DRIVES

Development and Research on Innovative Vocational Education Skills

# Summary Report on the European Automotive Apprenticeship Marketplace

Deliverable 5.2 Understanding the Marketplace

Co-funded by the Erasmus+ Programme of the European Union

Development and Research on Innovative Vocational Skills -DRIVES – Project number 591988-EPP-1-2017-1-CZ-EPPKA2-SSA-B

# TITLE OF THE DOCUMENT

| | | | |
|---|---|---|---|
| Report Title: | D5.2 Understanding the Marketplace - Summary Report on the European Automotive Apprenticeship Marketplace | | |
| Author(s): | Mick FELOY (SEMTA (Trading as ENGINUITY), Georg MACHER (TUG) | | |
| Responsible Project Partner: | TUG | Contributing Project Partners: | SEMTA, VSB, WP5 Partners |

| | | | | |
|---|---|---|---|---|
| Document data: | File name: | D5.2 Understanding the Marketplace - Summary Report | | |
| | Pages: | 84 | No. of annexes: | 1 |
| | Status: | Final | Dissemination level: | Public |
| Project title: | Development and Research on Innovative Vocational Educational Skills | | GA No.: | 2017-3295/001-001. |
| WP title: | WP5 – Apprenticeship Market | | Project No.: | 591988-EPP-1-2017-1-CZ-EPPKA2-SSA-B |
| | | | Deliverable No: | D 5.2 |
| Date: | Due date: | December 2021 | Submission date: | 11 March 2020 |
| Keywords: | Apprenticeship market, automotive market, automotive skill needs | | | |
| Reviewed by: | Anke Blume (P02), Fabian Grunert (P02) | | Review date: | 10 Jan 2020 |
| | Utimia Madaleno (P06), Petr Dolejsi (P20) | | Review date: | 19 Dec 2019 |
| Approved by: | John Mountford (P10), Jakub Stolfa (P01) | | Approval date: | 2 March 2020 |

# TABLE OF CONTENTS

# EXECUTIVE SUMMARY

The aim of this Summary Report (which summarises the findings of a more detailed Main Report) is to support the development of a shared understanding of the automotive apprenticeship marketplace in order that the sector can promote apprenticeships effectively and meet identified challenges.

The Report has been developed to help shape thinking and policy development and underpin practical action and intervention within the automotive apprenticeship marketplace.

The growing wave of new technologies and trends is about to redefine mobility. Therefore, it is of vital importance that the millions of Europeans working in the automotive industry are sufficiently prepared. Given the fast pace of developments, and with other world regions keen to take the lead, leveraging the strengths of the EU workforce is of utmost importance.

Simultaneously, domain experts and highly skilled engineers cannot keep up with the pace required to stay in sync with these changes. With the fast pace of industry change, skills grow obsolete quickly. More recent analysis shows the half-life of skills[1] is now only five years. Which means the skills learned today are only half as valuable five years from now.

This underlines the need for **the apprenticeship offer to be flexible enough to respond to these changes**. These changes also imply:

- It is difficult for providers to keep abreast of changing skill requirements
- Future skill requirements are difficult for employers to predict

The evidence of changing skill requirements within the automotive sector shows how **these changes will impact at all skill levels**. This underlines the importance of developing apprenticeships serving the sector at every level, including higher levels, in order to meet these changing needs.

**Upskilling of existing employees is at least as important as support for new entrants**. This implies the need for appropriately tailored training but also the need to maximise the potential for

[1] This means that every five years, that skill is about half as valuable as it was before https://www.weforum.org/agenda/2017/07/skill-reskill-prepare-for-future-of-work/

apprenticeships to support upskilling and provide clear learning pathways between different levels to facilitate continuous upskilling[2].

A number of specialist skills are emerging as technology changes within the industry. This implies employers need tailored, **often bite sized solutions to meet their needs**, which in turn has implications for the design of apprenticeships, with a degree of flexibility required[3].

Many of the current and likely future skill requirements within the automotive sector are quite complex. It is also the case that apprenticeships need to balance the need for equipping apprentices with the skills required for successful careers in the automotive industry with the need to meet employers specific changing skill requirements. This highlights the importance of not only understanding these requirements in detail, but **the need for a close and continued dialogue between employers in the sector together with schools, colleges, universities and other providers of apprenticeship training to ensure the apprenticeship offer evolves in line with these changing skills requirements**.

