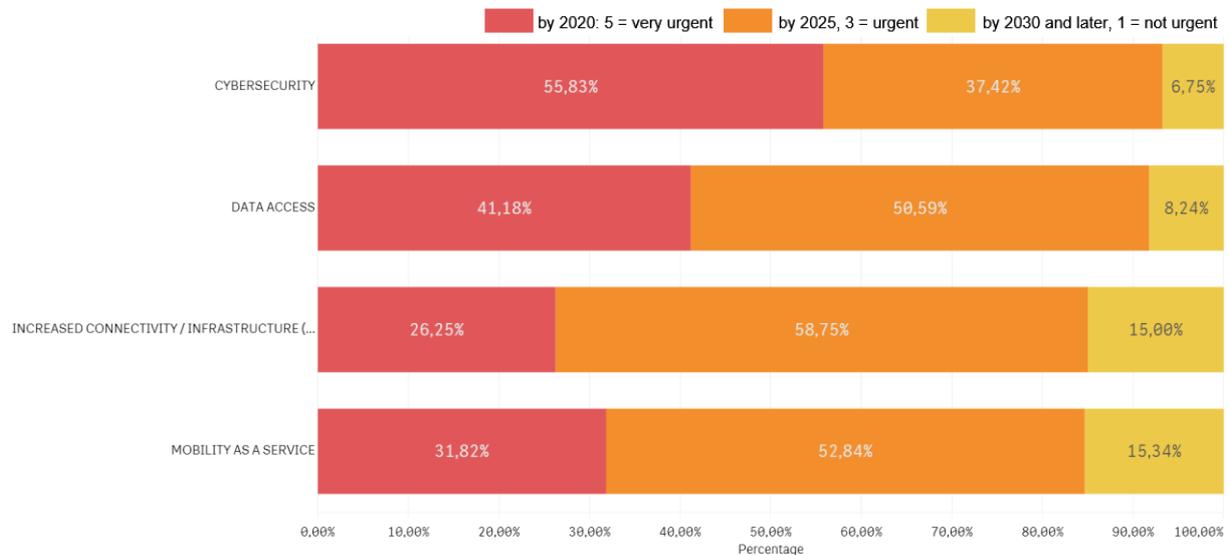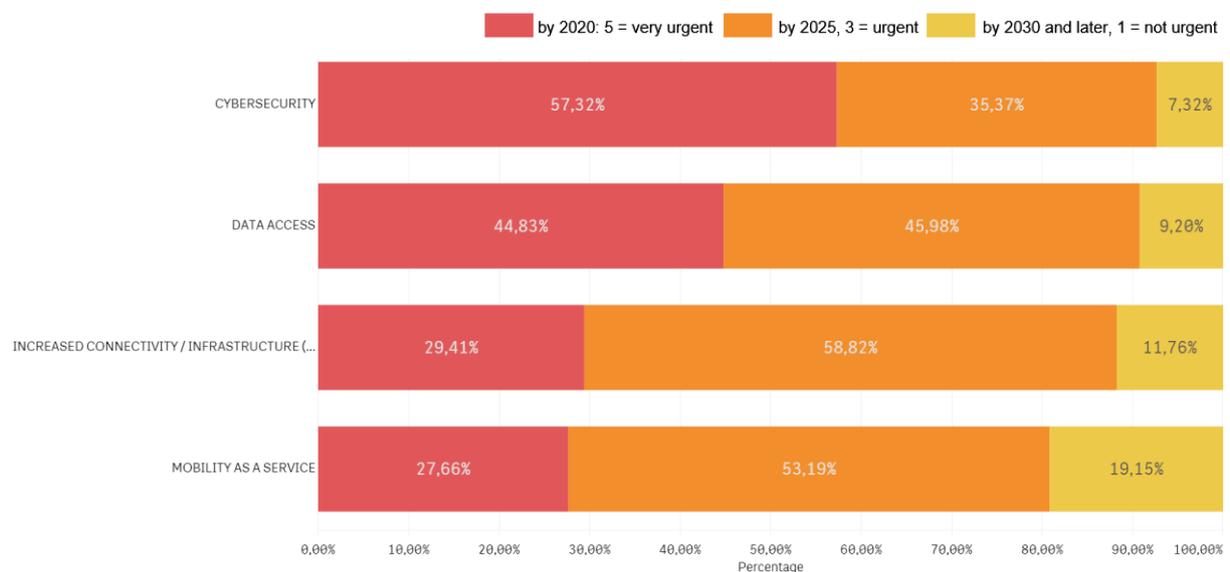

Figure 47 KPI 2.8 Drivers of Change – Group SOCIETAL CHANGES AND CHANGE IN THE WAY THAT CONSUMER ACCESS, PURCHASE AND USE THE CARS - URGENCY – Large Enterprises sample

Figure 47 highlights the same analysis but for Large Enterprises and indicates that in relation to those identifying the time period as 'very urgent' (by 2020), by comparison with all respondents (see Figure

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Figure 48 KPI 2.8 Drivers of Change – Group SOCIETAL CHANGES AND CHANGE IN THE WAY THAT CONSUMER ACCESS, PURCHASE AND USE THE CARS - URGENCY – SMEs sample

Figure 48 represents the same analysis for KPI 2.8 but in relation to SMEs. The analysis indicates that the relative urgency assigned to each specific Driver of Change is similar to patterns for all respondents (see Figure 46).
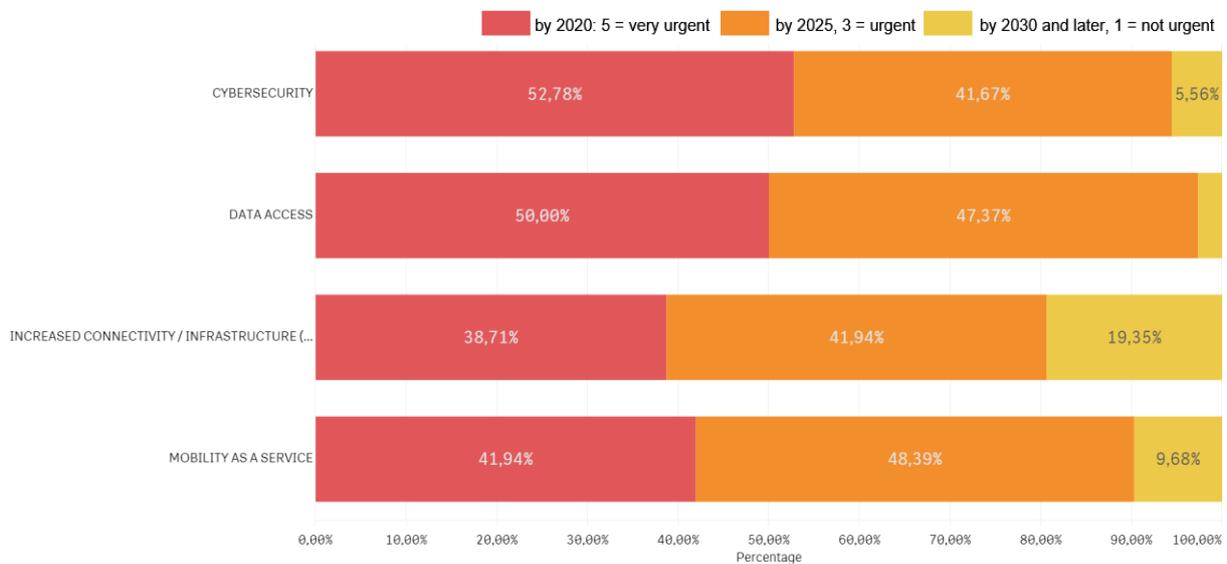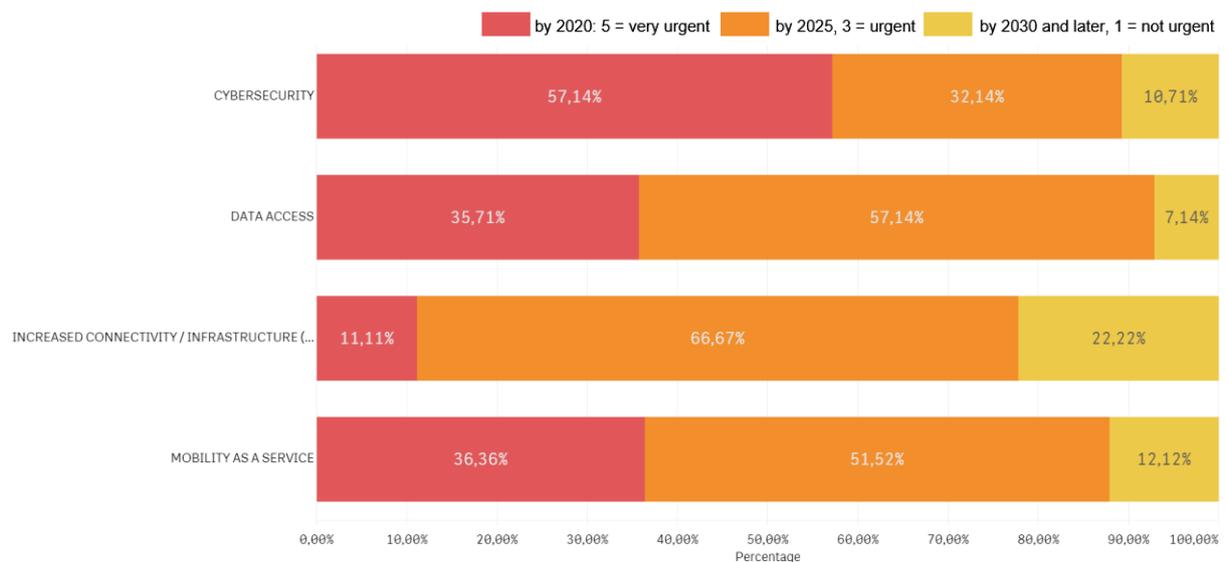

Figure 49 KPI 2.8 Drivers of Change – Group SOCIETAL CHANGES AND CHANGE IN THE WAY THAT CONSUMER ACCESS, PURCHASE AND USE THE CARS - URGENCY – Sectoral Industrial Associations sample

Figure 49 outlines responses from Sectoral Industrial Associations in relation to KPI 2.8. and indicates that by comparison with all respondents in terms of urgency, a higher proportion of responses relating to "INCREASED CONNECTIVITY / INFRASTRUCTURE (V2X)" and "DATA ACCESS" are evident in the less urgent categories of 'by 2025' or 'by 2030 and later' rather than short term (by 2020).

6.6 STRUCTURAL CHANGES

The automotive sector is a major European employer and the impact on the workforce resulting from the transition to new technologies will be significant. The demand for new skills and experience will contrast with a fall in demand for other more traditional skills. This implies a need for a skill restructuring that balances out existing skills mismatches and which in turn, will require significant investment in new technologies, production processes and in the reskilling and training of the workforce.

Individual Drivers of Change in this category are:

- **Restructuring**
  The European automotive sector is expected to undergo structural changes due to the development of digital technologies and the shift towards low and zero emission mobility. The industry, in particular SMEs, will need to assess and, if necessary, redefine their position in the value chain as well as increase their capacity to integrate digital technologies, alternative powertrains and circular economy concepts in their products portfolio and production processes.

- **Acquisition of new skills**

  The transformation of the automotive industry will have a significant impact on the industry's workforce and the acquisition of news skills will be a key factor enabling employees to be equipped to deal with these changes. These changes will lead to both the creation of new occupations and the need for new skills and competences amongst the existing workforce.

- **Continuous training**

  Continuous training is always useful but during periods of disruptive change continuous training is essential to align competences to changing skill requirements. These activities also need to be supported by actions to improve mobility and transferability of skills, linked to the development of an efficient apprenticeship market and encouragement of informal learning.

6.6.1 Structural Changes: Importance
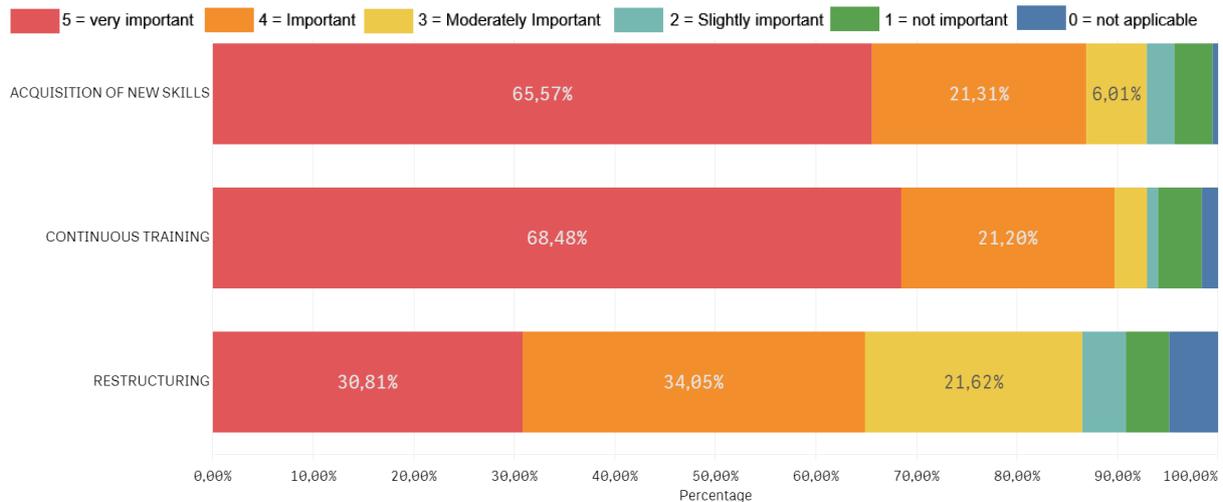
Figure 50 KPI 2.9 Drivers of Change – Group STRUCTURAL CHANGES: IMPORTANCE – Overall sample

Figure 50 outlines the relative importance of each specific Driver of Change relating to the STRUCTURAL CHANGES category (KPI 2.2). More than 85% of all respondents scored each specific Driver of Change as 3 or above in terms of level of importance: "CONTINUOUS TRAINING" (92.94%), "ACQUISITION OF NEW SKILLS" (92.89%) and "RESTRUCTURING" (86.48%). When considering only those responses with a score of 'very important'(5), 68.48% of responses in relation to "CONTINUOUS TRAINING" fell into this category and 65.57% in relation to "ACQUISITION OF NEW SKILLS".

Figure 51 KPI 2.9 Drivers of Change – Group STRUCTURAL CHANGES: IMPORTANCE – Large Enterprise sample

Figure 51 outlines the same analysis as above, but in relation to Large Enterprises and points to a similar pattern of responses as is the case for all respondents.

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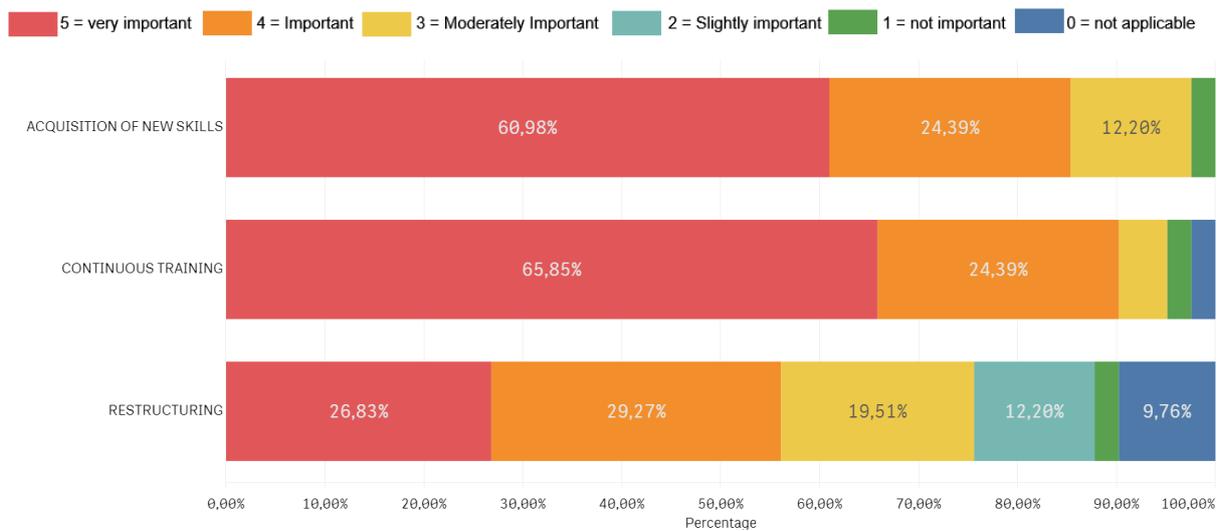
Figure 52 KPI 2.9 Drivers of Change – Group STRUCTURAL CHANGES: IMPORTANCE – SMEs sample

Analysis of responses from SMEs is outlined in Figure 52 and indicates a broadly similar pattern to that of all respondents, although the overall importance of "RESTRUCTURING" is reduced (Very important by -4%, important by -5% moderate importance by -2%). Overall, SME's perceived "CONTINUOUS TRAINING" followed by "ACQUISITION OF NEW SKILLS" more important than "RESTRUCTURING".
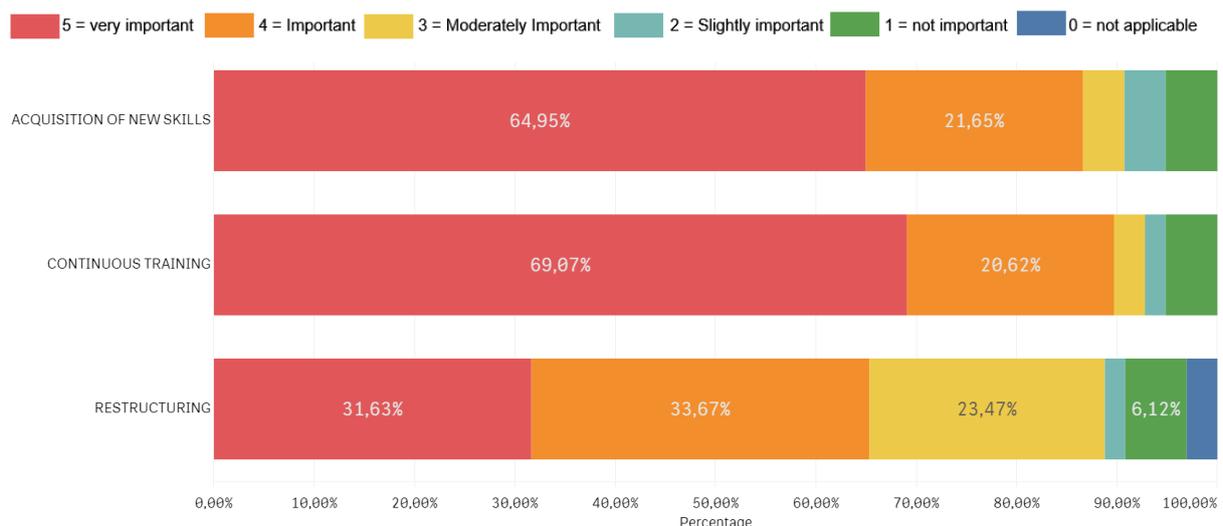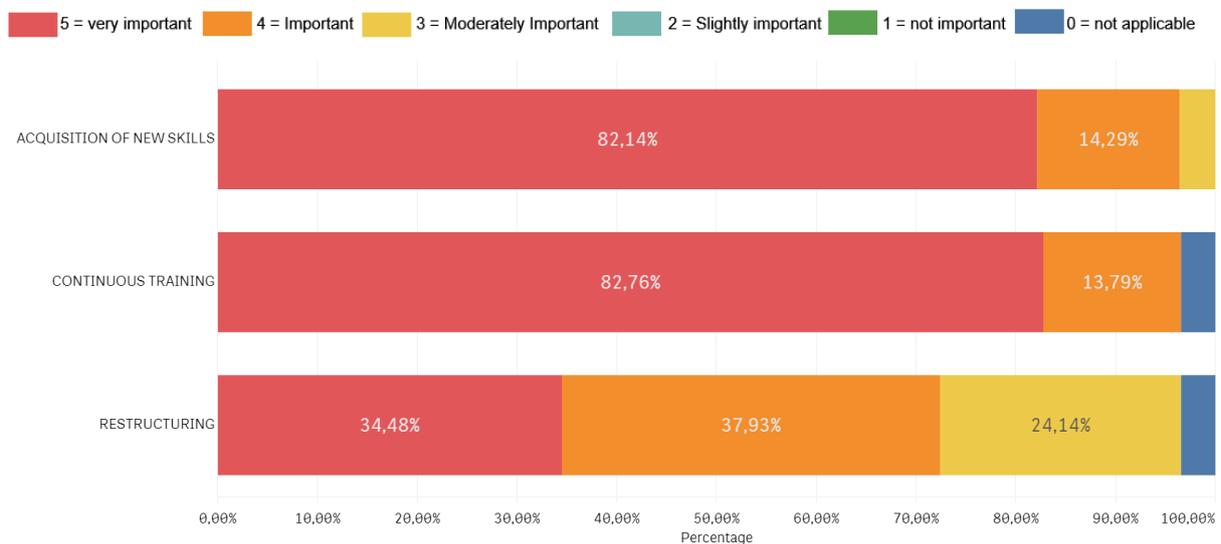

Figure 53 KPI 2.9: Drivers of Change – Group STRUCTURAL CHANGES: IMPORTANCE – Sectoral Industrial Associations sample

Figure 53 outlines responses from Sectoral Industrial Associations in relation to KPI 2.9. Respective proportions of respondents scoring the level of importance as 3 or above accounted for 100% of responses in relation to "ACQUISITION OF NEW SKILLS" and, almost the same proportion in relation to

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both "CONTINUOUS TRAINING" and "RESTRUCTURING" (97%). Taking all specific Drivers of Change across all categories into account, Sectoral Industrial Associations identified "CONTINUOUS TRAINING" as the most important specific Driver of Change together with "BATTERY EFFICIENCY" and "LOW AND ZERO-EMISSION VEHICLES" (See Figure 37) .

6.6.2   Structural Changes: Urgency
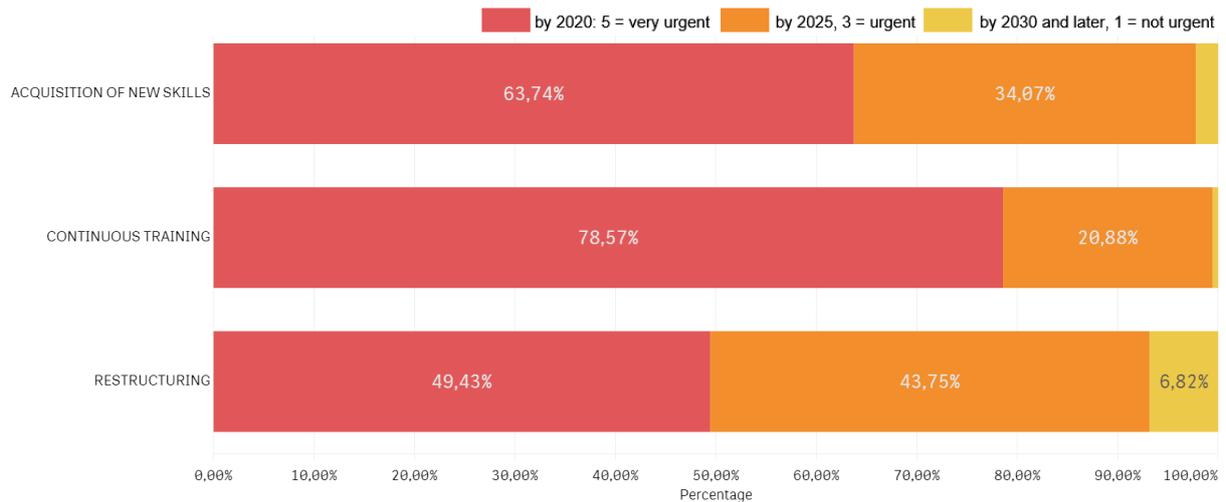
Figure 54 KPI 2.10 Drivers of Change – Group STRUCTURAL CHANGES - URGENCY – Overall sample

Based on all responses a relatively high level of urgency is identified in relation to "STRUCTURAL CHANGES". Figure 54 indicates that 79% of respondents identified the necessity for "CONTINUOUS TRAINING" as 'very urgent', with this level of urgency identified by 64% of respondents in relation to "ACQUISITION OF NEW SKILLS" and 49% of respondents in relation to "RESTRUCTURING".
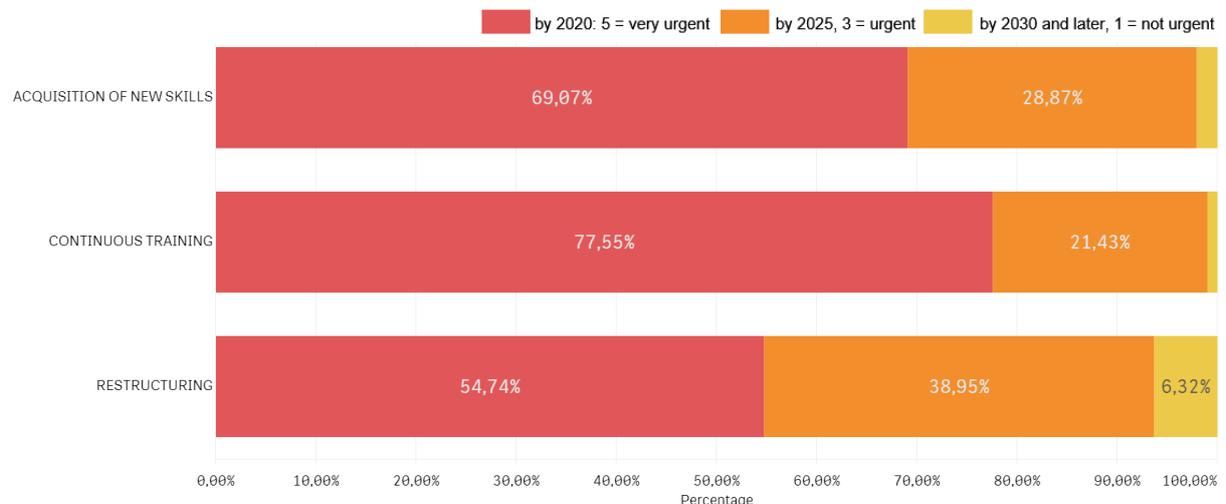
Figure 55 KPI 2.10 Drivers of Change – Group STRUCTURAL CHANGES - URGENCY – Large Enterprises sample

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Figure 55 outlines responses from Large Enterprises in relation to urgency for the "STRUCTURAL CHANGES" group and indicates that compared with responses from all stakeholders +5% more Large Enterprises identified "ACQUISITION OF NEW SKILLS" and "RESTRUCTURING" as very urgent. The position with "CONTINUOUS TRAINING" is broadly similar.
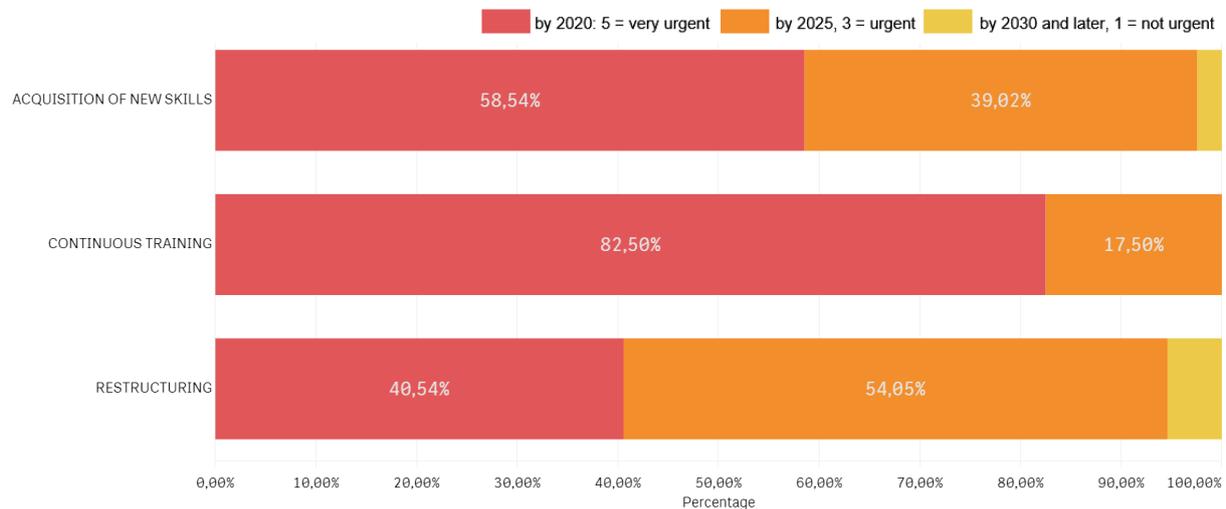
Figure 56 KPI 2.10 Drivers of Change – Group STRUCTURAL CHANGES - URGENCY – SMEs sample

Figure 56 presents the same analysis for KPI 2.10 in relation to SME's. The urgency with which "CONTINUOUS TRAINING" is identified amongst this group is clear, with 83% indicating 'very urgent' – the highest proportion of all Driver of Change categories.
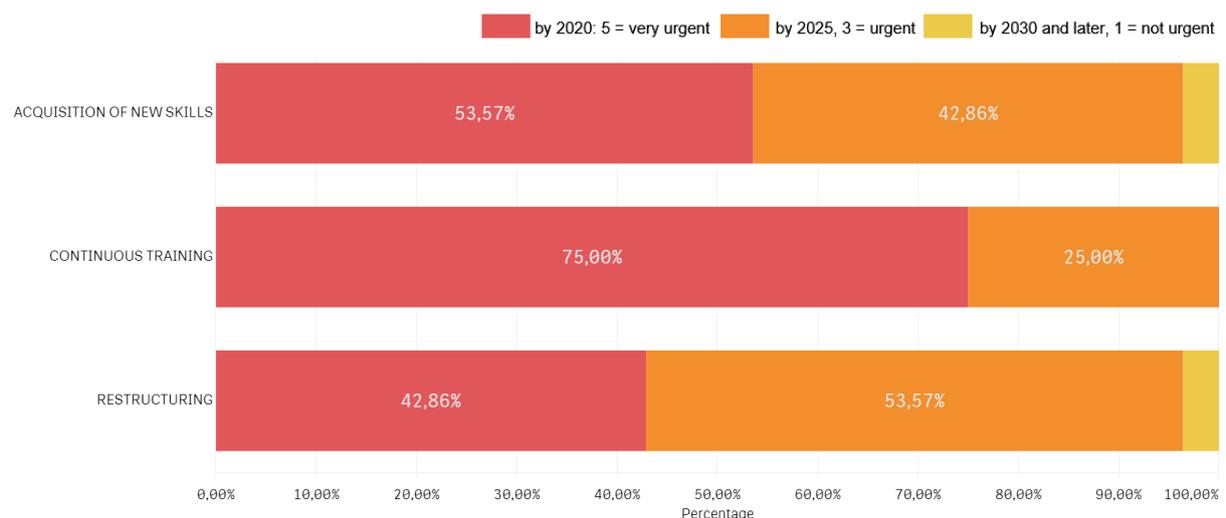
Figure 57 KPI 2.10 Drivers of Change – Group STRUCTURAL CHANGES - URGENCY – Sectoral Industrial Associations sample

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A similar pattern to that of SME's is evident in relation to responses from Sectoral Industrial Associations in relation to the urgency of action in relation to KPI 2.10. Figure 57 indicates "CONTINUOUS TRAINING" is identified as 'very urgent' amongst 75% of these respondents.

6.7 GLOBALISATION AND RISE OF NEW PLAYERS

The EU automotive sector is facing growing competition from non-EU markets and competitors. Over the next few years, production in global markets is expected to grow strongly, whilst EU production is predicted to remain relatively flat. Maintaining the EU's global competitiveness will depend on ensuring high levels of investment in the new and emerging areas. This will be particularly important in the area of product standardisation, supported by global technical harmonisation developed through regulatory dialogue with the EU's main trading partners in order to guarantee a stable access to (key) raw materials. Also, continued support to guarantee the investment in R&D will facilitate the development of the new expertise required to meet evolving customer requirements.

Individual Drivers of Change in this category are:

- **Global technical harmonisation**
  The supply chain structure within the Automotive sector will need to meet the challenges posed by the introduction of new technology, but also meet changing market conditions. New mobility concepts; new standards and product harmonisations will also be necessary to create scale economies and to satisfy a possible increased demand for white label components and unbranded vehicles (for example, the possibility for new car-sharing platforms to have a "standard" fleet where the core product is the service and not the car-brand).

- **Global regulatory dialogue**
  The EU Single Market is a key element for the maintenance of EU competitiveness. Future advantages are likely to be linked to increased standardisation between member states. It is evident that such process cannot be put in place by social partners or industry alone; the Commission and in general, Governments and public administrations will need to play a fundamental role in the elaboration of policies and strategies, that will support the competitiveness of the European Automotive sector.

- **Access to raw materials**
  In a disruptive scenario, activities linked to raw materials become critical, especially if some resources (limited in terms of quantity or geographical presence) are necessary to produce key components. From this point of view, the automotive sector will need to develop sourcing strategies to ensure a stable supply of critical and key raw materials (eg. Lithium) to insulate

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the circular economy by finding ways to improve the supply chain and resource efficiencies
and finding better methods to reuse and recycle materials will require the necessary skilled
people to meet these technology requirements.

6.7.1 Globalisation and Rise of New Players: Importance
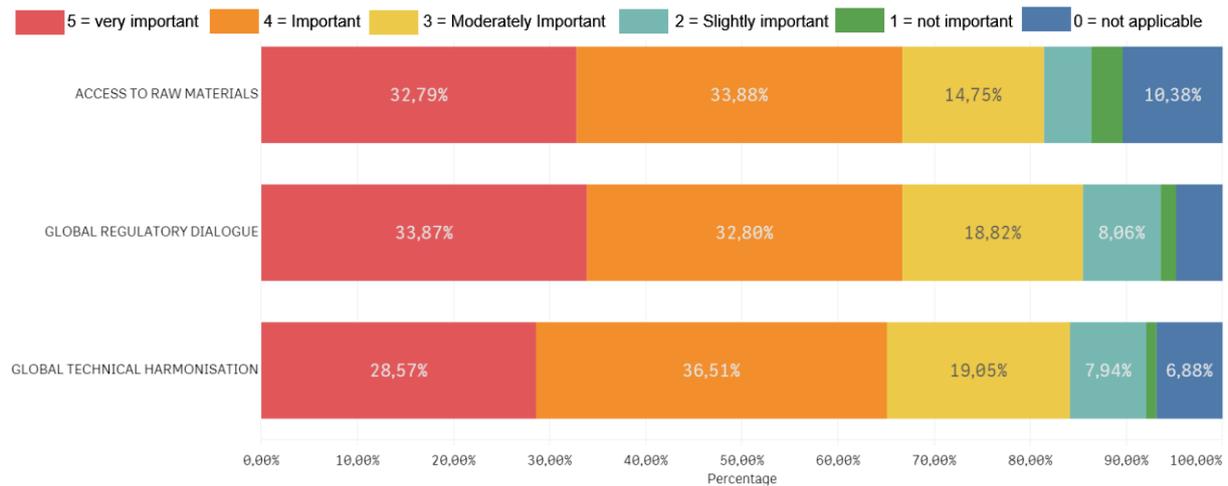
Figure 58 KPI 2.11: Drivers of Change – Group STRUCTURAL CHANGES: IMPORTANCE – Overall sample

Figure 58 outlines the relative importance of each specific Driver of Change relating to the
"GLOBALISATION AND RISE OF NEW PLAYERS" category. The necessity for development of policies
and strategies with the support of Governments and public administrations is considered an important
issue for the Automotive sector given "GLOBAL REGULATORY DIALOGUE" is ranked first, both in
relation to the proportion of responses indicating this is 'very important'(34% of respondents) and
when the proportion of responses relating to scores above 3 are considered (86%). Taking only
responses identifying each driver as 'very important' "ACCESS TO RAW MATERIALS" is ranked second
and "GLOBAL TECHNICAL HARMONISATION" third. The proportion of responses if all those scoring 3
or above are considered are broadly similar for all 3 specific Drivers of Change: "GLOBAL REGULATORY
DIALOGUE" (86%), "GLOBAL TECHNICAL HARMONISATION" (84%) and "ACCESS TO RAW MATERIALS"
(81%).

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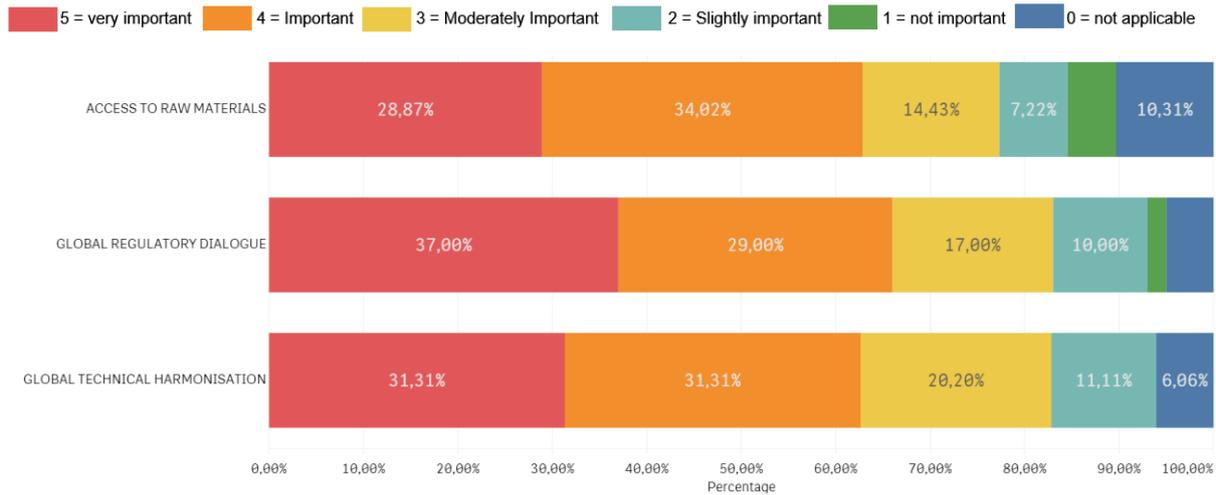**Figure 59 KPI 2.11: Drivers of Change – Group STRUCTURAL CHANGES: IMPORTANCE – Large Enterprise sample**

Figure 59 outlines responses for KPI 2.11 for Large Enterprises and points to broadly similar patterns of response to that for all respondents.
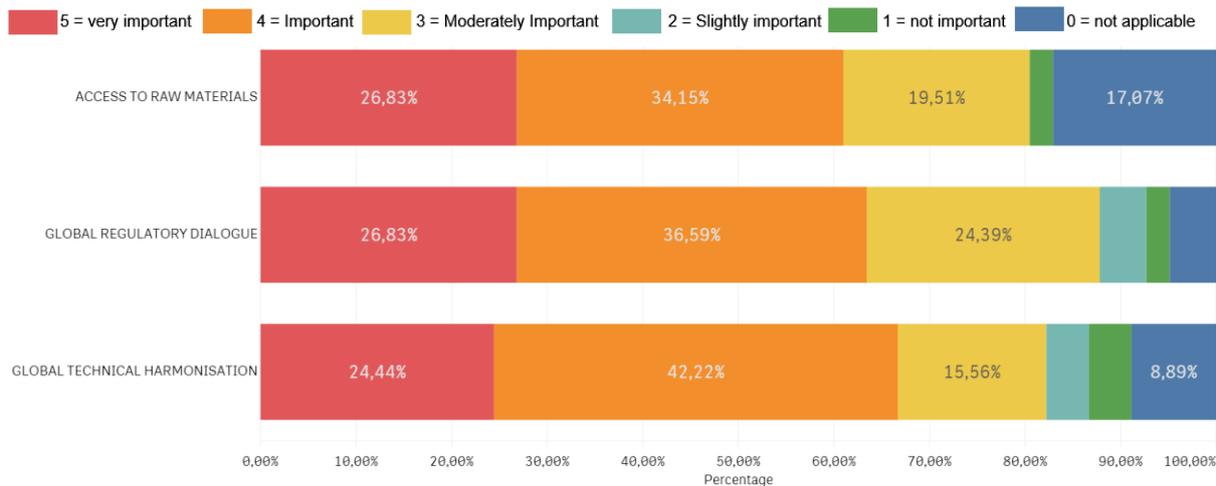
Figure 60 KPI 2.11: Drivers of Change – Group STRUCTURAL CHANGES: IMPORTANCE – SMEs sample

Looking now at responses from SME's for KPI 2.11 in Figure 60, a different pattern of responses emerges depending upon level of importance considered. If only those responses identifying each specific Driver of Change as 'very important' (5) are considered, it is indicated that "ACCESS TO RAW MATERIALS" and "GLOBAL REGULATORY DIALOGUE" are the most important, followed by "GLOBAL TECHNICAL HARMONISATION". However, if both 'very important' and 'important' (4) responses are counted, "GLOBAL TECHNICAL HARMONISATION" is ranked first, followed by "ACCESS TO RAW MATERIALS" and "GLOBAL REGULATORY DIALOGUE". If all responses with a score in terms of level importance of 3 or more is considered "GLOBAL REGULATORY DIALOGUE" is now ranked first, followed

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by "ACCESS TO RAW MATERIALS" second and "GLOBAL TECHNICAL HARMONISATION" third. However, all three specific Drivers of Change are relatively close in terms of perception of overall importance, irrespective of how measured.
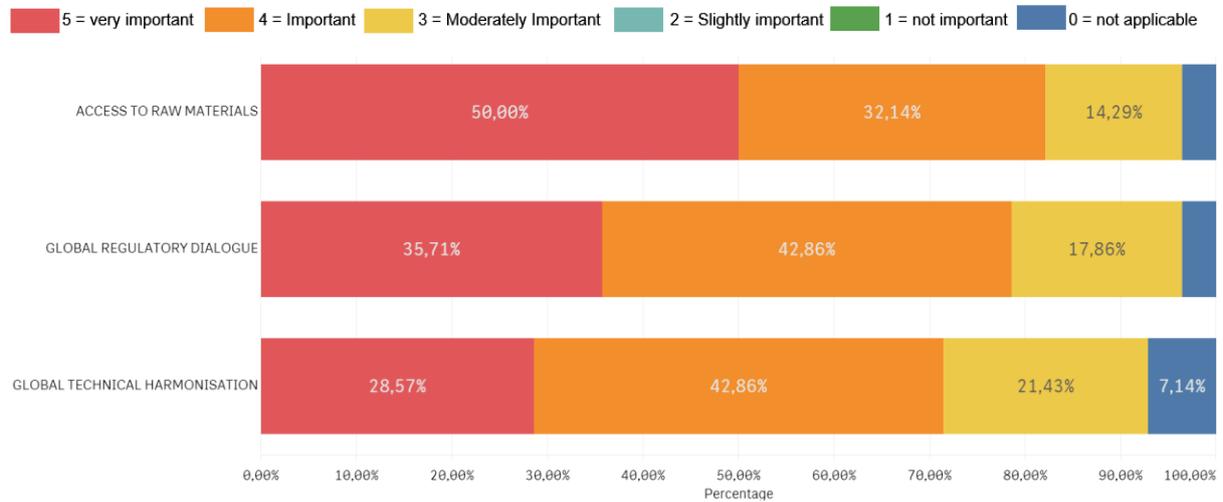
Figure 61 KPI 2.11: Drivers of Change – Group STRUCTURAL CHANGES: IMPORTANCE – Sectoral Industrial Association sample

In relation to responses from Sectoral Industrial Associations for KPI 2.11, Figure 61 shows "ACCESS TO RAW MATERIALS" is most likely to be considered the most important (based on those responses with a score of 5) followed by GLOBAL REGULATORY DIALOGUE and GLOBAL TECHNICAL HARMONISATION.

6.7.2   Globalisation and Rise of New Players: Urgency

Figure 62 KPI 2.12 Drivers of Change – Group GLOBALISATION AND RISE OF NEW PLAYERS - URGENCY – Overall sample

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Figure 62 highlights the relative urgency attached to KPI 2.12 by all respondents. The predominant response for all specific Drivers of Change in this category is that the most relevant time period is "by 2025".
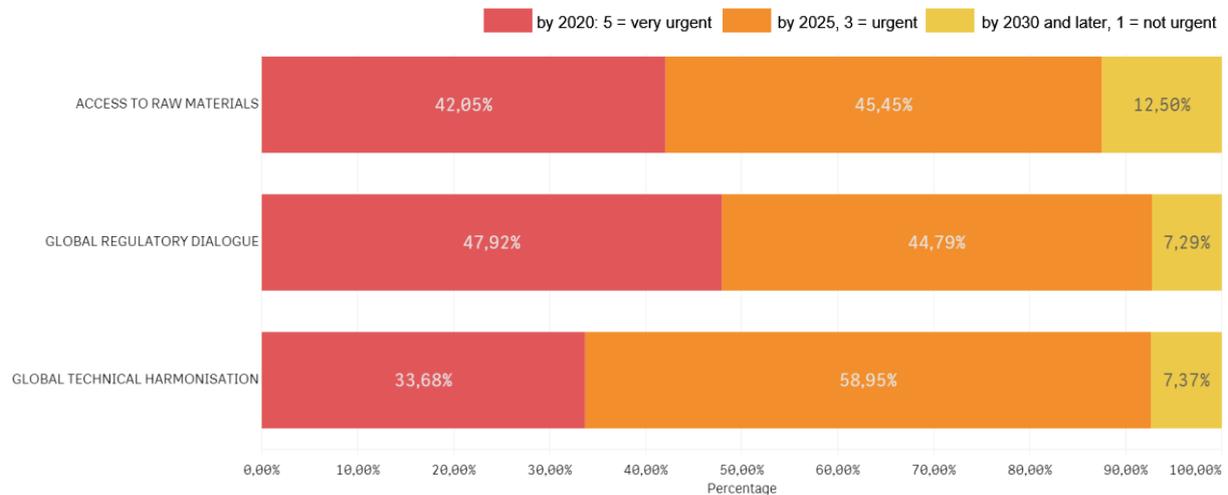
Figure 63 KPI 2.12 Drivers of Change – Group GLOBALISATION AND RISE OF NEW PLAYERS - URGENCY – Large Enterprise sample

Figure 63 shows the responses in relation to KPI 2.12 by Large Enterprises, the particular urgency attached to "GLOBAL REGULATORY DIALOGUE" is evident with 'very urgent' the most frequent response by this group of enterprises. A slight shift towards increased urgency is also evident with respect to both "GLOBAL TECHNICAL HARMONISATION" and "ACCESS TO RAW MATERIALS", by comparison with responses from all respondents.
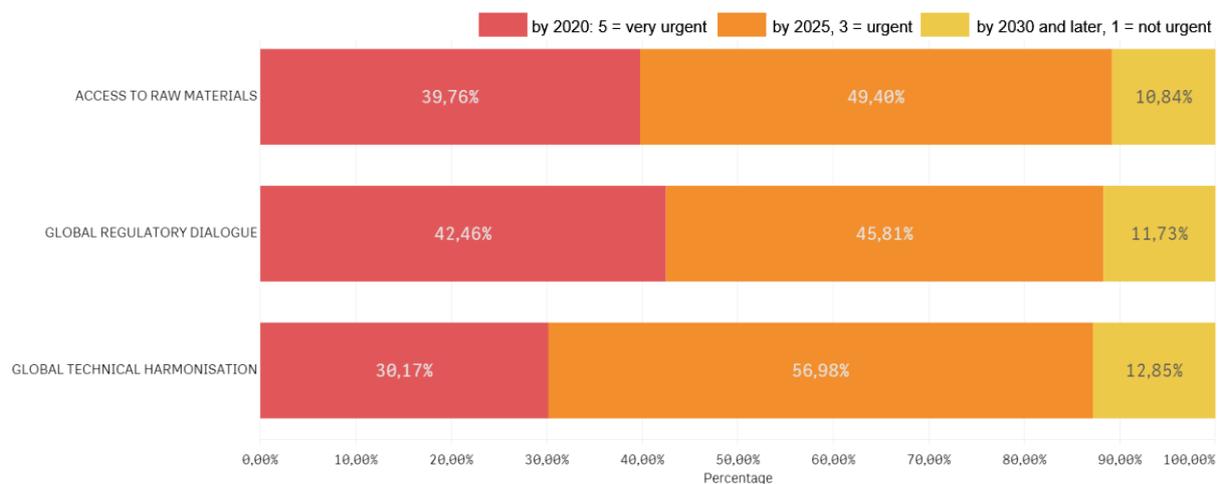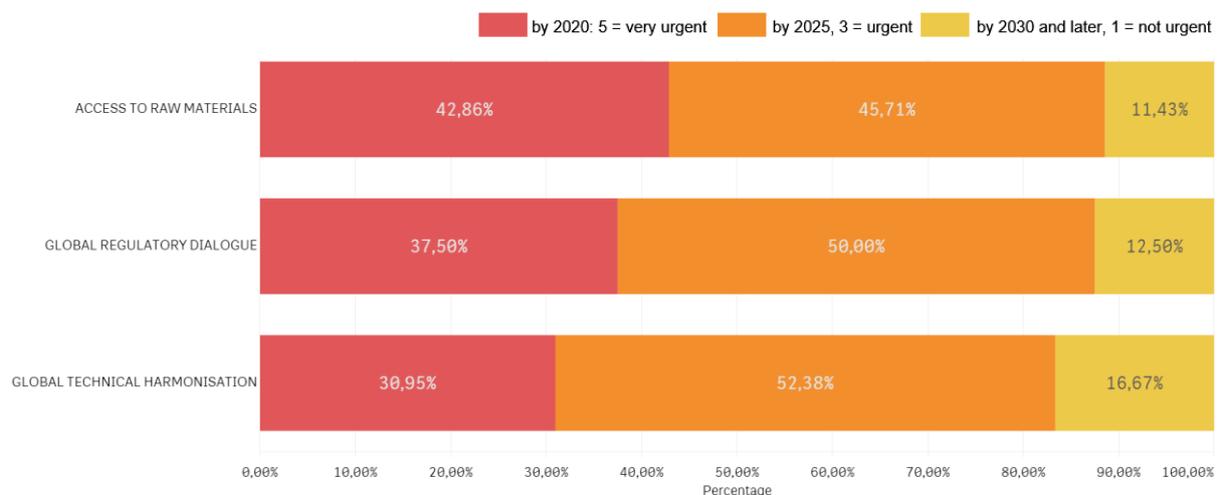