Recent research suggests changes relating to **Industry 4.0** are likely to imply the need to attract a higher level of applicant in order to be able to learn rapidly as jobs evolve and also the need to revise qualifications to take account of these changes[4].

There are also significant implications of digitalisation in relation to the way apprenticeships should be delivered in the future, in particular the increased use of digital technologies as part of apprenticeship programme delivery.

The common skills challenges faced across the EU automotive supply chain further underline **the importance of improving mobility of labour through improved qualification recognition between Member States** and in the case of apprenticeships, through the potential development of a single market for apprentices across the EU by linking regional, national and European apprenticeship initiatives.

[2] There is evidence that traditional preconceptions that apprentices can only be entry-level school leavers or labour-intensive workers are already evolving. See for example https://www.findcourses.co.uk/inspiration/apprenticeships/using-the-apprenticeship-levy-to-train-existing-staff-13125

[3] The Future of Work Jobs and Skills in 2030; UKCES; Z_punkt and the Centre for Research in Futures and Innovation (CRI-FI)

[4] Apprenticeships and 'future work': are we ready? Erica Smith, 2019 https://rdcu.be/bQRIx

It is well documented that the **automotive sector suffers from a poor image** amongst young people in a number of EU countries. A range of innovative solutions are required to address this.

It is also clear that there is **a gender imbalance across the automotive sector as a whole and particularly in relation to certain occupations** and that more could be done to ensure the industry is an attractive option for all groups[5]. **If the industry is to tackle changing future recruitment and skills challenges effectively it will be crucial that steps are taken not only to tackle the gender imbalance but to ensure the skills of all demographic groups are maximised**.

At present there are a number of aspects of the current apprenticeship market serving the EU automotive sector that impede efficient operation, with a number of factors potentially restricting labour mobility across the EU automotive sector. In particular:

- Some overall apprenticeship models are likely to encourage greater inter-industry mobility than other models.

- Labour mobility is currently further restricted by the wide inter-country variations, not only in terms of the overall apprenticeship models adopted, but in terms of patterns of school-company alternation, typical duration of apprenticeships, volume of in-company training per year, requirements placed on both employers and wider labour market stakeholders and age and educational level eligibility criteria.

- Based on research undertaken as part of the DRIVES project it is clear that within individual EU nations, skills provision serving the automotive sector can be characterised by a complicated mix of colleges, universities, private providers and employers' own training which can be particularly confusing for employers and potential trainees alike. Understanding and comparing different apprenticeship offers across different EU countries is currently a significantly more difficult challenge.

These challenges require innovative solutions to help both employers and trainees maximise the value of apprenticeships in meeting fast changing skill requirements.

[5] https://www.motortrader.com/motor-trader-news/automotive-news/driving-better-gender-balance-motor-business-15-03-2018

**The EU apprenticeship market poses particular challenges for automotive SME's** (which are vital to the efficient functioning of the automotive supply chain) both in relation to greater difficulties in recruiting candidates which meet their particular needs and providing the required learning and development for their employees.

Specifically, SME's often struggle to provide apprenticeship opportunities. Some of the most common reasons cited for this include: a lack of training infrastructure and personnel to supervise apprentices, as well as insufficient expertise and capacity to manage complex rules, employment law and administrative requirements[6]. This implies the need for the development of innovative approaches help SME's attract apprentices and support to ensure the capability to provide the required training support.

Increased globalisation has impacted across all sectors, but particularly in relation to the automotive sector, with **increasingly complex and global Supply Chain Management patterns**. As automotive supply chains become increasingly globalised in nature, by contrast apprenticeships tend to be focussed nationally or even more locally, with wide variations in approach, delivery mechanisms, employer involvement and commitment. This poses challenges for employers when choosing whether to participate in the apprenticeship systems of those countries they operate in, rather than adopt in house models, and for the mobility of apprentices seeking employment across national boundaries. Recognition of apprenticeships by different employers is also a problem in some cases.

This Report has been developed in order to underpin practical action and intervention within the EU automotive apprenticeship marketplace.