Figure 64 KPI 2.12 Drivers of Change – Group GLOBALISATION AND RISE OF NEW PLAYERS - URGENCY – SMEs sample

Figure 64 highlights views of SME's with respect to "GLOBALISATION AND RISE OF NEW PLAYERS". The relative urgency attached to "ACCESS TO RAW MATERIALS" mirrors that of Large Enterprises (see Figure 63), with a similar position in relation to "GLOBAL TECHNICAL HARMONISATION". However, SME's views of the urgency of "GLOBAL REGULATORY DIALOGUE" is significantly different from that of Large Enterprises, with a shift from "by 2020" to "by 2025" and "by 2030 and later" of +10%.
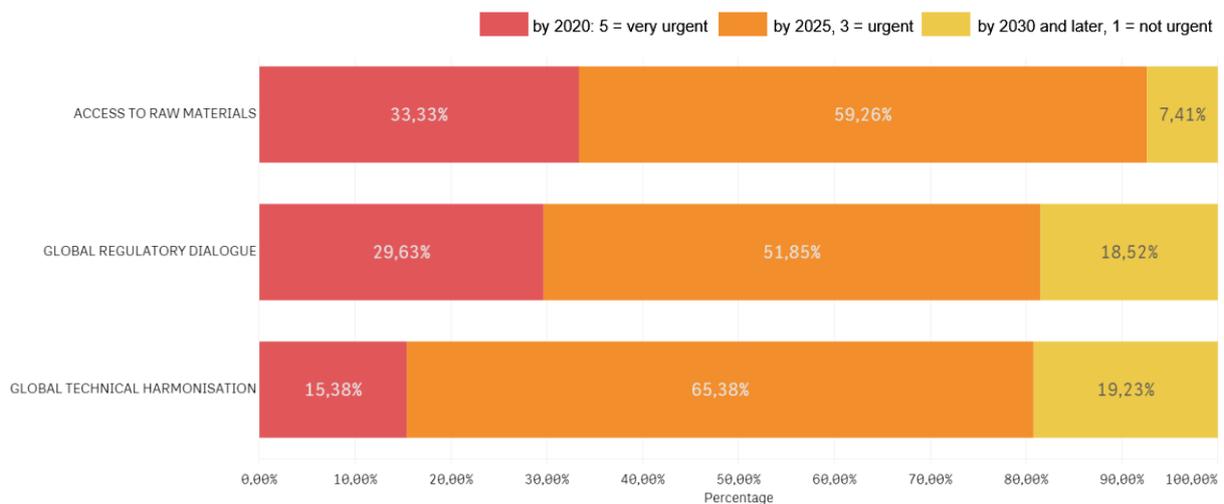
Figure 65 KPI 2.12 Drivers of Change – Group GLOBALISATION AND RISE OF NEW PLAYERS - URGENCY – Sectoral Industrial Associations sample

Figure 65 sets out views of Sectoral Industrial Associations with respect to urgency for KPI 2.12. By comparison with responses from all respondents there is a shift away from 'very urgent', with a higher proportion assigning each specific Driver of Change a 'medium' urgency label of "by 2025". In terms of overall urgency, "ACCESS TO RAW MATERIALS" is ranked first followed by "GLOBAL REGULATORY DIALOGUE" and "GLOBAL TECHNICAL HARMONISATION".

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6.8   DRIVER OF CHANGE PRIORITY INDEX

The creation of an index to combine 'importance' and 'urgency' criteria for each Driver of Change is essential in order to develop an overall priority index that provides a simple ranking of responses relating to stakeholders vision of the sector.

In a simplified form, the DoC PRIORITY INDEX is stated as:

Priority (1 to 5) **x Timeframe** (2020=5, 2025=3, 2030 and further=1).

A more precise formula is as follows:

PRIORITY DoC INDEX =

Where:

i = number of replies to the questionnaire

DoC [priority]$_i$ = score attributed to i DoC in the priority section, with a scale:

- o   0 = not applicable
- o   1 = not important
- o   2 = Slightly important
- o   3 = Moderately Important
- o   4 = Important
- o   5 = very important

DoC [urgency]$_i$ = score attributed to i DoC in the urgency section with a scale:

- o   by 2020: 5 = very urgent
- o   by 2025, 3 = urgent
- o   by 2030 and later, 1 = not urgent

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Figure 66 KPI 2.13 Drivers of Change – Priority Index – Overall sample

Figure 66 shows the overall PRIORITY DoC INDEX where „CONTINUOUS TRAINING" and „ACQUISITION OF NEW SKILLS" are ranked as the first two priority Drivers of Change measured on this basis. This result is particularly important for the DRIVES project as the necessity for upskilling and reskilling is a priority for the sector, but also a central objective of the DRIVES project itself. "ADVANCED MANUFACTURING, DIGITALISATION AND ROBOTIZATION OF THE MANUFACTURING PROCESS" is ranked third using this measure, and is a consequence of the importance attached by stakeholders to technological change in the Automotive sector.

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Figure 67 KPI 2.13 Drivers of Change – Priority Index - Large Enterprise sample

Looking now at the PRIORITY DoC INDEX purely in relation Large Enterprises, Figure 67 indicates that when compared with responses from all respondents the same TOP10 Drivers of Change are identified and ranked in a similar position. The main difference is that "ALTERNATIVE POWER TRAIN" falls out of the list for the TOP10 and has been replaced by "DATA ACCESS".
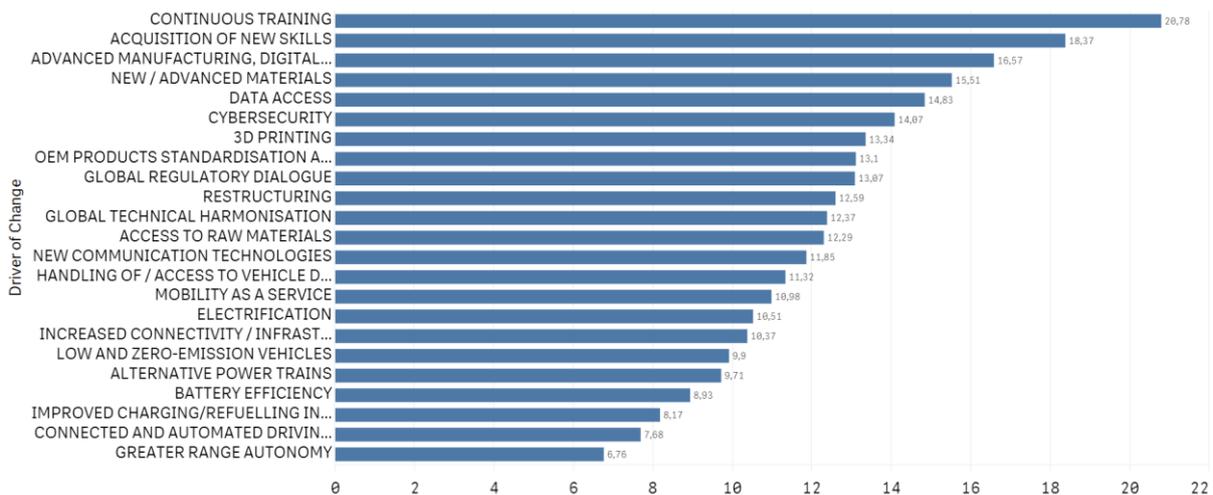
Figure 68 KPI 2.13 Drivers of Change – Priority Index – SMEs sample

Figure 68 outlines the PRIORITY DoC INDEX in relation to SME's. By comparison with Large Enterprises a slightly different pattern of responses emerges, with 3D PRINTING", "OEM PRODUCTS STANDARDISATION AND PLUG&PLAY", "GLOBAL REGULATORY DIALOGUE" and "RESTRUCTURING" now appearing in the list of the TOP10. This could be linked to the need for more tangible solutions and necessity to react quickly to changing requirements of Large Enterprise supply chains.

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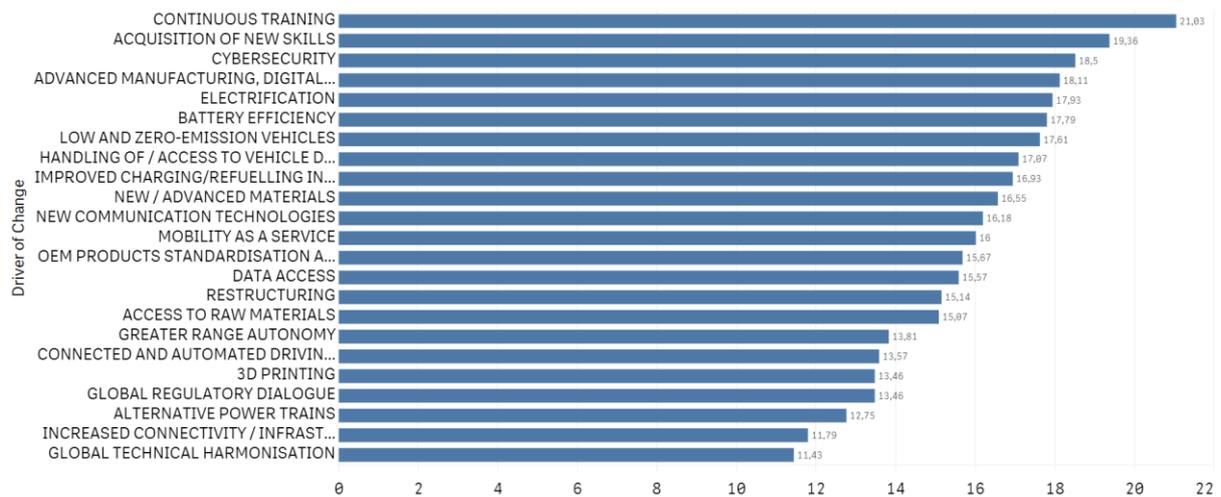
Figure 69 KPI 2.13 Drivers of Change – Priority Index - Sectoral Industrial Associations sample

Applying the same analysis for Sectoral Industrial Associations, the PRIORITY DoC INDEX is outlined in Figure 69. The Index reflects the responses of these stakeholders in relation to importance and urgency, as set out previously. "CONTINUOUS TRAINING" and "ACQUISITION OF NEW SKILLS" are the first two priority Drivers of Change based on this measure with "CYBERSECURITY" ranked third. "ADVANCED MANUFACTURING, DIGITALISATION AND ROBOTIZATION OF THE MANUFACTURING PROCESS", "ELECTRIFICATION", "BATTERY EFFICIENCY" and "LOW AND ZERO-EMISSION VEHICLES" are also identified as high priority, reflecting the importance to the future of the Automotive sector attached to these Drivers by Sectoral Industrial Associations.

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7 RESULT OF THE SURVEY - SKILLS

Given the 'open ended' nature of many of the survey questions the harmonisation process was an essential step of the questionnaire analysis as discussed in Chapter 3 and this chapter sets out analysis of the harmonised responses.

The complete list of skills is analysed is in the Appendix. In order to present the findings of the survey a Skills index has been created.

In a simplified form, the SKILLS INDEX is stated as:

Occurence (of each skill) **x Priority DoC Index** (average for each skill[40])

A more precise formula is stated as:

Skills Index =

Where:

i = number of responses to the questionnaire

Skill [occurrence]$_i$ = number of times the *i skill* has been mentioned

AVG DoC priority index$_i$ = the average of the priority DoC index linked to the *Skill$_i$* identified by the respondent

With this index it is possible to merge two important sets of information and present this a one number: specifically, how many times a skill has been mentioned in relation to the linked Driver of Change, ranked within one index.

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[40]   *Respondents were given the opportunity to indicate for each Skill, the related Drivers of Change interacting with this skill. With this index it is possible to link skills with appropriate Drivers of Change*

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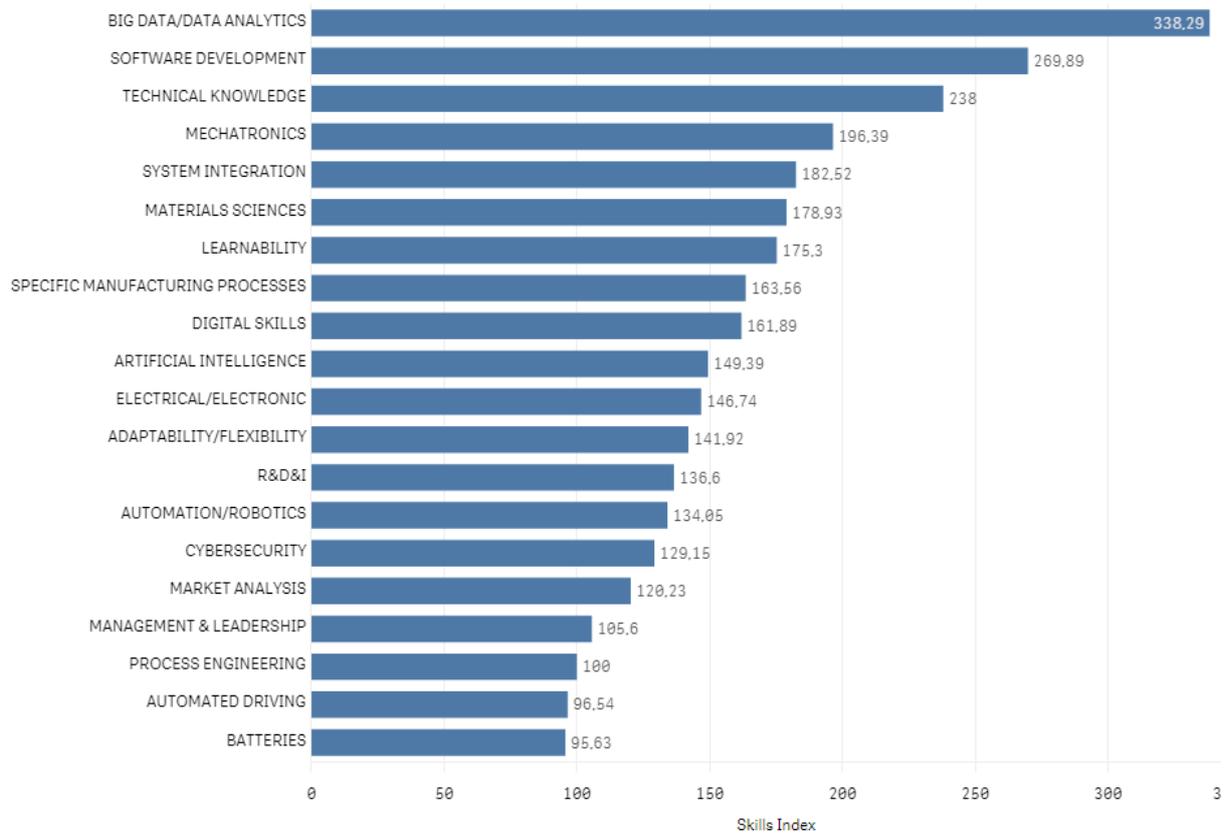Co-funded by the
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Figure 70 KPI 3.1 Skill Index – Overall sample

Figure 70 outlines the TOP15 Overall Skills ranked according to the Skill Index. Based on the categorisation adopted[41] five skills are TECHNICAL, 3 are relate to DIGITALISATION, with other less frequent occurrences relating to "ELECTRIFICATION", "LIFE CYCLE/PROCESS CHAIN", "MANUFACTURING" and "SOFT SKILLS" profiles. In terms of specific skill areas, "BIG DATA / DATA ANALYTICS" is ranked first with a significant gap to the second highest score relating to "SOFTWARE DEVELOPMENT", with "TECHNICAL KNOWLEDGE" ranked third, underlining the importance of skills required to adapt to technological change in the sector. The first SOFT SKILL - "LEARNABILITY" - is ranked seventh.

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[41]   *Chapter 3.2 normalisation of skills*

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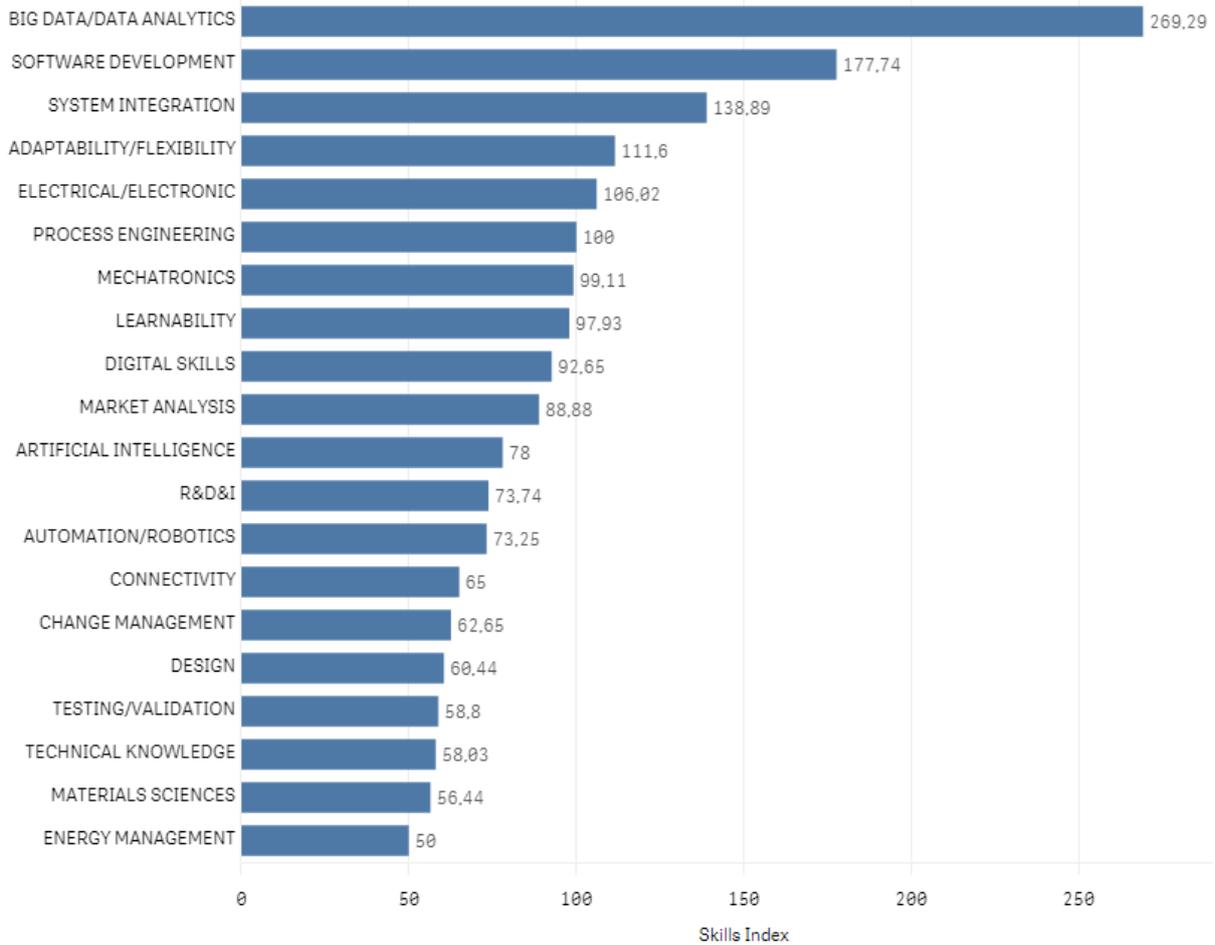
Figure 71 KPI 3.1 Skill Index - Large Enterprise sample

Looking in more detail Figure 71 outlines the TOP15 Skills ranked by the Skill Index in relation to Large Enterprises. Based on the categorisation adopted through the Skill Index,[42] by comparison with the analysis for all respondents set out in the previous Figure (70), SOFT SKILLS are more evident, with 3 specific soft skills included in the TOP 15 ("ADAPTABILITY/FLEXIBILITY", LEARNABILITY" and "CHANGE MANAGEMENT"), together with 3 in "LIFE CYCLE/PROCESS CHAIN" and 3 "TECHNICAL" . Overall, the 3 most important specific skills are "BIG DATA/DATA ANALYTICS", "SOFTWARE DEVELOPMENT" and "SYSTEM INTEGRATION".

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[42]   *Chapter 3.2 normalisation of skills*
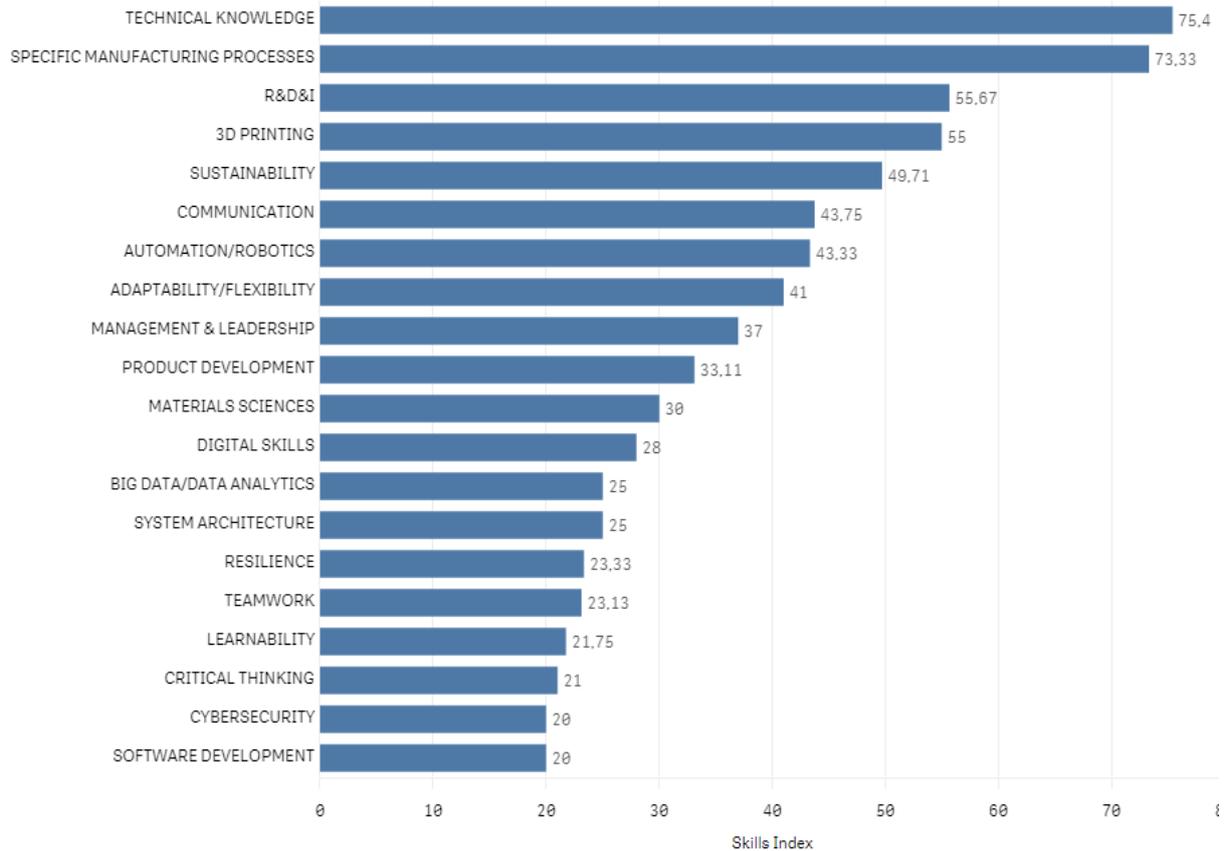
Figure 72 KPI 3.1 Skill Index – SMEs sample

Applying the same analysis only to SME's, SOFT SKILLS are even more evident within the TOP 15 Skill Index skills. Figure 72 indicates that there are 4 specific skills occurring within the TOP 15: "COMMUNICATION", "ADAPTABILITY/ FLEXIBILITY", "MANAGEMENT & LEADERSHIP" and "RESILIENCE". The TOP3 skills using this measure are "TECHNICAL KNOWLEDGE" (TECHNICAL), "SPECIFIC MANUFACTURING PROCESSES" (MANUFACTURING) and "R&D&I" (LIFE CYCLE/PROCESS CHAIN).

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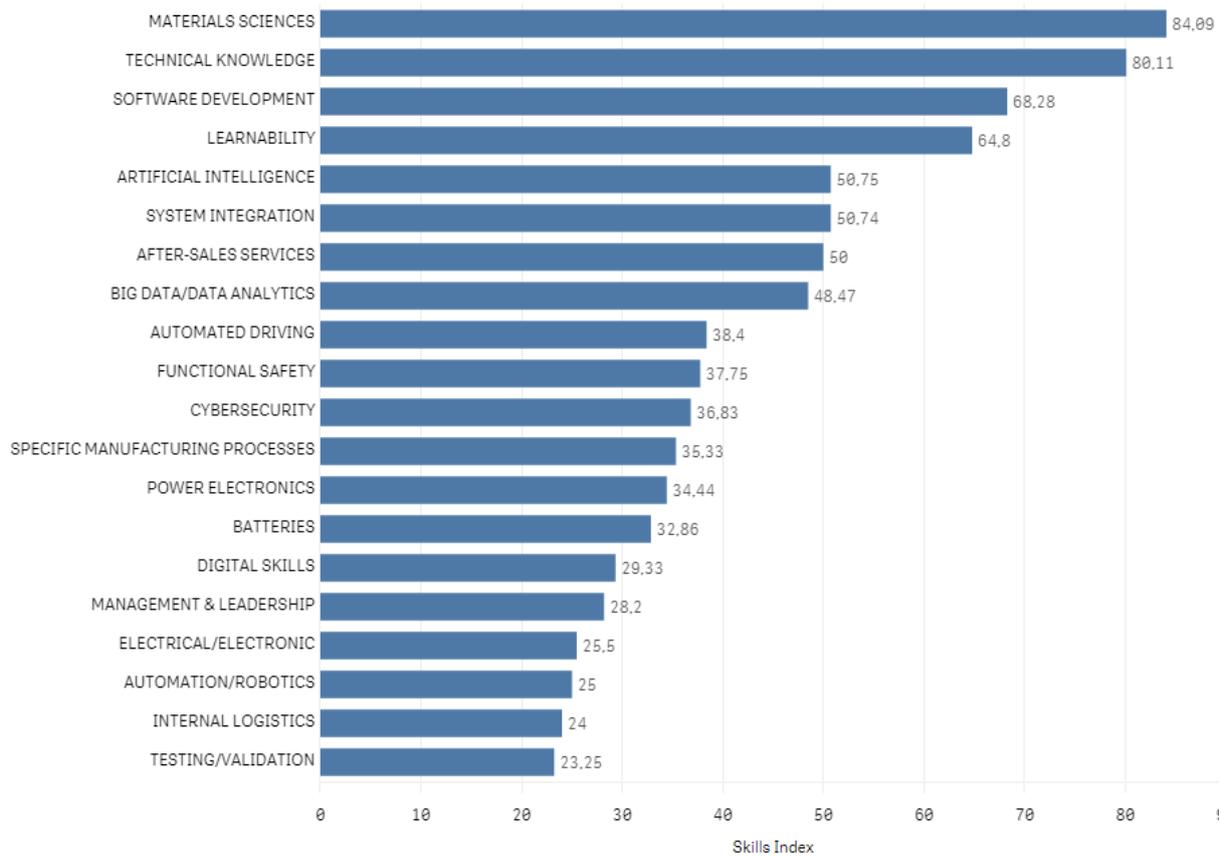
Figure 73 KPI 3.1 Skill Index - Sectoral Industrial Association sample

Figure 73 sets out this analysis in relation to Sectoral Industrial Associations for the TOP 15 skills, ranked according to the Skill Index. With the exception of "LEARNABILITY" (ranked fourth) "SOFT SKILL" are absent from the TOP 15 list based on responses from Sectoral Industrial Associations, with "TECHNICAL", "ELECTRIFICATION" and "DIGITALISATION" categories the most evident.

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The same approach and methodology used for Skills has been adopted for analysis of Job Roles, with the creation of an index.

In a simplified form, the JOB ROLE INDEX is stated as:

Occurence (of each JobRole) **x Priority DoC Index** (average of each JobRole[43])

A more precise formula is:

$$\text{JobRole Index} =$$

Where:

i = number of responses to the questionnaire

JobRole [occurrence]$_i$ = number of times the *i JobRole* has been mentioned

AVG DoC priority index$_i$ = the average of the priority DoC index linked to the *JobRole$_i$* identified by respondents

With this index it is possible to merge two important sets of information and present this as in one number: specifically, how many times a JobRole has been mentioned in relation to the linked Driver of Change, ranked within one index.

The complete list of Job Roles is outlined in the Appendix.

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[43]   *Interviewed had possibility to indicate per each JobRole the related Drivers of Change interacting with the JobRole itself. With this index it is possible to link JobRoles with appropriate Drivers of Change*

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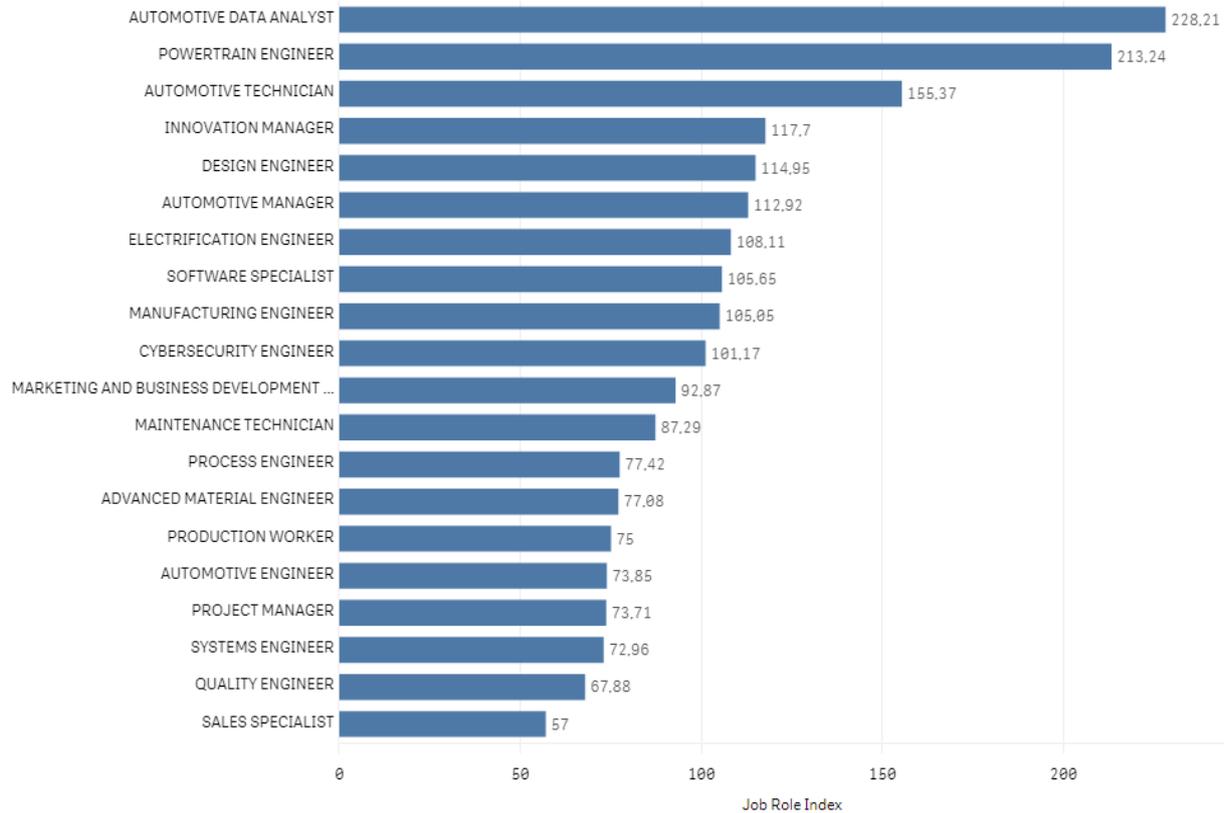
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Figure 74 KPI 4.1 Job Role Index – Overall sample

Figure 73 outlines the TOP 15 Job Roles ranked according to the JobRole Index. Based on this, the positions ranked first, second and third are all automotive specific roles, these being "AUTOMOTIVE DATA ANALYST", "POWERTRAIN ENGINEER" and "AUTOMOTIVE TECHNICIAN". The first non-Automotive specific Job Role is ranked 4th and is "INNOVATION MANAGER".

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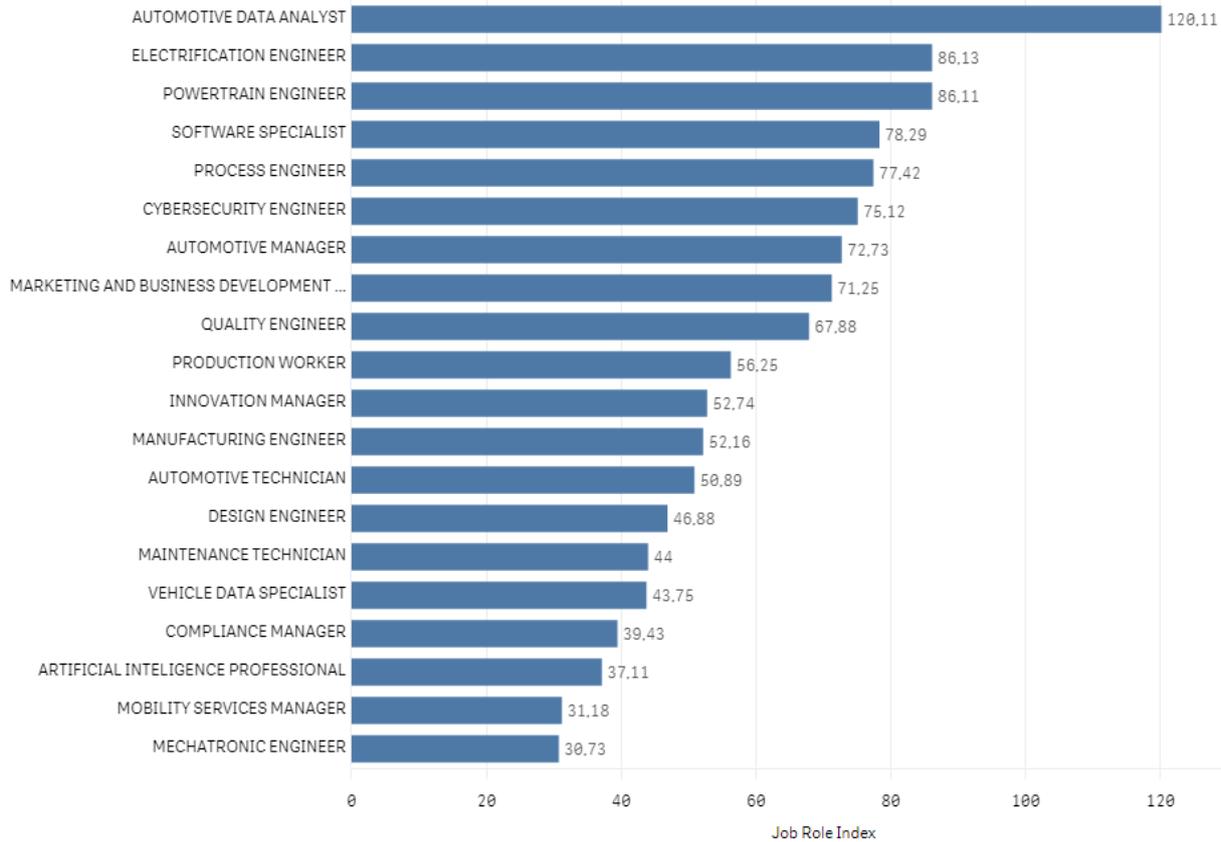
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Figure 75: KPI 4.1 – Job Role Index - Large Enterprise sample

Looking now just at responses from Large Enterprises, Figure 75 outlines the KPI 4.1 JobRole Index, and again highlights automotive specific Job Roles in the highest ranked positions. The first more generic role is ranked 8th and is a sales and marketing job role: "MARKETING AND BUSINESS DEVELOPMENT MANAGER".
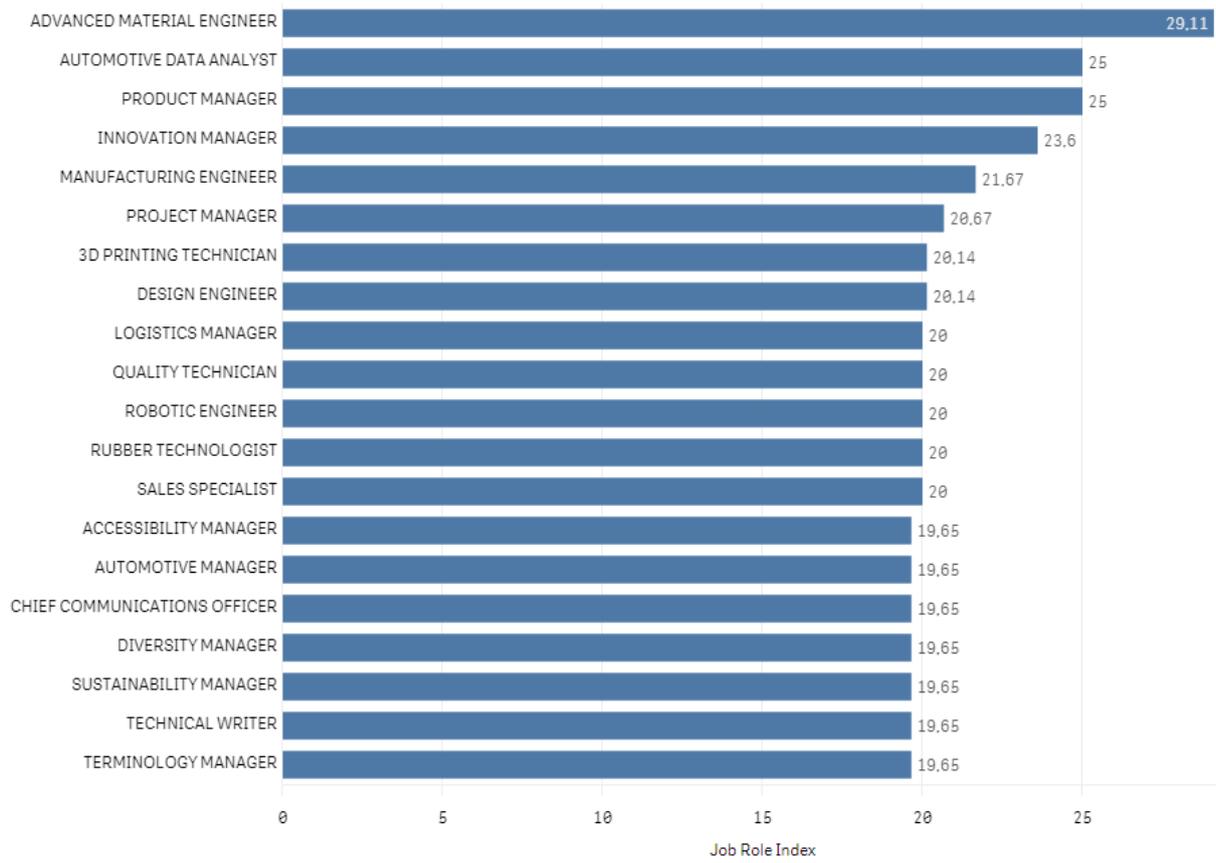
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Figure 76 KPI 4.1 Job Role Index – SMEs sample

Figure 76 outlines the JobRole Index in relation to SME responses and indicates "ADVANCED MATERIAL ENGINEER" is ranked first, followed by "AUTOMOTIVE DATA ANALYST", "PRODUCT MANAGER" and "INNOVATION MANAGER". The first sales job role is "SALES SPECIALIST", ranked 13th.

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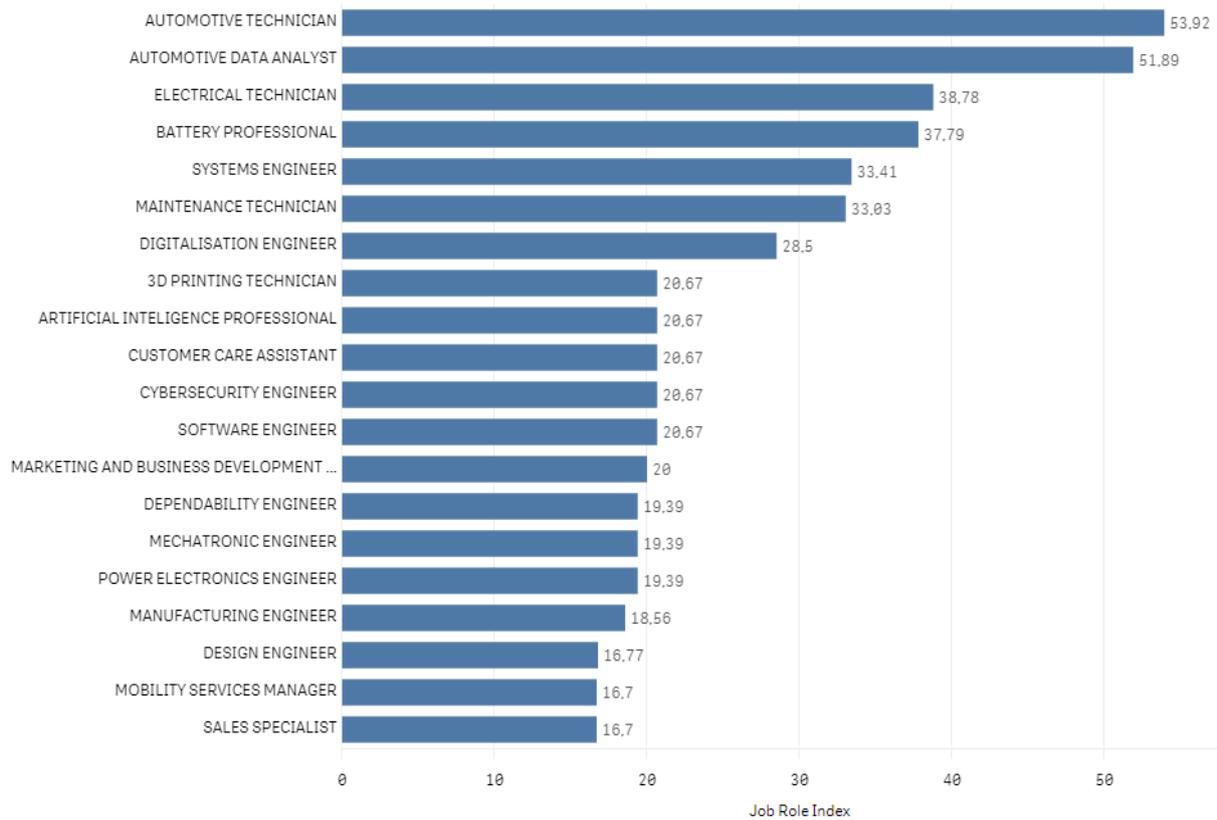therein.

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Figure 77 KPI 4.1 Job Role Index - Sectoral Industrial Associations

Figure 77 sets out the JobRole Index based on responses from Sectoral Industrial Associations and broadly reflects patterns set out previously for this KPI, with technical and automotive jobs predominating in the highest ranked positions.

Vocational Education and Training (VET) aims to equip people with knowledge, know-how, skills and/or competences required in particular occupations, or more broadly within the labour market.

The 3 most relevant types of VET in the context of the DRIVES project are:

- CVET[44]: Continuing vocational education and training is defined as "education or training after initial education or entry into working life, aimed at helping individuals to improve or update their knowledge and/or skills; acquire new skills for a career move or retraining; and/or continue their personal or professional development"

- IVET[45]: General or vocational education and training carried out in the initial education system, usually before entering working life. Some training undertaken after entry into working life may be considered as initial training (e.g. retraining); initial education and training can be carried out at any level in general or vocational education (full-time school-based or alternance training) pathways or apprenticeships.

- TVET[46]: Technical and Vocational Education and Training (TVET) is concerned with the acquisition of knowledge and skills for the world of work. Throughout the course of history, various terms have been used to describe elements of the field that are now considered as as comprising TVET. These include: Apprenticeship Training, Vocational Education, Technical Education, Technical-Vocational Education (TVE), Occupational Education (OE), Vocational Education and Training (VET), Professional and Vocational Education (PVE), Career and Technical Education (CTE), Workforce Education (WE), Workplace Education (WE), etc. Several of these terms are commonly used in specific geographic areas.

Understanding current VET mechanisms is identified as an important element of the overall skills strategy. The section is divided in 3 parts:

- **Education and training approach**: This enables respondents to identify which training approach is likely to be the most appropriate in the future (both for initial education and continuous training)

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44   http://www.cedefop.europa.eu/files/3070_en.pdf
45   https://www.eqavet.eu/eu-quality-assurance/glossary/initial-educuation-and-training-(ivet)
46   https://unevoc.unesco.org/go.php?q=What+is+TVET

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- **Education and training strategy**: Enables respondents to set out their views on the best approach to transfer skills
- **Apprenticeships**: Captures views on the current and future evolution of apprenticeships serving the automotive sector.

9.1   VET APPROACH

This section provides information about VET approaches and explores different ways of approaching training and learning. It is considered an important factor when defining the overall skills strategy and understanding the preferences of stakeholders in relation to VET provision and also supports the design and orientation of all the project work packages;

As discussed in chapter 3.4.1, the pre-defined list used in the questionnaire, was:

- **Classroom based training**:the classic school method, where skills are learned in a theoretical environment, with a preference for academic and analytical approaches.

- **Dual system**: includes both school training and work experience with an emphasis on apprenticeships.

- **On the job training**: employees learn in the environment where they will need to practice the knowledge and skills obtained during training.

- **Mentoring:** Similar to the previous on the job training but now the "training by doing" activity is supported by a mentor (an identified skilled person) who follows and supports individuals who need or want the same skills and advantages to move up in work, skill level, or school performance.