A number of potential practical actions to try and tackle issues set out in this report are suggested, which can be summed up under four main headings:

[6] Services for Apprenticeships (SERFA) Erasmus Plus Project Transnational Report; Apprenticeships across eight European countries: Current situation, best practice and SMEs' needs Prepared by Roland Löffler and Martin Mayerl (öibf) May 2017
https://www.serfa-project.eu/sites/default/files/upload/projet/transnational_report_final_version.pdf

- Establish a central resource enabling access to examples of good practice in terms of apprenticeship design and delivery within the automotive sector in partnership with key stakeholders and building on existing resources[7].
- Establish an intelligence service to track skills changes for employers and providers and act as an accessible resource for both employers and providers.
- Establish an Apprenticeship comparison tool to try and help both employers and individuals to navigate the confusing apprenticeship landscape and compare offers in different countries.
- Adopt more innovative ways of designing apprenticeships such as ensuring increased flexibility, just in time design to respond to rapid skill changes, and making sure the apprenticeship offer supports upskilling of existing employees as well as new entrants to the sector

[7] Including the European Centre for the Development of Vocational Training (CEDEFOP) and European Alliance for Apprentices (Eafa)

# 1 INTRODUCTION

The vehicle of the future will no longer function solely as a mode of transportation. Car usage behaviour, electrification, sharing, autonomy and connectivity are all fundamentally shifting the automotive sector's vision towards the integration of services around the product itself.

This makes sense because the ways that consumers' access, purchase and use cars and other modes of transport are changing rapidly. New technologies and the massive use of the internet will have a huge impact on the use and very concept of mobility. There is also a growing public expectation that greater automation will lead to even higher standards of road safety and higher connectivity of vehicles, together with a wide range of new services. These changes will involve issues surrounding Big data and Cybersecurity, whilst creating a demand for horizontal skills, and necessitating the migration of occupations from other sectors and the emergence of new skill requirements.

In the face of such seismic change The Development and Research on Innovative Vocational Education Skills (DRIVES) project was commissioned to try and support the future-proofing of skills and allow the EU workforce to continue to compete on a global scale. Running from January 2018 until December 2021, the project brings together 24 partners from 11 EU countries with a large automotive presence including the UK, Germany, Spain and Italy. Its broad objectives are to:

- Analyse key trends, covering the whole value-chain
- Define future skills and job roles
- Identify skills gaps for foreseen changes
- Analyse the current offering of training/upskilling/reskilling
- Provide clear guidance for education and training providers

A key aim of the DRIVES project is to identify ways of supporting the creation of an effective apprenticeship market serving the automotive sector.

In order to achieve this it is necessary to develop a clear and common understanding of the current apprenticeship marketplace, both in terms of the different models currently operating and the key challenges faced in relation to addressing changing skill requirements and tackling impediments to mobility of labour within the sector.

The aim of this Summary Report is to support the development of a shared understanding of the automotive apprenticeship marketplace in order that the sector can promote apprenticeships effectively and meet identified challenges.

The Report which summarises findings of a more detailed Main Report identifies a range of key issues impacting on the automotive sector that have implications for the apprenticeship marketplace serving the sector including:

- Skills related issues such as the pace of skills change, the impact of these changes on different educational levels, the balance between skills needed for new entrants and upskilling of existing employees, the specific nature of changing skill requirements and the particular implications of industry 4.0 (the fourth industrial revolution)
- The importance of employer, provider and government involvement in the design of apprenticeships to meet changing employer needs
- Recruitment related issues such as image of the sector and the need to improve workforce diversity
- The current apprenticeship offer across different countries and implications for apprenticeship mobility and labour mobility more generally
- The particular challenges facing Small and Medium Enterprises (SME's)
- The implications relating to the global nature of the automotive industry

Specifically, the purpose of this Report is to provide a resource to:

- Enhance understanding of the current nature of the apprenticeship marketplace serving the EU automotive sector
- Highlight the problems and challenges in relation to this marketplace
- Identify potential improvements that could be put in place in relation to the current automotive apprenticeship marketplace at all stages, including; planning, recruitment, support arrangements, employer involvement, tackling skill gaps, monitoring, evaluation, learning from good practice and trans-national networking and working.