- **Online courses**: This is a mix between a 'theoretical' vocational training (without the physical presence of the employee = online) and the possibility to have more interaction with user forums to support community interactions among students, professors, and teaching assistants as well as immediate feedback to tests and assignments

- **Blended learning**: This is a mix of online and classroom-based learning

Using the same strategy adopted for each Driver of Change, respondents were given the opportunity to indicate the importance of each VET approach using a score from 0 to 5:

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o   0 = not applicable

o   1 = not important

o   2 = Slightly important

o   3 = Moderately Important
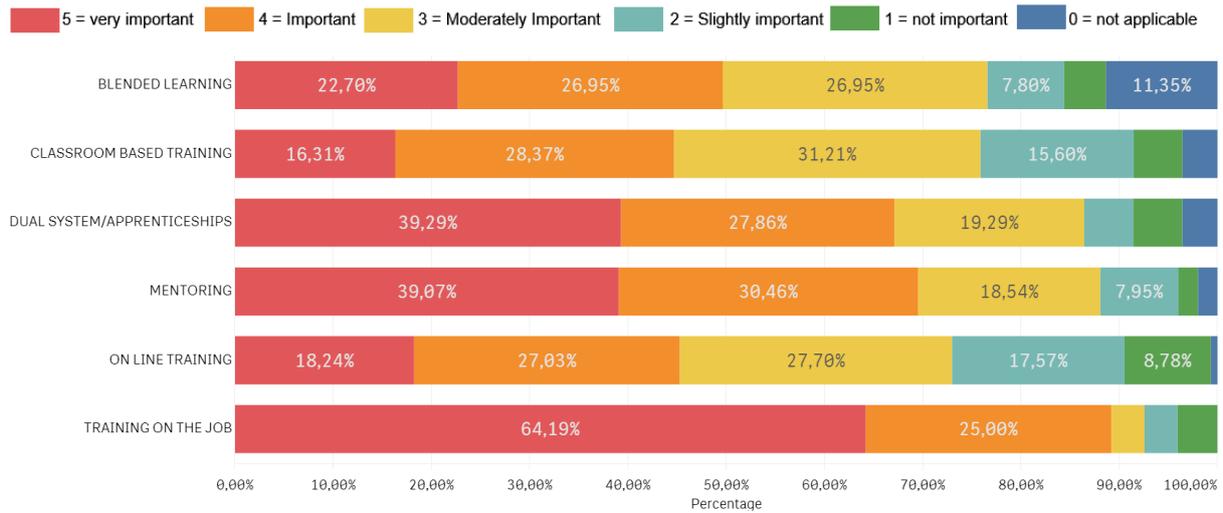
o   4 = Important

o   5 = very important

Figure 78 KPI 5.1 VET Approaches – Overall sample

Figure 78 outlines results of responses relating to VET approach (KPI 5.1) and underlines the importance of "TRAINING ON THE JOB". This is followed by "DUAL SYSTEM/APPRENTICESHIP" and "MENTORING" in terms of the level importance attached to each approach , based on both those scoring each approach as very important (5) and those scoring 3 or above. Overall, the results underline the importance stakeholders attach to work-based-approaches to VET.
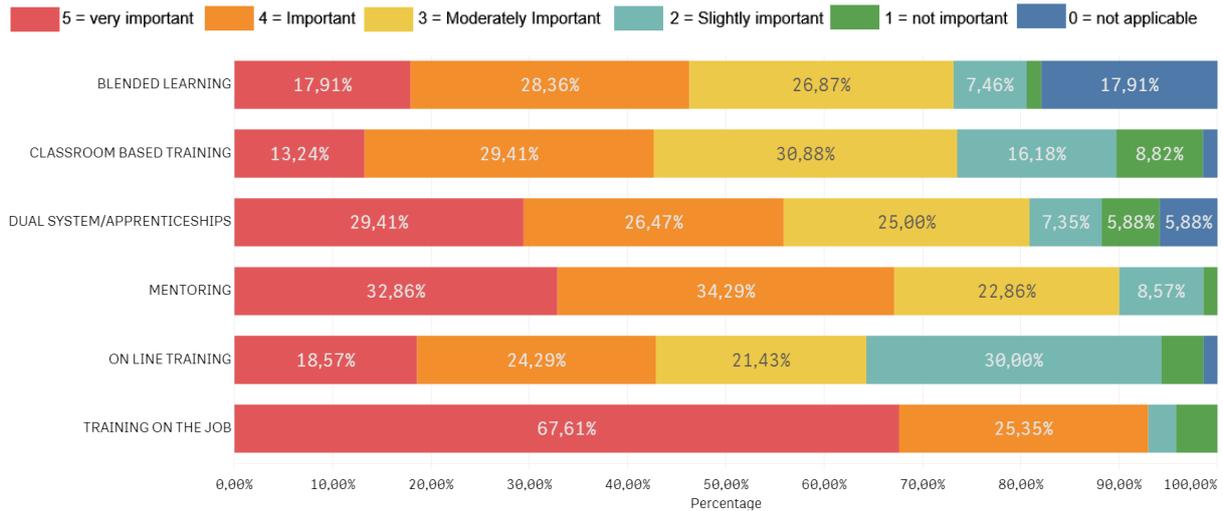
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Figure 79 KPI 5.1 VET Approaches - Large Enterprise sample

Figure 78 outlines the above analysis for KPI 5.1 but in relation to Large enterprises. The results are broadly similar to those set out for all respondents in Figure 78, with "TRAINING ON THE JOB" still considered the most important approach. In the case of Large enterprises the proportion of those considering "BLENDED LEARNING" as 'not relevant' has increased to 18% and, in general, more importance is attached to online training. This is probably linked to the complexities of managing training across different facilities/branches for Large Enterprises, which can, to a certain extent be alleviated through online training.
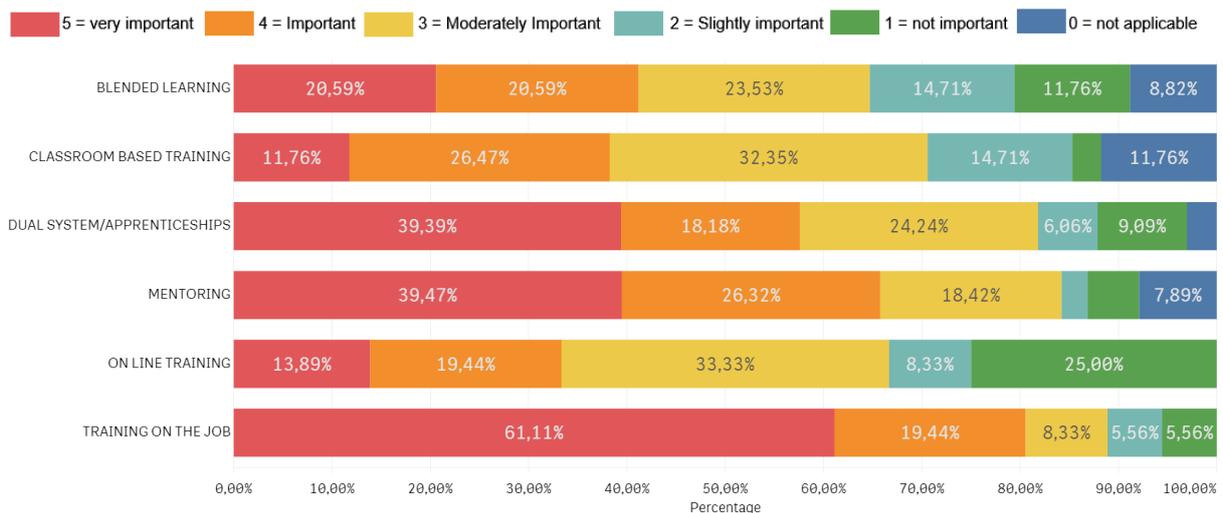

Figure 80 KPI 5.1 VET Approaches – SMEs sample

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Focussing on SMEs, Figure 80 underlines the importance attached to all work-based VET approaches, with , "TRAINING ON THE JOB" ranked first (89% based on those scoring 3 or above), followed by "MENTORING" (84%) and "DUAL SYSTEM APPRENTICESHIP" (81%).
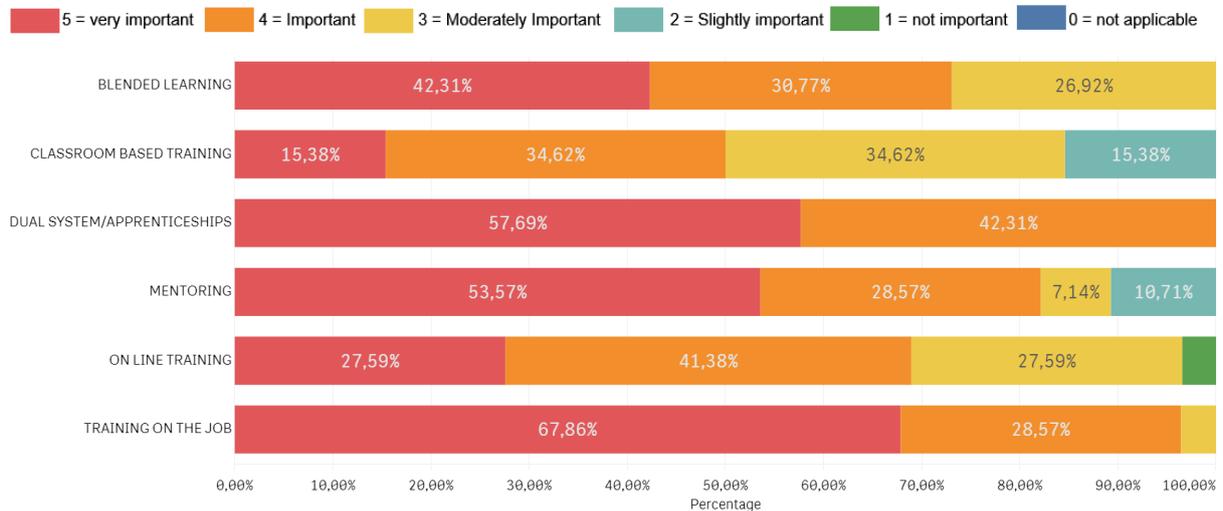

Figure 81 KPI 5.1 VET Approaches - Sectoral Industrial Association sample

Figure 81 sets out analysis for KPI 5.1 in relation to Sectoral Industrial Associations. In relation to these stakeholders, the importance attached to "DUAL SYSTEM/APPRENTICESHIPS" increases, and if only those responses indicating 'very important' or 'important' are considered, is ranked first. Based only on responses rating each approach as 'very important' "TRAINING ON THE JOB" remains ranked as first, with this followed by "DUAL SYSTEM/APPRENTICESHIPS" and "MENTORING" ranked third.

If all scores of 3 or above are considered "DUAL SYSTEM/APPRENTICESHIPS" are ranked first along with "TRAINING ON THE JOB" and "BLENDING LEARNING" (All scoring 100% on this basis), followed by "ONLINE TRAINING" (97%) and "MENTORING" (89%). The results point to the conclusion that for Sectoral Industrial Associations theory and practice must be combined as part of an overall approach to VET within the sector, with online technologies an important element of this mix.

9.2   VET STRATEGY

A detailed analysis of VET provision mechanisms was also undertaken with a focus on two key but very different approaches, these being:

- **Creation of a restricted group of highly specialised trainers with high mobility**: a limited number of highly trained "teachers" available to travel around the EU and disseminate knowledge. This strategy ensures that know-how is disseminated by the same people ensuring

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standard outputs, even if different EU languages can create communication challenges and trainers might be not always be available.

- **Dissemination of the results "TRAIN THE TRAINERS" programmes:** this strategy focuses on a possible standardisation of the programme through the development of local/national trainers. This would support a wider and larger number of trainers with the possibility to teach respective native languages in each country but might result in the potential dilution of quality and consistency in the delivery of training across EU.

Using the same strategy adopted in the previous VET approach section, respondents were given the opportunity to indicate, the relative importance of each VET strategy using a score of 0 to 5:

- o   0 = not applicable
- o   1 = not important
- o   2 = Slightly important
- o   3 = Moderately Important
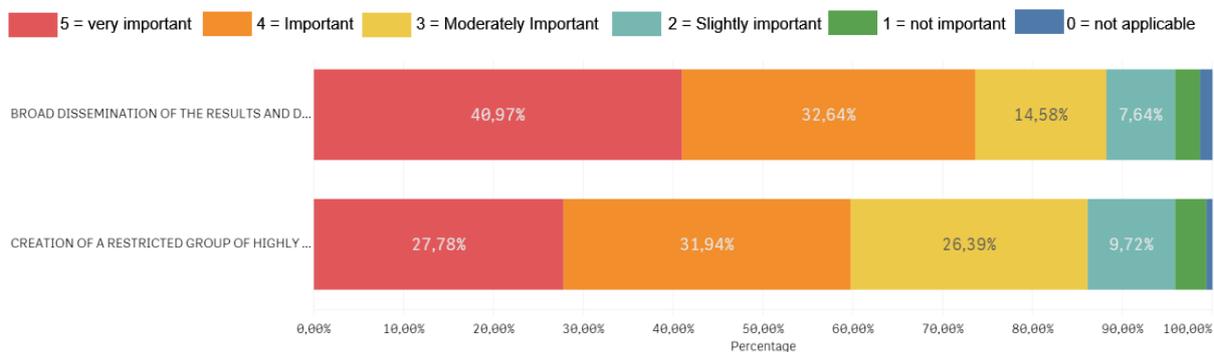- o   4 = Important
- o   5 = very important

Figure 82 KPI 5.2 VET Strategies – Overall sample

Figure 82 shows the most important VET strategy identified by stakeholders based on the two pre-determined options, it was "BROAD DISSEMINATION OF THE RESULTS AND DEFINITION THROUGH TRAIN THE TRAINERS", with a positive net balance of 13% when compared with "CREATION OF A RESTRICTED GROUP OF HIGHLY SPECIALISED TRAINERS WITH HIGH MOBILITY", when those scoring 'very important' are considered.   However, when based on all scores of 3 or above this positive net balance reduces to +2%. A small number of further strategies were also made by stakeholders, including "NETWORKING AND EXCHANGE INFORMATION OF EMPLOYEES/EXPERTS/EMPLOYERS", "DIGITAL/E LEARNING" and "WORK BASED TRAINING".

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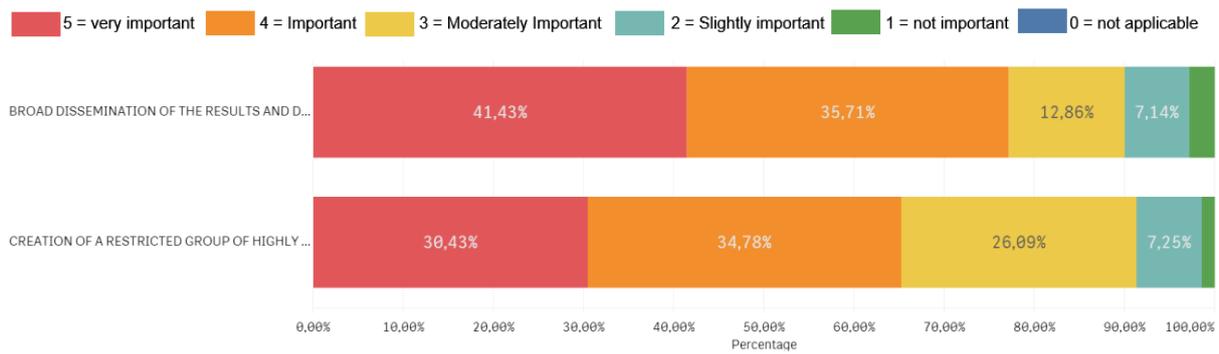
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Figure 83 KPI 5.1 VET Strategy - Large Enterprise sample

Figure 83 repeats the above analysis for KPI 5.1, but the analysis is restricted to responses from Large Enterprises. The analysis indicates a similar pattern to that of all stakeholders.
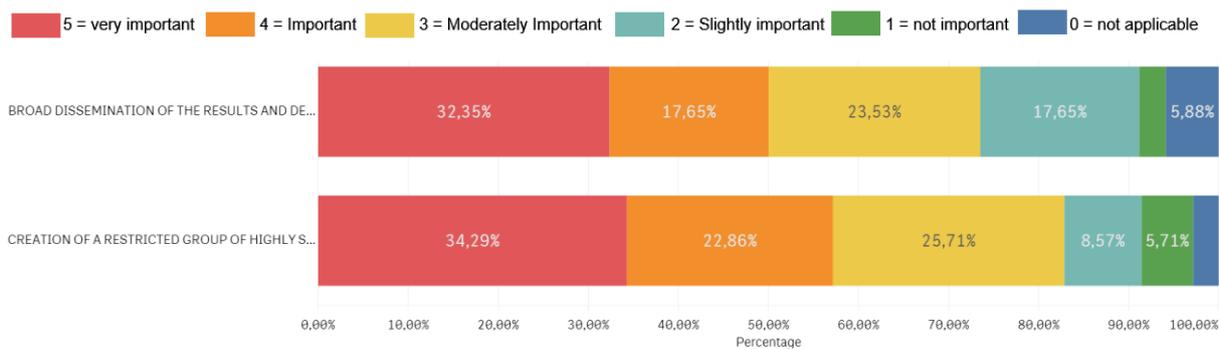

Figure 84 KPI 5.1 VET Strategy – SMEs sample

Figure 84 outlines responses from SMEs and points to somewhat different views when compared with Large Enterprises. For SME's the "CREATION OF A RESTRICTED GROUP OF HIGHLY SPECIALISED TRAINERS WITH HIGH MOBILITY" is the marginally preferred strategy when all those responses with scores of 5 (very important) are considered, but only by a positive net balance of +2%. This increases to +9% when all scores of 3 and above are considered.
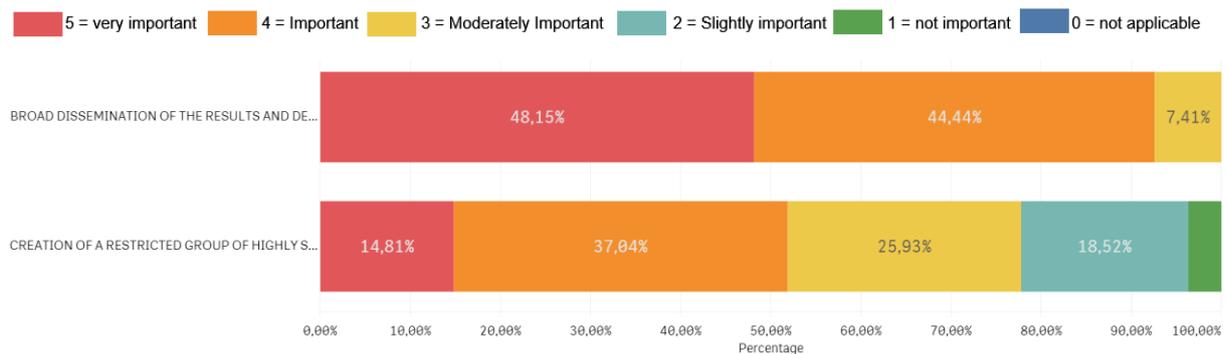
Figure 85 KPI 5.1 VET Strategy - Sectoral Industrial Association

Figure 85 sets out analysis of KPI 5.1 based on responses from Sectoral Industrial Associations and indicates that the "BROAD DISSEMINATION OF THE RESULTS AND DEFINITION THROUGH TRAIN THE TRAINERS" is the strategy preferred by most of these respondents.

9.3 APPRENTICESHIP

An apprenticeship can be defined as 'systematic, long-term training alternating periods at the workplace and in an educational institution or training centre. The apprentice is contractually linked to the employer and receives remuneration (a wage or allowance).

In addition, an apprenticeship has the following characteristics:

- following successful completion, learners acquire a qualification and receive an officially recognised certificate;
- apprentices usually have the status of employees.

As previously outlined in chapter 1, the categories of stakeholders involved in the DRIVES "demand" questionnaire were:

- Company:
  - o SMEs
  - o Large Enterprises
- Organisation:
  - o Technology Centre
  - o Sectoral/Industrial Association
  - o Trade Union
  - o Labour Market Intelligence Entities
  - o Public and Private Employment Services
  - o Public Authority

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- o Chambers of Commerce
- o Labour Ministries
- o National Statistics Offices

Questions relating to apprentices were only included in the 'Company' version of the questionnaire.

The main issues covered were:

- Job Roles currently involving apprenticeships
- Job Roles that will be involve apprenticeships over the next 5 years.

Figure 86 KPI 5.3 APPRENTICESHIP: JOB ROLES CURRENT RANKING – TOP mentioned job roles – overall sample

Figure 86 outlines those job roles currently involving Apprenticeships and indicates "ENGINEER", "TECHNICIAN", "OPERATOR" and "RESEARCH & DEVELOPMENT" are the most frequently cited roles, closely linked to analysis of overall Job Roles outlined in Chapter 8.

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Figure 87 KPI 5.3 APPRENTICESHIP: JOB ROLES CURRENT RANKING – TOP mentioned job roles – Large Enterprise sample

Figure 87 outlines the same analysis relating to KPI 5.3, but with respect to responses from Large Enterprises and points to a similar pattern to that of all respondents. The main difference is that "TECHNICIAN (TEST)" is ranked in 4th position but did not previously appear in the top 10 list of Job Roles relating to all respondents.

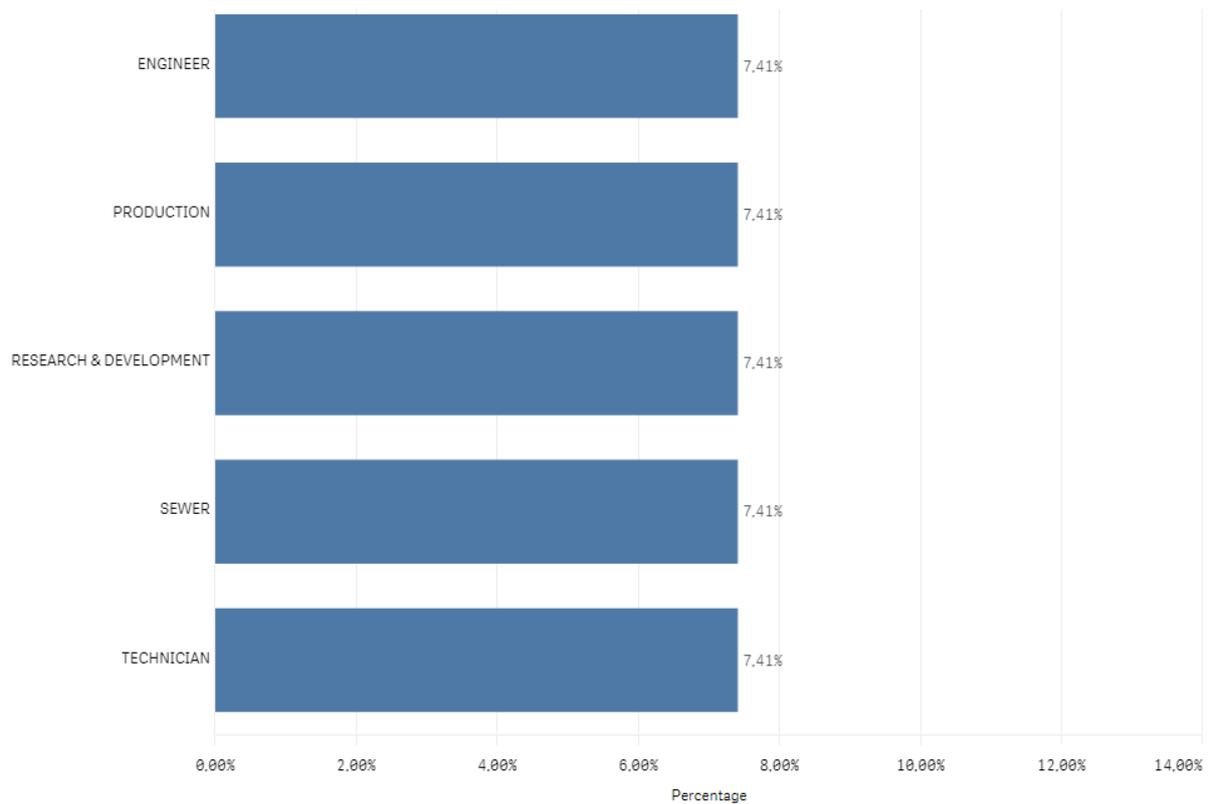**Figure 88 KPI 5.3 APPRENTICESHIP: JOB ROLES CURRENT RANKING – TOP mentioned job roles – SMEs sample**

Interesting, first, the different distribution of preference in the Figure 88, filtered by SMEs. Five job roles have now equal importance with an interesting "SEWER" included in this list. This is the first case that a manual-work with high level of handmade competences and training appear in a DRIVES list in TOP positions.
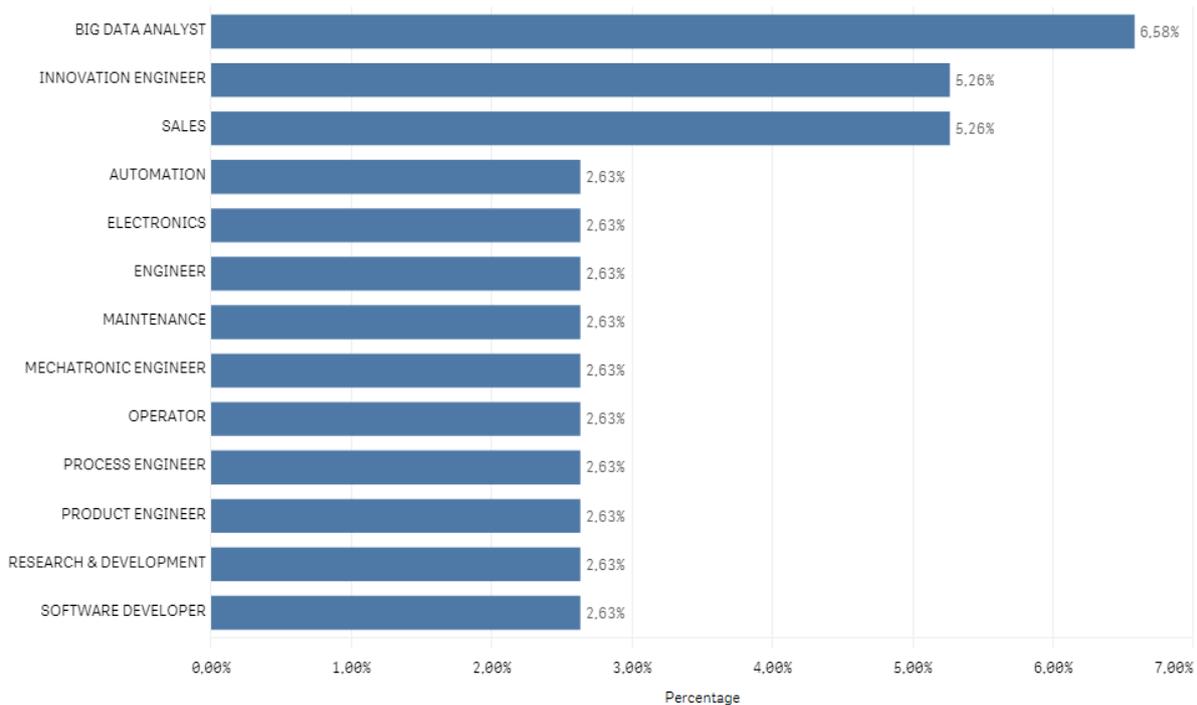
Figure 89 KPI 5.4 APPRENTICESHIP: JOB ROLES IN FIVE YEARS – TOP mentioned job roles – Overall sample

Figure 89 sets out analysis of the Apprenticeship Job Roles expected over the next five years. Comparing the TOP 3 expected apprenticeships job roles in the next 5 years with the current distribution of Job Roles as set out in Figure 86 indicates that "BIG DATA ANALYST" and "INNOVATION ENGINEER" are now in the first and second position in terms of expected Job Roles but were not included in the TOP6 current Job Roles. This points to a desire for stakeholders to see apprentices in different company positions in the future, including some relatively high-level technical skill areas. The vision between the current and future pattern of apprenticeships is quite different, with less than 50% of 'Top' Job Roles appearing in both the current and future analysis, these being "ENGINEER", "OPERATOR", "R&D", and "MAINTENANCE AND PRODUCT ENGINEER". Compared with the current position stakeholders appear to attach less importance in the future to apprenticeship roles for "TECHNICIAN" (ranked 2nd currently), "PRODUCTION", "TECHNICIAN (TEST)", "TESTING ENGINEER", "DESIGN ENGINEER" and "FINANCE" and more importance in the future to emerging or upskilling job roles for "BIG DATA ANALYST", "INNOVATION ENGINEER", "SALES", "AUTOMATION", "ELECTRONICS", "MECHATRONIC ENGINEER" and "PROCESS ENGINEER" (all ranked in the first 10 positions).

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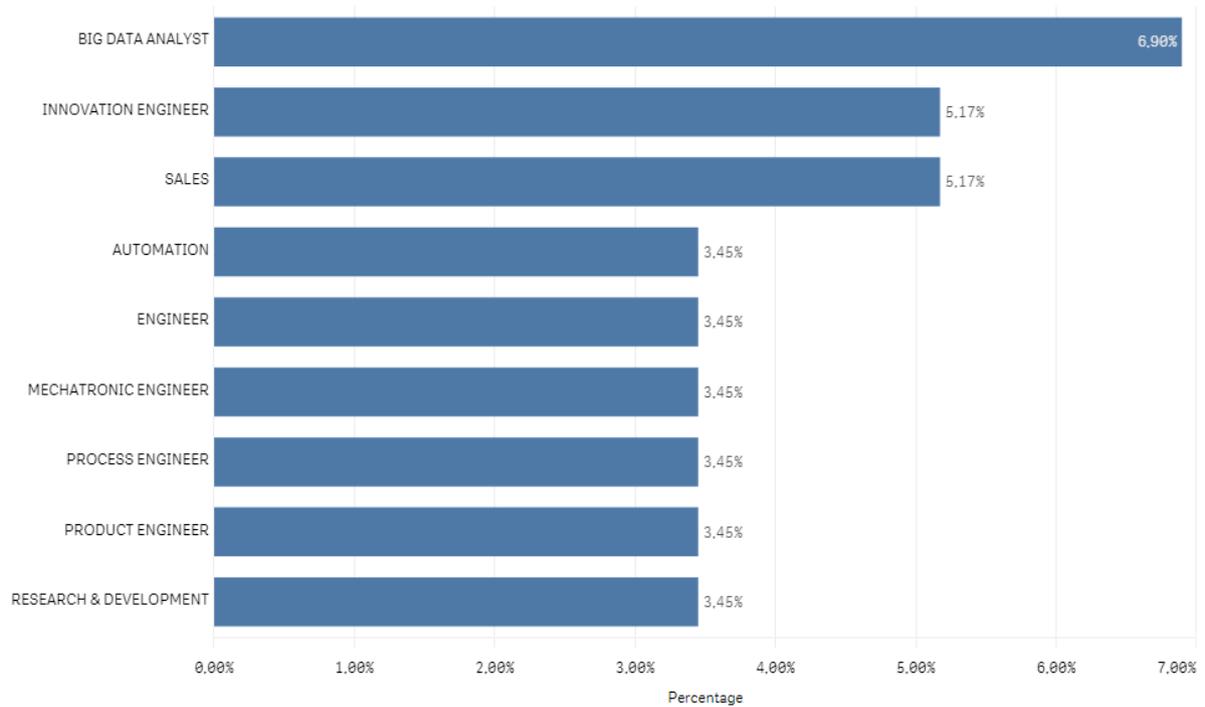
Figure 90 KPI 5.4 APPRENTICESHIP: JOB ROLES IN FIVE YEARS – TOP mentioned job roles – Large Enterprise sample

Figure 90 sets out the same analysis, but just for responses from Large Enterprises and broadly reflects responses from all respondents.
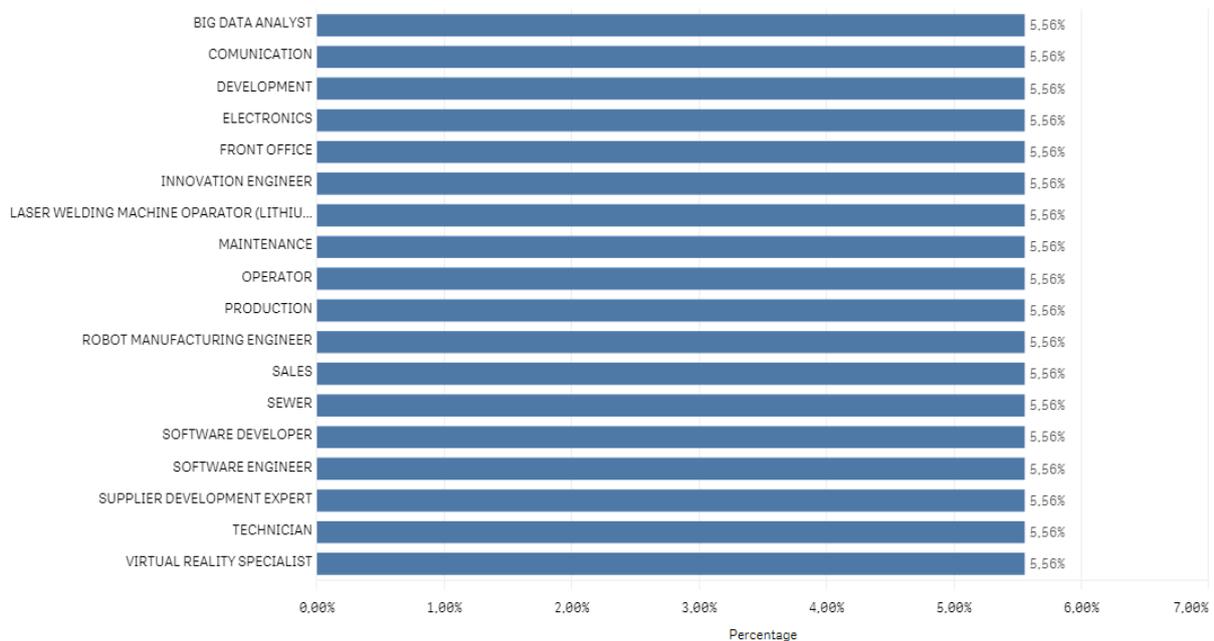
Figure 91 KPI 5.4 APPRENTICESHIP: JOB ROLES IN FIVE YEARS – All mentioned job roles – SMEs sample

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Also per KPI 5.4 filtered by SMEs in Figure 91, the outcome is similar, in terms of distribution of preference by stakeholders to Figure 88. To note some job roles not mentioned before as "FRONT OFFICE", "LASER WELDING MACHINE OPERATOR", "SUPPLIER DEVELOPMENT EXPERT" and "VIRTUAL REALITY SPECIALIST", indicating new and emerging job roles or the necessity to use apprenticeship to upskill (as "FRONT OFFICE").

9.3.1 Apprenticeship: Methods to Recruit

Within the Apprenticeship section of the questionnaire there were also a specific set of questions relating to the best approach to recruit apprentices: If the EU automotive sector needs to maintain a highly skilled workforce, it must attract talented and skilled workers who have benefitted from appropriate VET provision to acquire the technical skills required. This section explored stakeholders' views about how the sector is perceived and gathered suggestions of specific initiatives to increase the attractiveness of the sector.
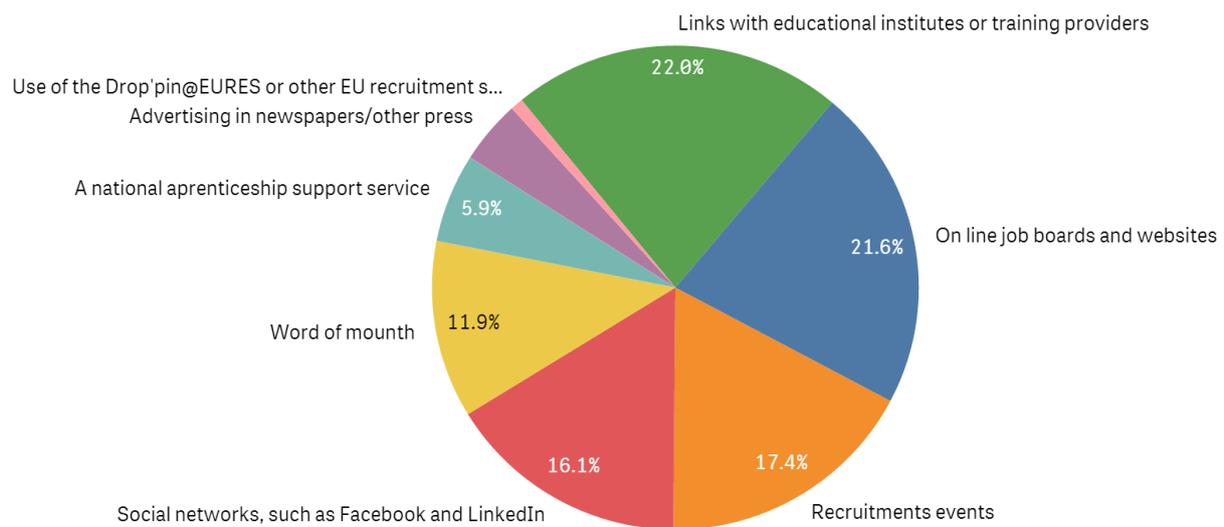
Figure 92 KPI 5.5 APPRENTICESHIP: RECRUITMENT STRATEGIES – Overall sample

Figure 92 outlines views on the preferred method to recruit apprenticeships (KPI 5.5). The analysis indicates that "LINKS WITH EDUCATIONAL INSTITUTES OR TRAINING PROVIDERS", *online/social networks* ("ON LINE JOB BOARDS AND WEBSITE" and "SOCIAL NETWORKS, SUCH AS FACEBOOK AND LINKEDIN") and "RECRUITMENT EVENTS" (with the possibility to have a face-to-face interaction) are relatively evenly split in terms of preferred methods and cover more than 77% of the total responses. Word of mouth also still accounts for almost 12% of responses.

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Figure 93 KPI 5.5 APPRENTICESHIP: RECRUITMENT STRATEGIES – Large Enterprise sample

When responses from Large Enterprises are analysed for KPI 5.5, Figure 93 indicates an increased preference for "ONLINE JOB BOARDS AND WEBSITE" (now ranked first), although "LINKS WITH EDUCATIONAL INSTITUTES OR TRAINING PROVIDERS" is still considered important. This is probably linked to the necessity for Large Employers to aggregate information and collect results for a large number of employees, something made much easier through use of online tools. Not surprisingly, the preference for "WORD OF MOUTH" as a strategy decreases slightly.
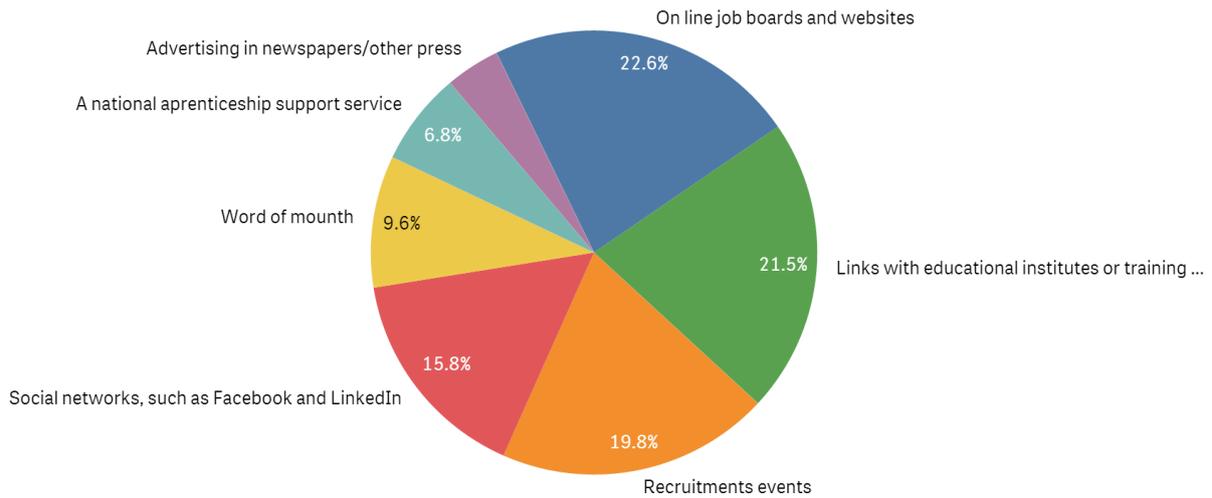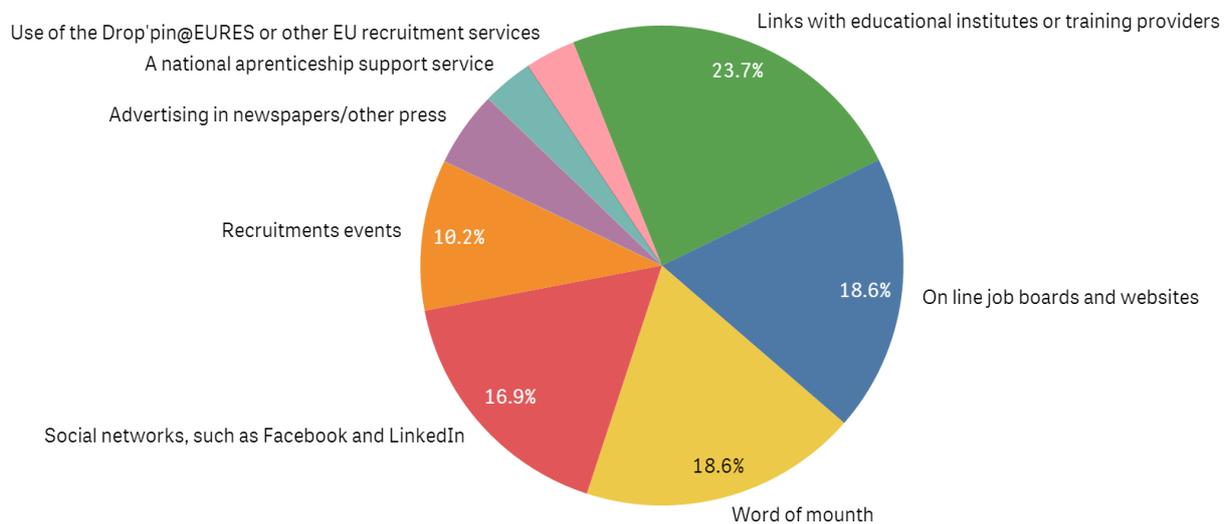

Figure 94 KPI 5.5 APPRENTICESHIP: RECRUITMENT STRATEGIES – SMEs sample

Figure 94 analyses KPI 5.5 in relation to responses from SMEs and indicates that "LINKS WITH EDUCATIONAL INSTITUTES OR TRAINING PROVIDERS" is the most frequently cited 'preferred strategy', and again, not surprisingly, much more importance attached to informal "WORD OF MOUTH"

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methods, ranked third. By contrast attendance at "RECRUITMENTS EVENTS" is much less important, probably linked to the time and resources involved in this approach.

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10 RESULT OF THE SURVEY – SKILLS RECOGNITION AND QUALIFICATION FRAMEWORKS

The necessity for "standard(s)" across the EU Automotive sector to enable movement of skilled workers between EU countries and recognition of skill levels relating to training undertaken to allow easier mobility of workers is a key focus of the DRIVES project. A pre-determined list of the most recognised standard and qualification frameworks was included in the questionnaire, with the option for stakeholders to add to this list.

The pre-determined list comprised five possible choices (See Chapter 3.5), with the complete list of responses outlined in the Annex. The following analysis is based on the 5 pre-determined categories.
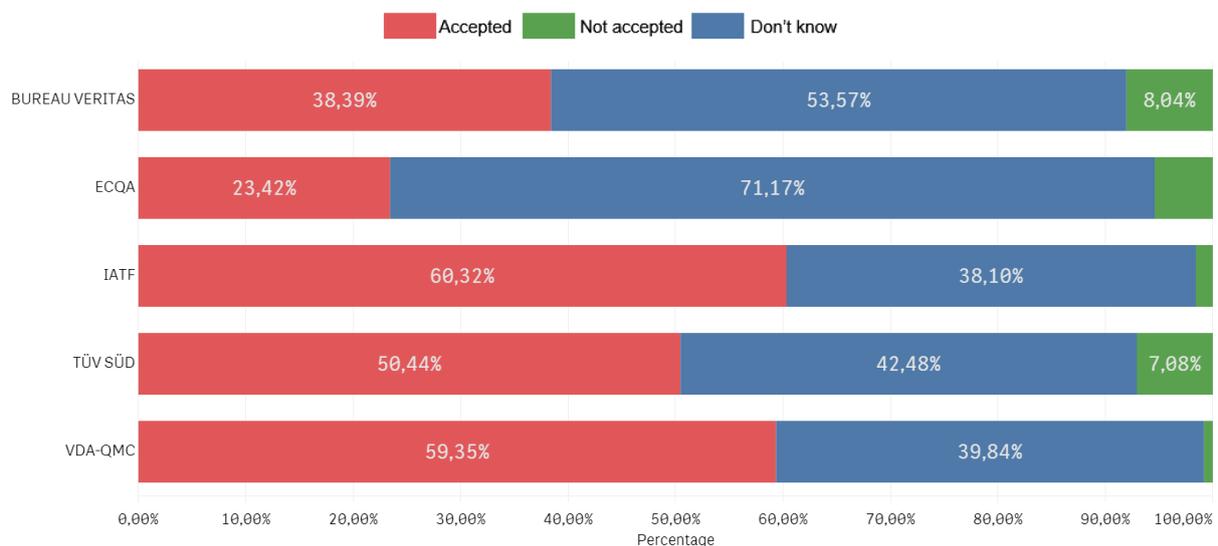

Figure 95 KPI 6.1 Skill Recognition Standards – Overall sample

Figure 95 outlines results in relation to recognition of existing skill recognition standards (KPI 6.1). The analysis indicates that the TOP 3 standards in terms of recognition are IATF, closely followed by VDA-QMC (a marginal difference of 1% in relation to frequency of response). TUV-SUD is the third most frequently recognised (50% of respondents). The least two recognised standards based on the five pre-determined options were BUREAU VERITAS (38%) and ECQA (23%).

Stakeholders listed several other standards and certifications. A complete list can be found in the Annex.

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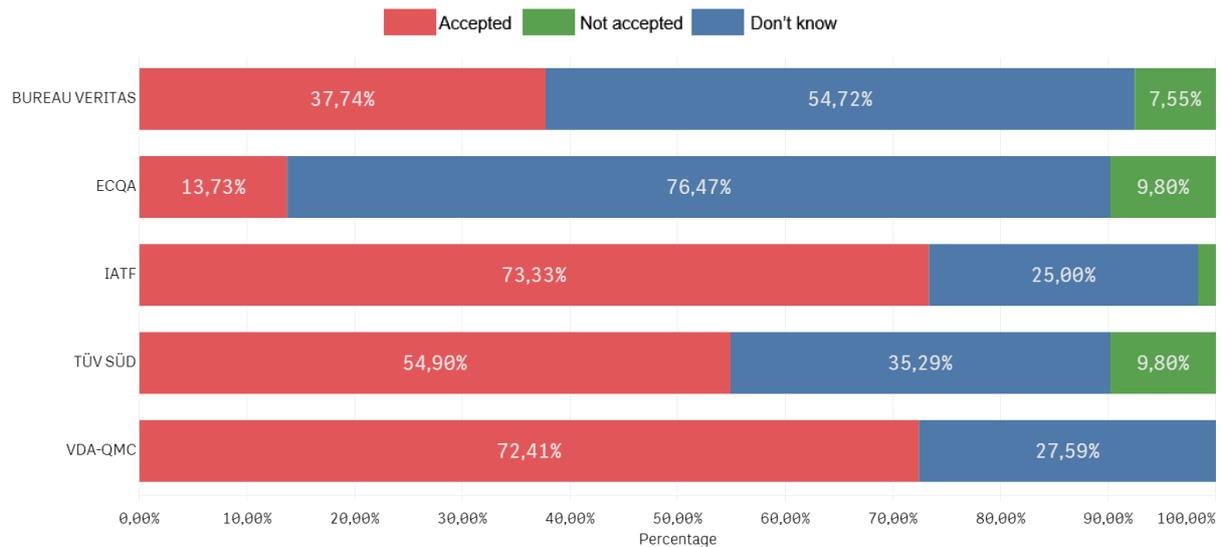Co-funded by the
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Figure 96 KPI 6.1 Skill Recognition Standards – Large Enterprise sample

Figure 96 outlines the same analysis of KPI 6.1, but just for Large Enterprises. The analysis indicates that levels of recognition are higher amongst these enterprises for the top 3 standards, these being IATF and VDA-QMC and TUV-SUD, but lower recognition levels are evident in relation to ECQA (a fall of about 10% compared with all stakeholders).
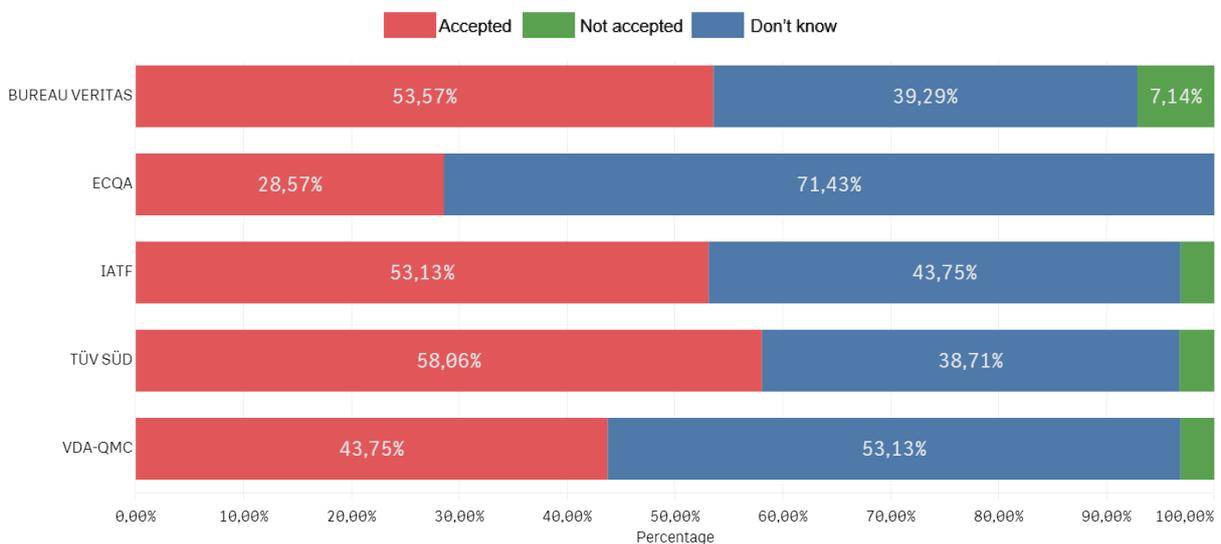
Figure 97 KPI 6.1 Skill Recognition Standards – SMEs sample

Figure 97 outlines the same analysis for KPI 6.1 but with respect to SMEs. The analysis indicates that for SME's TUV-SUD is the most accepted standard (58%), followed by IATF (53%) and BUREAU VERITAS (54%), the latter being significantly more likely to be accepted than is the case for Large Enterprises

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(+16% positive net balance) . ECQA is also more likely to be accepted by SME's (29%) than Large Enterprises.
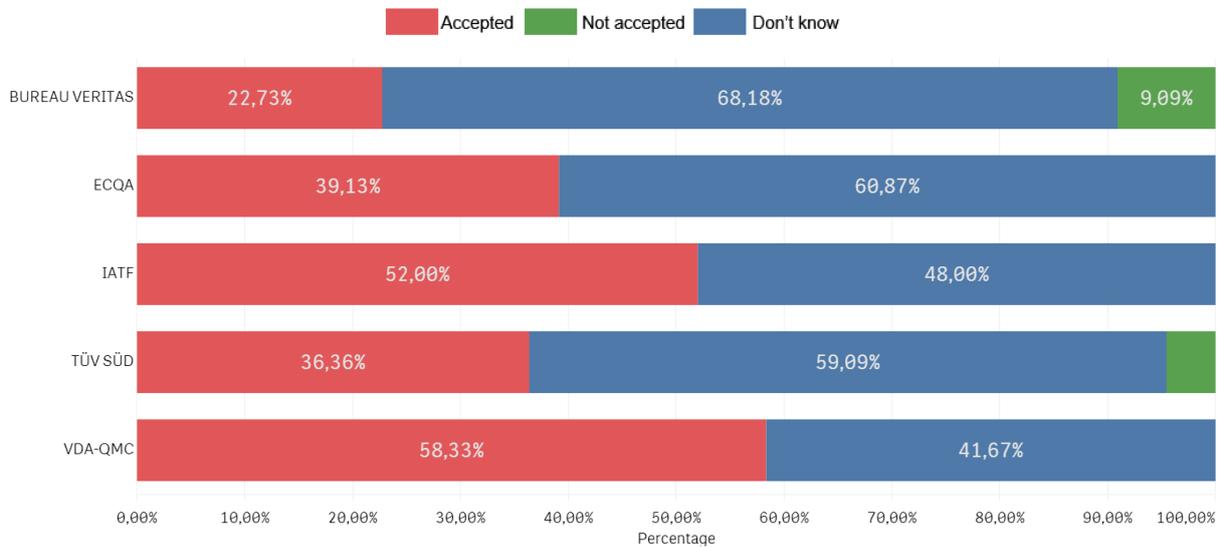

Figure 98 KPI 6.1 Skill Recognition Standards – Sectoral Industrial Associations sample

Figure 98 sets out analysis of KPI 6.1 but for Sectoral Industrial Associations. Again, significant differences in recognition levels are evident, underlining the importance of understanding these differences amongst different stakeholder groups as part of the DRIVES project. Amongst Sectoral Industrial Associations VDA-QMC is ranked first in terms of levels of recognition with 58%, followed by IATF (52%), third is ECQA (39% representing the highest recognition levels of all stakeholder groups), TUV SUD (36%) and last, BUREAU VERITAS (23%).

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11 RESULT OF THE SURVEY – RECRUITMENT AND ATTRACTIVENESS OF THE SECTOR

This section of the questionnaire comprised a number of open-ended questions in order to explore stakeholders views of the current and future vision of the Automotive sector.

If the EU automotive sector is to maintain a highly skilled workforce, it must attract talented and skilled workers who have benefitted from appropriate VET provision in order to acquire the required technical skills. This section therefore explores stakeholders views about how the sector is perceived and gathers suggestions of initiatives designed to increase the attractiveness of the sector for potential new recruits.

The normalisation process has already been explained in chapter 3.6, which also includes a detailed explanation of each of the main responses.

11.1.1 Challenges

The open-ended question in this section of the Questionnaire focussed on stakeholder perceptions of the challenges relating to attractiveness of the EU Automotive sector.
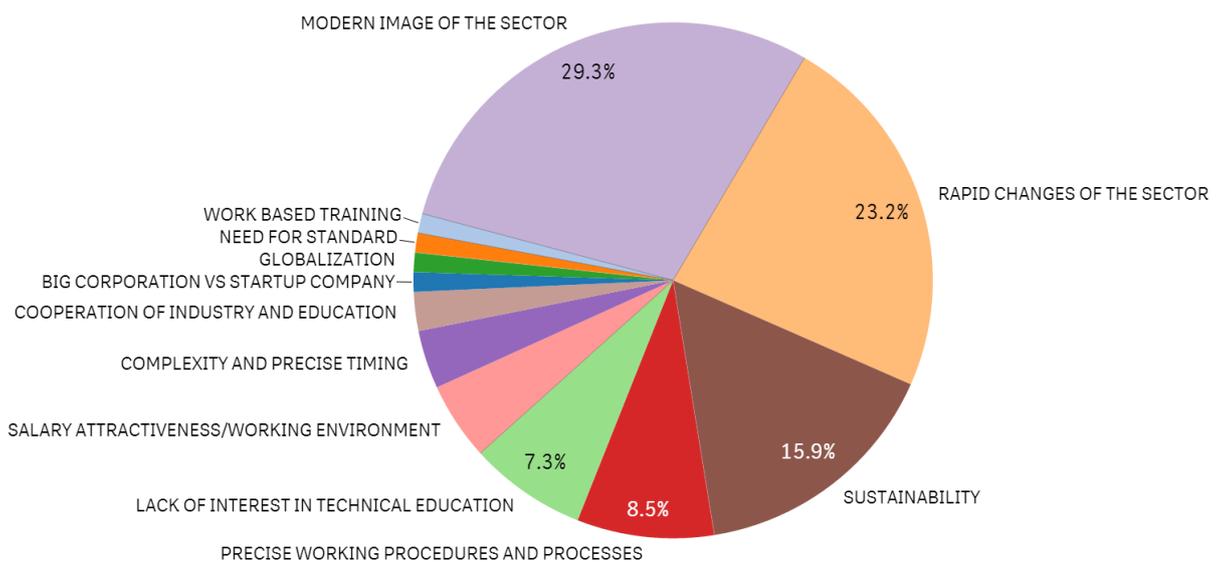

Figure 99 KPI 7.1 RECRUITMENT AND ATTRACTIVENESS: CHALLENGES – Overall sample

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The Automotive sector is one of the most modern, technologically advanced and transversal sectors but it appears that it is not able to project a "MODERN IMAGE", as this is the challenge ranked as first by stakeholders in terms of future challenges facing the sector, as Figure 99 outlines. To be able to properly adapt to the future, "RAPID CHANGES" are necessary, this being the second most frequently identified challenge, followed by "SUSTAINABILITY", which includes a commitment to environmental change.
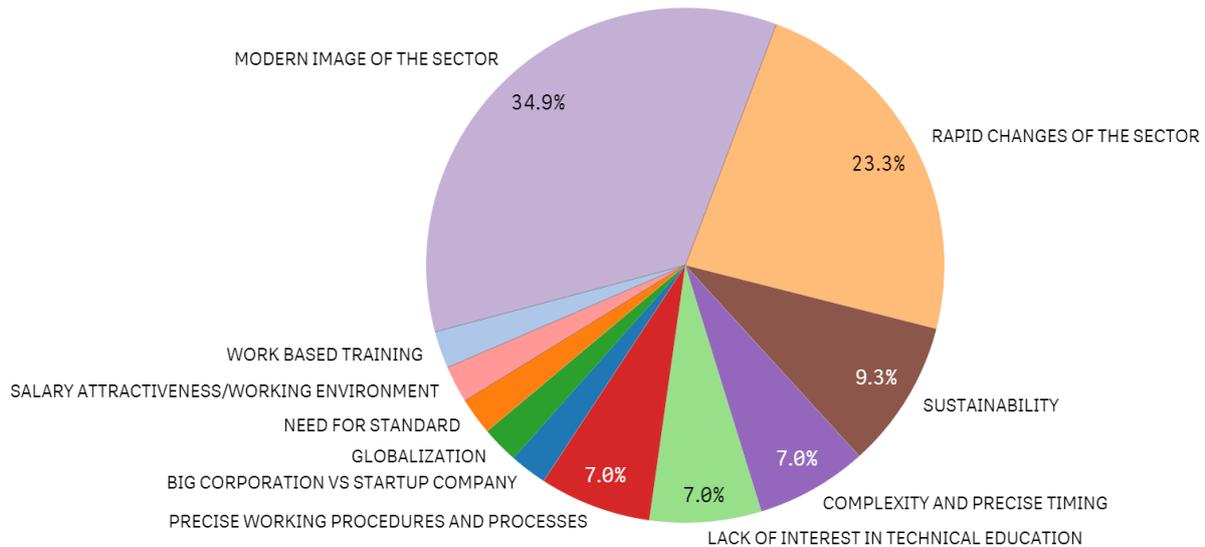

Figure 100 KPI 7.1 RECRUITMENT AND ATTRACTIVENESS: CHALLENGES - Large Enterprise sample

Figure 100 outlines analysis of KPI 7.1 for Large Enterprises only. By comparison with responses for all stakeholders, the TOP 3 challenges in terms of recruitment and attractiveness remain the same, but the relative importance of each is slightly different. In particular, the frequency that "MODERN IMAGE OF THE SECTOR" was cited increased by +6% in the case of Large Enterprises, with a corresponding decrease in relation to "SUSTAINABILITY of -7%. The next three most frequently cited challenges were "COMPLEXITY AND PRECISE TIMING", "LACK OF INTEREST IN TECHNICAL EDUCATION" and "PRECISE WORKING PROCEDURES AND PROCESS", all at 7% (see chapter 3.6 for more details).

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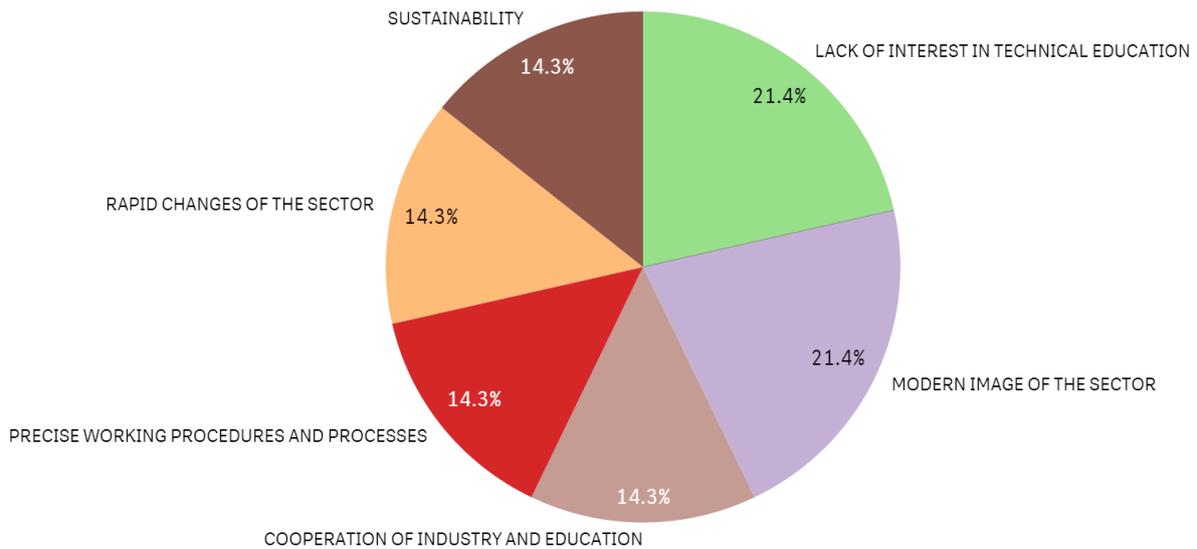of the European Union

Figure 101 KPI 7.1 RECRUITMENT AND ATTRACTIVENESS: CHALLENGES – SMEs sample

Figure 101 outlines analysis of KPI 7.1 for SMEs and points to a reduction in the range of challenges cited, with only 6 listed. The most frequently identified challenges were "LACK OF INTEREST IN TECHNICAL EDUCATION" and "MODERN IMAGE OF THE SECTOR", both accounting for 21% of responses. Other challenges identified, all accounting for 14% of responses, were "COOPERATION OF INDUSTRY AND EDUCATION", "PRECISE WORKING PROCEDURES AND PROCESS", "RAPID CHANGE OF THE SECTOR" and "SUSTAINABILITY" (see chapter 3.6 for more details).
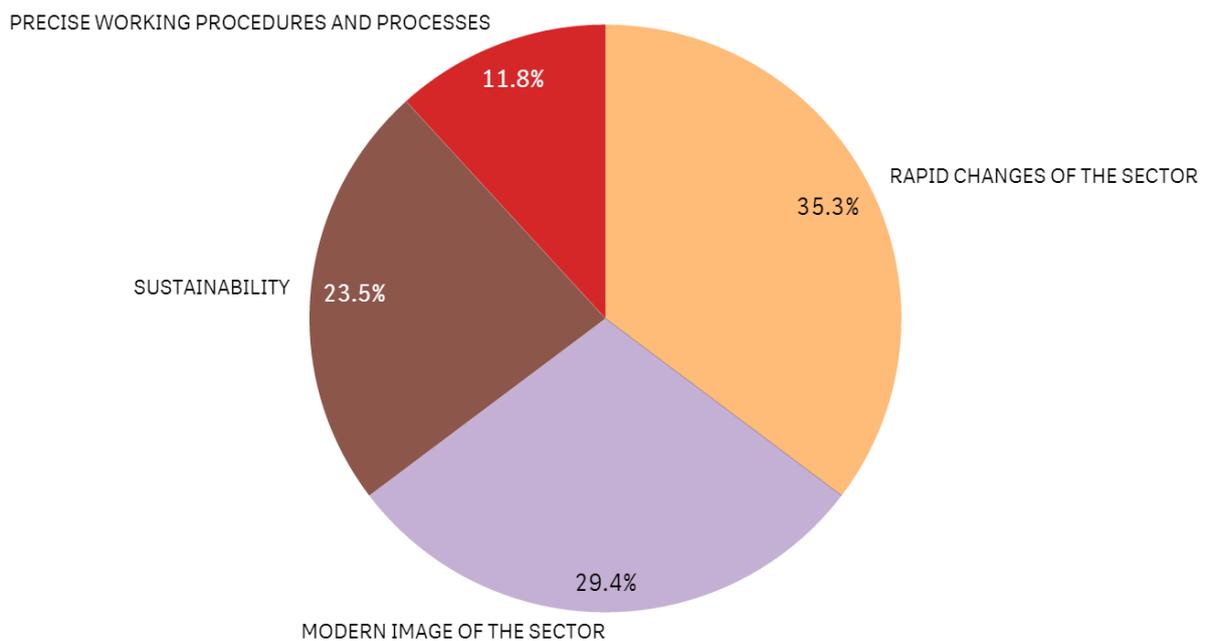

Figure 102 KPI 7.1 RECRUITMENT AND ATTRACTIVENESS: CHALLENGES - Sectoral Industrial Associations sample

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Analysis of KPI 7.1 for Sectoral Industrial Associations indicates that there were only four challenges identified, with "RAPID CHANGES OF THE SECTOR" ranked first (35%), followed by "MODERN IMAGE OF THE SECTOR", "SUSTAINABILITY" and "PRECISE WORKING PROCEDURES AND PROCESS" (see chapter 3.6 for more details).

11.1.2 Approach

The open ended question in this section of the questionnaire was designed to identify the most significant approaches for attracting future workers to the EU Automotive sector (young people as well as people currently working in other sectors), building on previous replies regarding key challenges.

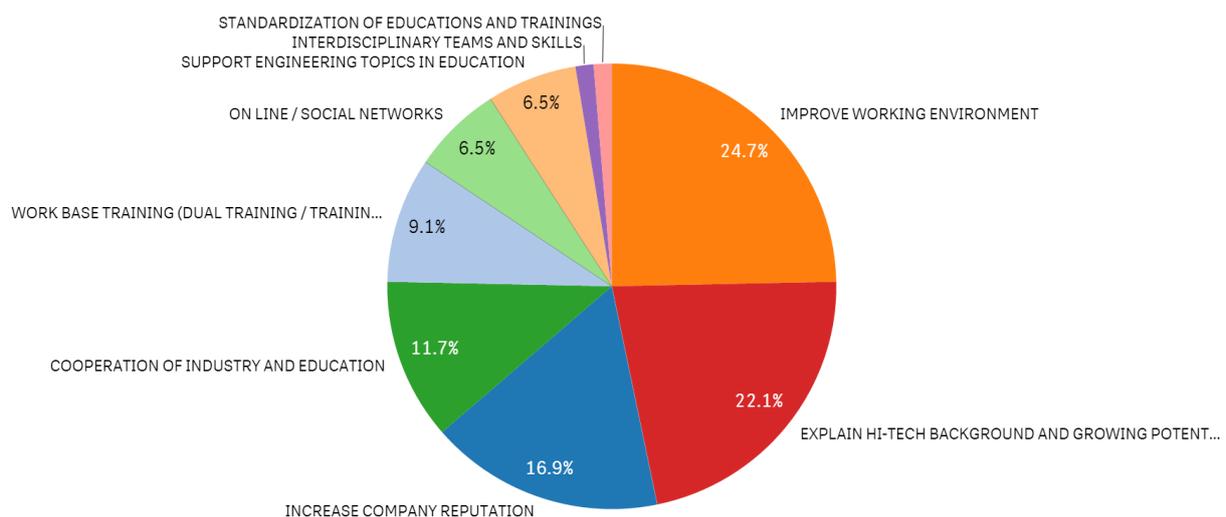A complete list of normalised responses is set out in chapter 3.6.

Figure 103 KPI 7.2 RECRUITMENT AND ATTRACTIVENESS: APPROACH – Overall sample

To attract future workers into the sector, stakeholders identified a range of different solutions, as set out in Figure 103. "IMPROVE WORKING ENVIRONMENT" was the most frequently suggested approach, followed by "EXPLAIN HI-TECH BACKGROUND" (linked to the "MODERN IMAGE" identified in the previous Figure 98) and "INCREASE COMPANY REPUTATION" (linked to the last Diesel Gate scandal, and included under the "SUSTAINABILITY" heading in the previous Figure 99) which are second and third in this list. "WORK BASED TRAINING" included responses relating to approaches such as "DUAL TRAINING", "TRAINING ON THE JOB", "ROTATION" and "APPRENTICESHIP".

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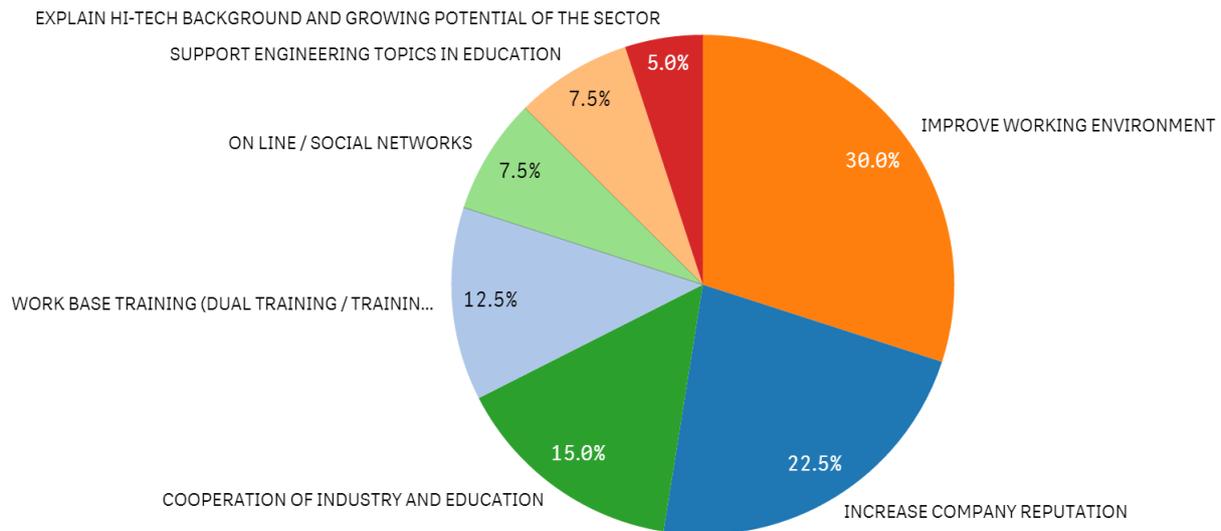
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Figure 104 KPI 7.2 RECRUITMENT AND ATTRACTIVENESS: APPROACH - Large Enterprise sample

Figure 104 sets out analysis of KPI 7.2 for Large Enterprises. The necessity to improve the "WORKING ENVIRONMENT" remains ranked first (30%), followed by "INCREASE COMPANY REPUTATION" (23%). These two approaches accounted for more than half of all responses. "COOPERATION OF INDUSTRY AND EDUCATION" is ranked third, followed by "WORK BASED TRAINING". It is clear that for Large Enterprises, the focus in relation to addressing recruitment and image issues within the sector is divided mainly between influencing internal company practices like working environment / reputation and improving collaboration with VET providers in terms of recruiting, skilling and upskilling.
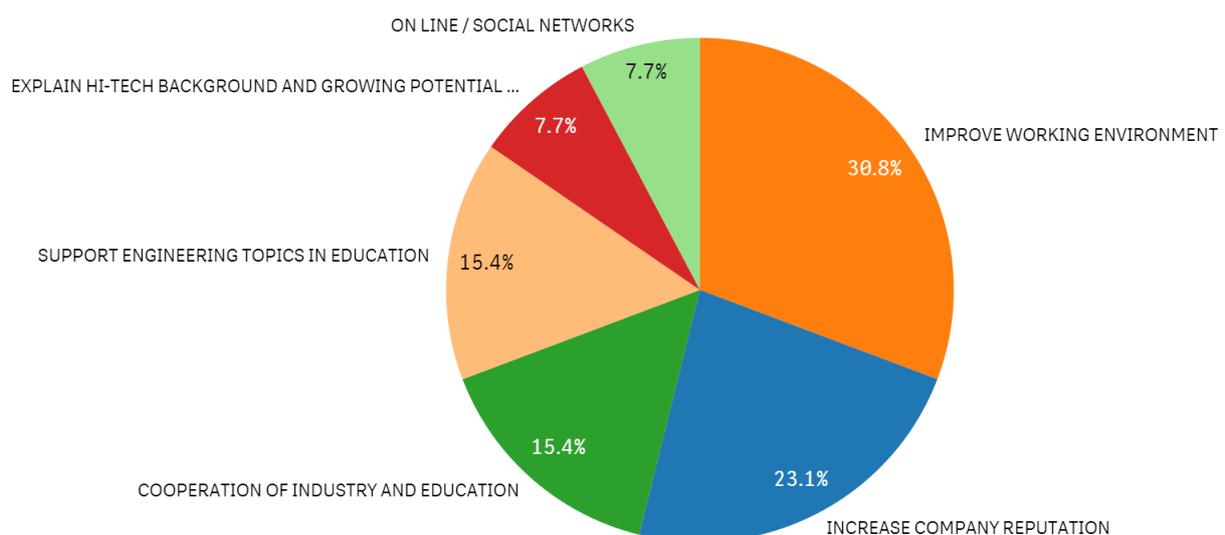

Figure 105 KPI 7.2 RECRUITMENT AND ATTRACTIVENESS: APPROACH – SMEs sample

Feedback from SMEs as outlined in Figure 105 is broadly similar to that of Large Enterprises, as set out in the previous Figure 104. The fourth ranked response - "SUPPORT ENGINEERING TOPICS IN EDUCATION" – illustrates the need for SMEs to increase overall workforce competence levels and ensure competitiveness in the context of Large Enterprises' supply chains.
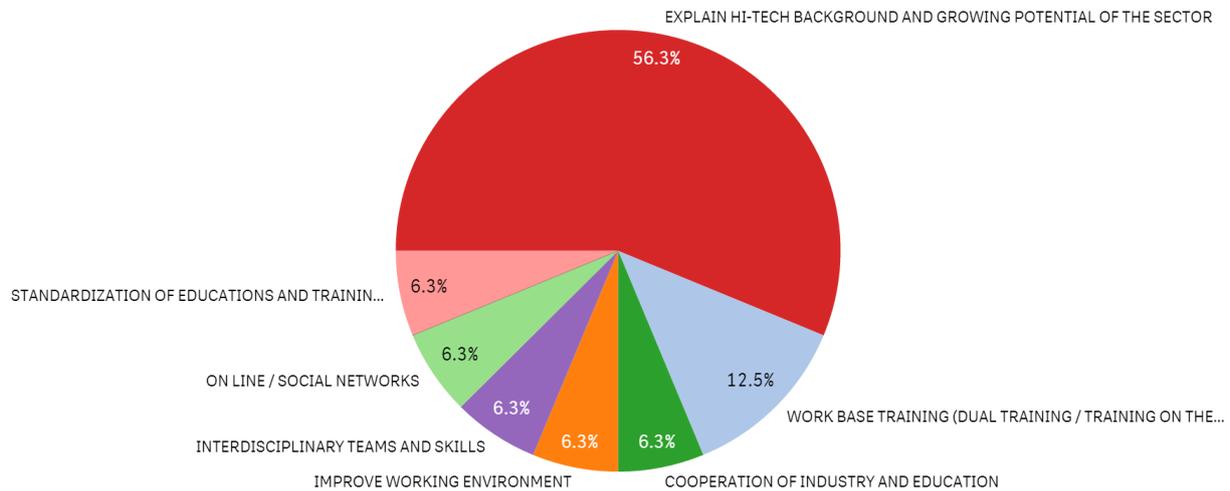
Figure 106 KPI 7.2 RECRUITMENT AND ATTRACTIVENESS: APPROACH - Sectoral Industrial Associations sample

With respect to responses from Sectoral Industrial Associations, as outlined in Figure 106, 56% of responses related to "EXPLAIN HI-TECH BACKGROUND AND GROWING POTENTIAL OF THE SECTOR". This underlines the hi-tech nature of the sector and huge potential growth opportunities in the near future, together with the need to communicate these opportunities more effectively in order to ratchet up current workforce skill levels and capitalise on these opportunities.

11.1.3 Methods

The final question related to the most effective methods to recruit future workers in the Automotive sector.

A complete list of normalised responses is set out in chapter 3.6.
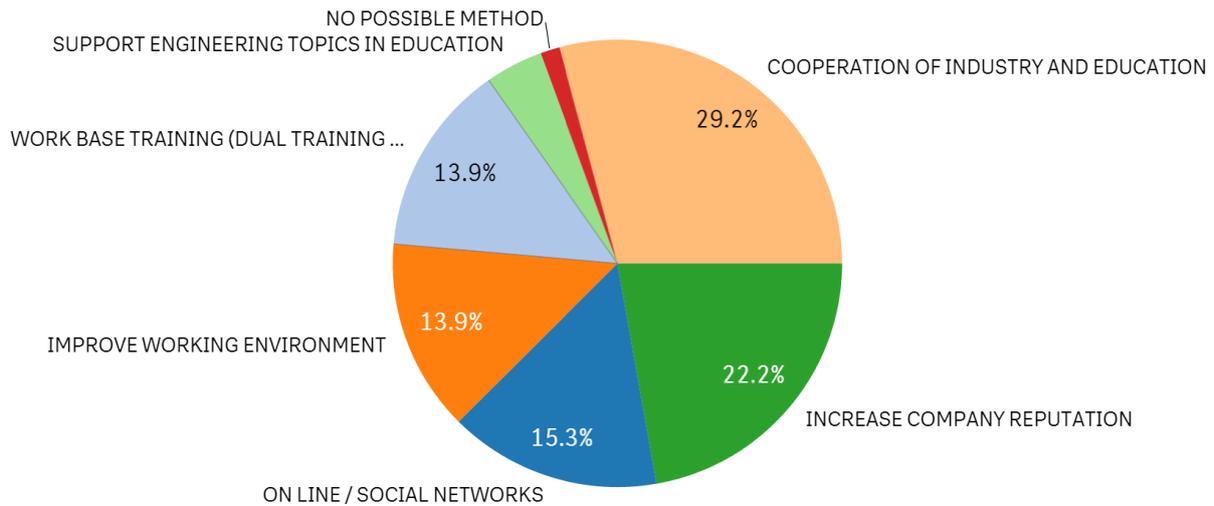
Figure 107 KPI 7.3 RECRUITMENT AND ATTRACTIVENESS: METHODS – Overall sample

Figure 107 outlines responses from all stakeholders in relation to the most effective methods to recruit into sector in the future. In this Figure the sum of previous visions and suggestions are now presented by stakeholders with the possibility to recommend the best methods to win challenges and to boost approaches for attracting future workers with appropriate methods. Based on this analysis the Overall picture shows "COOPERATION BETWEEN INDUSTRY AND EDUCATION" ranked first followed by "(INCREASE) COMPANY REPUTATION", (as highlighted previously this is a mix of concepts like SUSTAINABILITY and MODERN IMAGE). The 3rd, 4th and 5th ranked positions are fairly evenly spread in terms of frequency of response, there being "ON LINE/ SOCIAL NETWORK" (to have a presence; as a mechanism to share information and requirements), "WORKING ENVIRONMENT" (to improve) and "WORK BASED TRAINING" (which includes suggestions concerning DUAL TRAINING / TRAINING ON THE JOB / ROTATION / APPRENTICESHIP).

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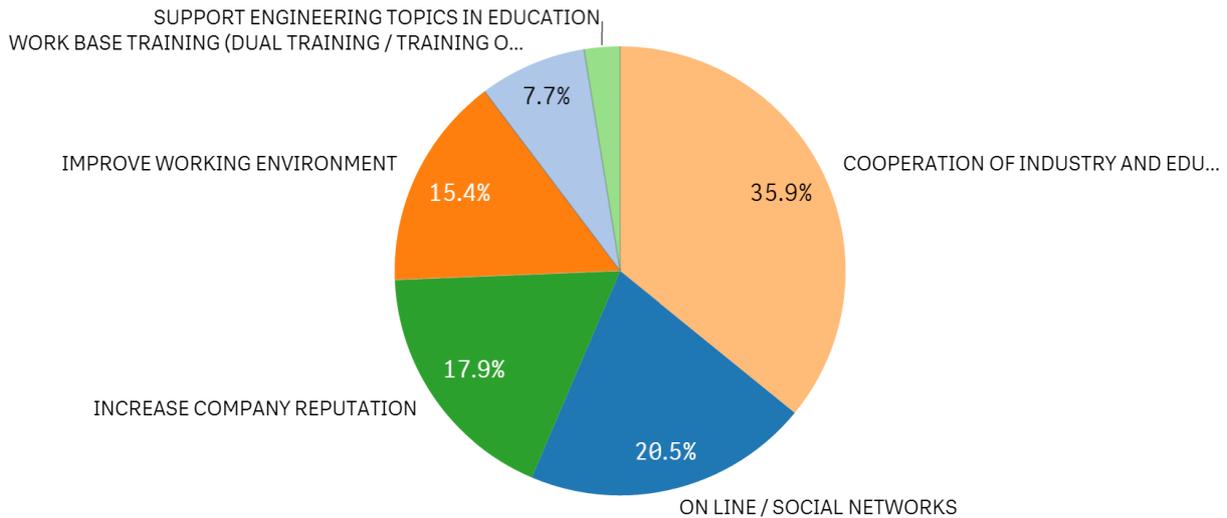
Figure 108 KPI 7.3 RECRUITMENT AND ATTRACTIVENESS: METHODS - Large Enterprise sample

Figure 108 outlines analysis of KPI 7.3 for Large Enterprises only. By comparison with responses for all stakeholders, the TOP 3 methods remain the same, even if now "ONLINE/SOCIAL NETWORKS" is second and "INCREASE COMPANY REPUTATION" is third. The "COOPERATION BETWEEN INDUSTRY AND EDUCATION" is still ranked first with a +10,7%.
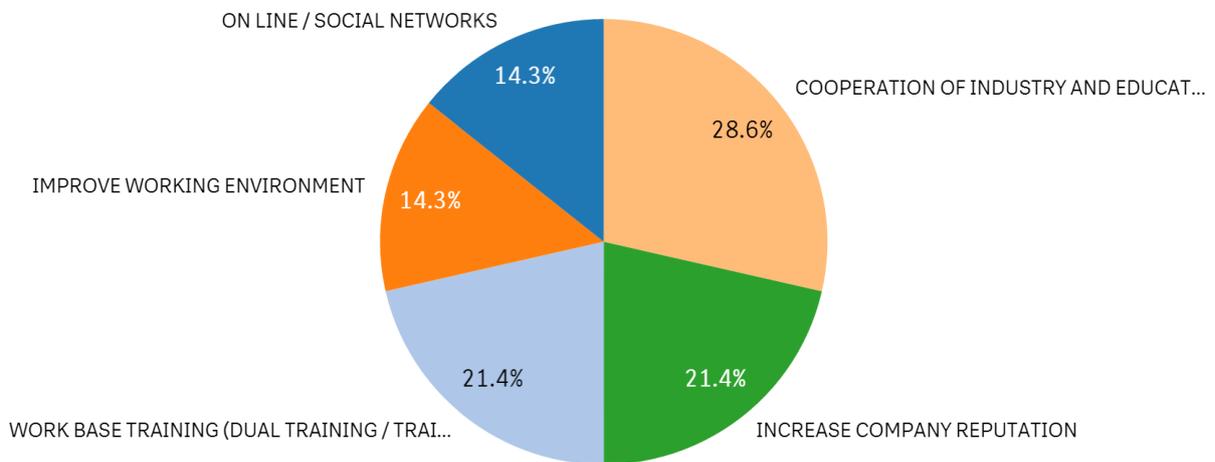
Figure 109 KPI 7.3 RECRUITMENT AND ATTRACTIVENESS: METHODS – SMEs sample

Interesting the point of view from SMEs. In Figure 109 the "COOPERATION BETWEEN INDUSTRY AND EDUCATION" is still ranked first and "INCREASE COMPANY REPUTATION" return to second position compare to the Large Enterprise filter in Figure 107. Now third position is "WORK BASED TRAINING" (which includes suggestions concerning DUAL TRAINING / TRAINING ON THE JOB / ROTATION /

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APPRENTICESHIP) to indicate how important for SMEs is the flexibility and the possibility to adapt their working standard to new methods if needed.
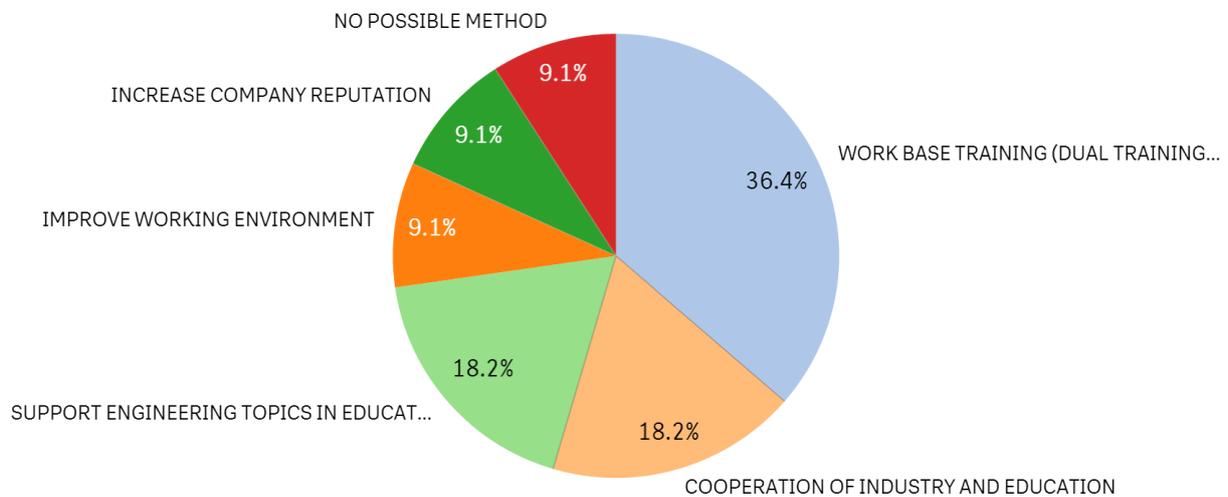
Figure 110 KPI 7.3 RECRUITMENT AND ATTRACTIVENESS: METHODS - Sectoral Industrial Associations sample

Finally, in Figure 110, the KPI 7.3 filtered by Sectoral Industrial Association where the "WORK BASED TRAINING" (which includes suggestions concerning DUAL TRAINING / TRAINING ON THE JOB / ROTATION / APPRENTICESHIP) is now ranked first with 36,4%, the "COOPERATION BETWEEN INDUSTRY AND EDUCATION" is still important even if now is ranked second and a new TOP3 method arise with the necessity to increase technical background and skills / competence of workers and attract new workers with "SUPPORT ENGINEERING TOPICS IN EDUCATIONS".

APPENDIX

A   LIST OF SKILLS

Skill Name	Skill Category	Skill Index
BIG DATA/DATA ANALYTICS	DIGITALIZATION	338.29
SOFTWARE DEVELOPMENT	TECHNICAL PROFILE	269.89
TECHNICAL KNOWLEDGE	TECHNICAL PROFILE	238.00
MECHATRONICS	TECHNICAL PROFILE	196.39
SYSTEM INTEGRATION	ELECTRIFICATION	182.52
MATERIALS SCIENCES	TECHNICAL PROFILE	178.93
LEARNABILITY	SOFT SKILLS	175.30
SPECIFIC MANUFACTURING PROCESSES	MANUFACTURING	163.56
DIGITAL SKILLS	DIGITALIZATION	161.89
ARTIFICIAL INTELLIGENCE	DIGITALIZATION	149.39
ELECTRICAL/ELECTRONIC	TECHNICAL PROFILE	146.74
ADAPTABILITY/FLEXIBILITY	SOFT SKILLS	141.92
R&D&I	LIFE CYCLE/PROCESS CHAIN	136.60
AUTOMATION/ROBOTICS	MANUFACTURING	134.05
CYBERSECURITY	DIGITALIZATION	129.15
MARKET ANALYSIS	LIFE CYCLE/PROCESS CHAIN	120.23
MANAGEMENT & LEADERSHIP	SOFT SKILLS	105.60
PROCESS ENGINEERING	LIFE CYCLE/PROCESS CHAIN	100.00
AUTOMATED DRIVING	VEHICLE SYSTEM	96.54
BATTERIES	ELECTRIFICATION	95.63
TESTING/VALIDATION	LIFE CYCLE/PROCESS CHAIN	92.81
DESIGN	LIFE CYCLE/PROCESS CHAIN	92.52
COMMUNICATION	SOFT SKILLS	84.57
SYSTEM ARCHITECTURE	VEHICLE SYSTEM	80.26
PRODUCT DEVELOPMENT	LIFE CYCLE/PROCESS CHAIN	76.97
FUNCTIONAL SAFETY	VEHICLE SYSTEM	74.29
AFTER-SALES SERVICES	LIFE CYCLE/PROCESS CHAIN	73.33
MECHANICAL	TECHNICAL PROFILE	68.44
SUSTAINABILITY	TECHNICAL PROFILE	68.21
DRIVETRAIN	VEHICLE SYSTEM	68.20
ENERGY MANAGEMENT	ELECTRIFICATION	65.71
CONNECTIVITY	VEHICLE SYSTEM	65.00
CREATIVITY	SOFT SKILLS	64.42
CHANGE MANAGEMENT	SOFT SKILLS	62.65
3D PRINTING	DIGITALIZATION	55.00
POWER ELECTRONICS	ELECTRIFICATION	54.00
PROJECT MANAGEMENT	SOFT SKILLS	49.62
PRODUCTION ORGANIZATION	MANUFACTURING	48.86
THERMAL MANAGEMENT	ELECTRIFICATION	47.14

Skill Name	Skill Category	Skill Index
FOREIGN LANGUAGES	SOFT SKILLS	44.89
SIMULATION	LIFE CYCLE/PROCESS CHAIN	43.75
MOBILITY SERVICES	LIFE CYCLE/PROCESS CHAIN	43.50
TEAMWORK	SOFT SKILLS	43.29
DIGITAL NETWORKS	DIGITALIZATION	40.95
VIRTUAL PRODUCT DEVELOPMENT & TESTING	DIGITALIZATION	40.22
INTERNAL LOGISTICS	LIFE CYCLE/PROCESS CHAIN	39.90
ELECTRIC MOTORS	ELECTRIFICATION	39.00
SALES	LIFE CYCLE/PROCESS CHAIN	29.33
CONTINUOUS IMPROVEMENT	SOFT SKILLS	26.29
PROBLEM SOLVING	SOFT SKILLS	23.56
RESILIENCE	SOFT SKILLS	23.33
IOT & CLOUD	DIGITALIZATION	23.14
CRITICAL THINKING	SOFT SKILLS	21.00
ELECTROCHEMICAL	TECHNICAL PROFILE	20.50
NETWORKING	SOFT SKILLS	20.00
DIGITAL TWINS	DIGITALIZATION	18.17
ENTREPRENEURSHIP	SOFT SKILLS	18.17
BEHAVIOURAL AGILITY	SOFT SKILLS	15.33
ALTERNATIVE ICE POWERTRAINS	VEHICLE SYSTEM	15.00
MAINTENANCE	MANUFACTURING	15.00
PREDICTIVE MAINTENANCE	DIGITALIZATION	15.00
OPTIMIZE ACTIVITIES	SOFT SKILLS	10.00

B   LIST OF JOB ROLES

Job Role Name	Job Role Index
AUTOMOTIVE DATA ANALYST	228.21
POWERTRAIN ENGINEER	213.24
AUTOMOTIVE TECHNICIAN	155.37
CYBERSECURITY ENGINEER	101.17
INNOVATION MANAGER	117.70
DESIGN ENGINEER	114.95
AUTOMOTIVE MANAGER	112.92
SOFTWARE SPECIALIST	105.65
MARKETING AND BUSINESS DEVELOPMENT MANAGER	92.87
ELECTRIFICATION ENGINEER	108.11
MANUFACTURING ENGINEER	105.05
PROCESS ENGINEER	77.42
SYSTEMS ENGINEER	72.96
MAINTENANCE TECHNICIAN	87.29
ADVANCED MATERIAL ENGINEER	77.08
PROJECT MANAGER	73.71
PRODUCTION WORKER	75.00

Job Role Name	Job Role Index
AUTOMOTIVE ENGINEER	73.85
SOFTWARE ENGINEER	52.67
QUALITY ENGINEER	67.88
ARTIFICIAL INTELLIGENCE PROFESSIONAL	56.30
MOBILITY SERVICES MANAGER	48.00
ARCHITECTURE AND INTEGRATION SPECIALIST	55.50
SALES SPECIALIST	57.00
BATTERY PROFESSIONAL	54.40
MECHATRONIC ENGINEER	53.59
DIGITALISATION ENGINEER	42.75
PRODUCT ENGINEER	43.08
MECHANICAL TECHNICIAN	43.75
VEHICLE DATA SPECIALIST	43.75
3D PRINTING TECHNICIAN	40.60
CUSTOMER CARE ASSISTANT	41.33
COMPLIANCE MANAGER	39.43
ELECTRICAL TECHNICIAN	38.78
V2X SPECIALIST	38.00
QUALITY TECHNICIAN	34.17
PRODUCT MANAGER	33.75
MECHATRONIC TECHNICIAN	31.47
HOMOLOGATION ENGINEER	25.00
MECHANICAL ENGINEER	25.00
TECHNICAL SALES SUPPORT	25.00
MAINTENANCE ENGINEER	23.00
SYSTEM INTEGRATION ENGINEER	22.40
ACCESSIBILITY MANAGER	19.65
CHIEF COMMUNICATIONS OFFICER	19.65
DIVERSITY MANAGER	19.65
SUSTAINABILITY MANAGER	19.65
TECHNICAL WRITER	19.65
TERMINOLOGY MANAGER	19.65
CONFIGURATION AND CHANGE MANAGER	22.13
AUTONOMOUS DRIVING SPECIALIST	21.88
COMPUTER VISION ENGINEER	21.88
FLEET MANAGEMENT SYSTEM DEVELOPER	21.88
AUTOMATION ENGINEER	21.75
LOGISTICS MANAGER	20.00
PARTNER RELATIONSHIP MANAGER	18.52
ACES ENGINEER	19.30
DEPENDABILITY ENGINEER	19.39
POWER ELECTRONICS ENGINEER	19.39
HEAD OF STRATEGY	6.44
HUMAN RESOURCES SPECIALIST	20.13
PROCUREMENT PROFESSIONAL	20.13

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Job Role Name	Job Role Index
ROBOTIC ENGINEER	20.00
RUBBER TECHNOLOGIST	20.00
ALTERNATIVE ENERGY ENGINEER	16.00
SALES MANAGER	13.50
ADDITIVE MANUFACTURING ENGINEER	18.95
R&D ENGINEER	18.95
CYBERSECURITY MANAGER	15.45
APPLICATION ENGINEER	14.17
INDUSTRIAL ENGINEER	14.17
TECHNICAL MANAGER	14.33
ELECTRICAL ENGINEER	12.54
PRODUCTION TEAM LEADER	12.54
GOVERNMENT AFFAIRS	11.05
CAPACITY PLANNER	12.00

C   LIST OF APPRENTICESHIP JOB ROLES

C.1   Job Roles currently involving apprenticeships

Apprenticeship: Current Job Roles	Percentage
ENGINEER	13.54%
TECHNICIAN	10.42%
OPERATOR	7.29%
RESEARCH & DEVELOPMENT	5.21%
MAINTENANCE	3.13%
PRODUCTION	3.13%
TECHNICIAN (TEST)	3.13%
TESTING ENGINEER	3.13%
DESIGN ENGINEER	2.08%
FINANCE	2.08%
MECHANIC	2.08%
PRODUCT ENGINEER	2.08%
SEWER	2.08%
ADMINISTRATOR	1.04%
AUTONOMOUS DRIVING	1.04%
CAD DESIGNERS	1.04%
COMMUNICATE CO2 IMPACT	1.04%
COMMUNICATION	1.04%
COMPUTER VISION	1.04%
CUSTOMER SERVICE	1.04%
DATA MANAGEMENT	1.04%
DEVELOPMENT ENGINEER	1.04%
EXPORT SALES WITH SPECIFIC SKILLS ACCORDING TO EACH MARKET	1.04%
FRONT SUPPORT	1.04%
HR JUNIOR SPECIALIST	1.04%

Apprenticeship: Current Job Roles	Percentage
HUMAN RESOURCES	1.04%
HW AND SW EXPERT	1.04%
INDUSTRIAL ENGINEER	1.04%
INNOVATION ENGINEER	1.04%
IT JUNIOR SPECIALIST	1.04%
IT TECHNICIAN	1.04%
JUNIOR ACCOUNTANT	1.04%
LABORATORY ANALYST	1.04%
LOGISTICS JUNIOR SPECIALIST	1.04%
MACHINE CONDUCTORS	1.04%
MACHINING	1.04%
MAINTENANCE ENGINEER	1.04%
MANUFACTURING PROCESS IMPROVER	1.04%
MANUFACTURING TECHNICIAN	1.04%
MECHATRONICS	1.04%
OTHER	1.04%
PROCESS ENGINEER	1.04%
PROCESS QUALITY TECHNICIAN	1.04%
PRODUCTION OPERATOR	1.04%
QUALITY	1.04%
QUALITY ENGINEER	1.04%
QUALITY MANAGER	1.04%
QUALITY TECHNICIAN	1.04%
ROLE MODEL FOR MOBILITY	1.04%
RUBBER PRODUCTION SPECIALIST	1.04%
SALES	1.04%
WELDING EXPERT	1.04%

C.2 Job Roles that will be involve apprenticeships over the next 5 years.

Apprenticeship: Future Job Roles	Percentage
BIG DATA ANALYST	6.58%
INNOVATION ENGINEER	5.26%
SALES	5.26%
AUTOMATION	2.63%
ELECTRONICS	2.63%
ENGINEER	2.63%
MAINTENANCE	2.63%
MECHATRONIC ENGINEER	2.63%
OPERATOR	2.63%
PROCESS ENGINEER	2.63%
PRODUCT ENGINEER	2.63%
RESEARCH & DEVELOPMENT	2.63%
SOFTWARE DEVELOPER	2.63%
ACCOUNTANT	1.32%

Apprenticeship: Future Job Roles	Percentage
ADMINISTRATION	1.32%
AFTER SALES TECHNICIAN	1.32%
APPLICATION ENGINEER	1.32%
CHEMICAL	1.32%
CNC PROGRAMMER	1.32%
COMPUTER VISION	1.32%
COMMUNICATION	1.32%
DESIGN THINKING	1.32%
DESIGNER	1.32%
DEVELOPMENT	1.32%
DIGITAL ENGINEER	1.32%
DIGITAL PROTOTYPES	1.32%
DIGITAL ROLES (NETWORKS. SOFTWARE AND DATA)	1.32%
ELECTRICAL ENGINEER	1.32%
ELECTRONICS ENGINEER	1.32%
FINANCE	1.32%
FRONT OFFICE	1.32%
HIGH POWER HW/SW EXPERT	1.32%
IT	1.32%
IT MECHATRONIC	1.32%
IT SPECIALIST	1.32%
LABORATORY TEST SPECIALIST	1.32%
LASER WELDING MACHINE OPERATOR (LITHIUM BATTERIES)	1.32%
LOGISTICS AND PLANNING	1.32%
MATERIALS	1.32%
MATHEMATICAL MODELS DESIGNERS	1.32%
MECHANICAL DESIGNER	1.32%
MENTOR	1.32%
POWERTRAIN ENGINEER	1.32%
PROCESSES ENGINEERING	1.32%
PRODUCTION	1.32%
PROJECT MANAGEMENT	1.32%
ROBOT MANUFACTURING ENGINEER	1.32%
SENSORY FUSION	1.32%
SEWER	1.32%
SOCIAL MEDIA SPECIALIST	1.32%
SOFTWARE ENGINEER	1.32%
SUPPLIER DEVELOPMENT EXPERT	1.32%
SYSTEMS ENGINEER	1.32%
TECHNICIAN	1.32%
TECHNOLOGIST	1.32%
VIRTUAL REALITY SPECIALIST	1.32%

#	STANDARD NAME	ACCEPTED	NOT ACCEPTED	DON'T KNOW
1	IATF	60%	2%	38%
2	VDA-QMC	59%	1%	40%
3	TÜV SÜD	50%	7%	42%
4	BUREAU VERITAS	38%	8%	54%
5	ECQA	23%	5%	71%
6	NATIONAL CHAMBERS AND INSTITUTIONS	100%	0%	0%
7	EAL	100%	0%	0%
7	UNIVERSITY	100%	0%	0%
8	APM	100%	0%	0%
8	OCR	100%	0%	0%
8	OHSAS 18001	100%	0%	0%
8	PMI	100%	0%	0%
8	SIX SIGMA	100%	0%	0%
9	(ISC)²	100%	0%	0%
9	AENOR	100%	0%	0%
9	AIAG	100%	0%	0%
9	CERTIFICATS DE QUALIFICATION PARITAIRES (CQP)	100%	0%	0%
9	EMAS	100%	0%	0%
9	ENGINEERING COUNCIL UK	100%	0%	0%
9	EUPPA - EUROPEAN POSITIVE PSYCHOLOGY ACADEMY	100%	0%	0%
9	FEDM - FORUM EUROPEAN DIVERSITY MANAGEMENT	100%	0%	0%
9	IMECH ENG	100%	0%	0%
9	ISO14001	100%	0%	0%
9	ISO17025	100%	0%	0%
9	ISO27001	100%	0%	0%
9	ISO45001	100%	0%	0%
9	LICS - LANGUAGE INDUSTRY CERTIFICATION SYSTEMS	100%	0%	0%
9	MICROSOFT	100%	0%	0%
9	ODETTE	100%	0%	0%
9	PRICE2	100%	0%	0%
9	PSBR (VOLKSWAGEN GROUP)	100%	0%	0%
9	RINA	100%	0%	0%
9	SCRUM	100%	0%	0%
9	SGS	100%	0%	0%
9	SMX	100%	0%	0%
9	TISAX	100%	0%	0%