# 2 OVERVIEW OF THE AUTOMOTIVE SECTOR IN THE EU

It is estimated that over 1 billion cars travel our roads in Europe today and over 90 million new ones are produced annually. This high usage has turned the automotive domain and smart transportation into a key industrial sector for Europe[8] with 13.8 million jobs, representing 6.1% of total EU employment, producing 21% of the vehicles worldwide and generating a yearly trade balance of over €99 billion. Almost 6.1 million of those motor vehicles were exported in 2018, generating a trade surplus of €84.4 billion for the European Union. Taxation on these vehicles is worth €428 billion per year in the EU15 countries.

At the same time, Europe's automotive industry remains committed to addressing tomorrow's challenges. The automotive sector has been Europe's key driver of knowledge and innovation for many years and worldwide the second biggest R&D sector. EU automakers and suppliers have increased their R&D investments by 6.7%[8], to reach an all-time high of €57.4 billion per year, representing Europe's largest private contributor to R&D. This makes the automotive sector Europe's number one investor in innovation, responsible for 28% of total EU spending on R&D. Compared to other regions worldwide, the EU auto sector leads the way in terms of R&D investment. Moreover, 8,700 automotive patents were granted by the European Patent Office last year[8].

The current automotive revolution is driven by the concept of a connected and automated car. These cars communicate with each other, with the local environment, and with the world at large via radio networks and satellites. By implementing real-time connectivity to cloud computing services and new ways of providing information and entertainment the primary function of these cars is evolving from transportation devices to integrated systems in a connected world of things. Embedded cyber-physical systems and Industrial IoT (IIoT) shift the value creation in the automotive domain towards the ICT domain and service orientation.

Thus, the entire industrial sector needs to evolve and adapt at a very fast pace to stay ahead of global competition, while including all stakeholders and addressing societal needs.

[8] European Automobile Manufacturer Association, The Automobile Industry Pocket Guide 2018 - 2019, 2019.

## 2.1 KEY ECONOMIC FIGURES RELATING TO THE EUROPEAN AUTOMOTIVE SECTOR

As already outlined the scope of the European automotive sector is enormous in terms of economic significance. Europe's automotive sector has been the key driver of knowledge and innovation for many years. Also, numbers employed in the sector have risen over the last years (see Figure 1) with a quarter of all cars produced worldwide made in Europe.

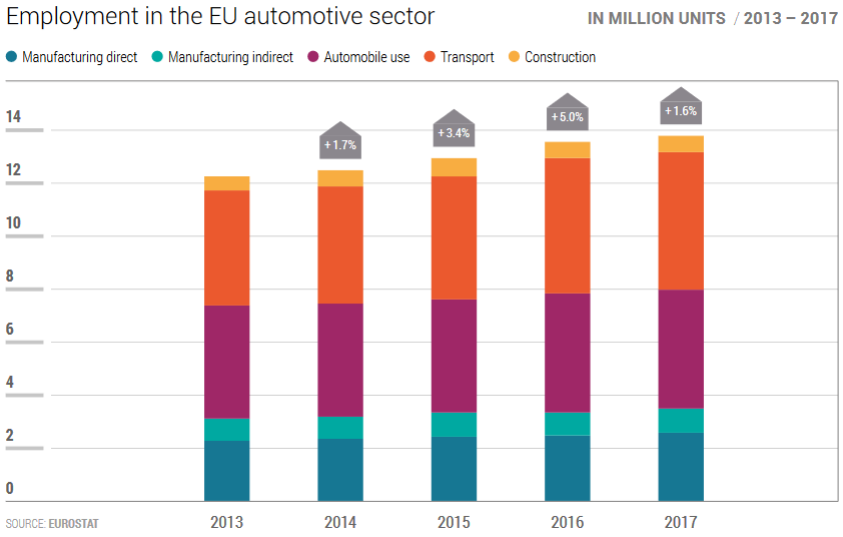



**Figure 1 Employment in the EU automotive sector[8]**

Along with US and Asian countries, the European automotive industry is identified as mainly an innovation-driven economy.[9]

[9] L. M. Kurekova, The automotive industry in Central Europe: A success?, IZA World of Labor, 2018.

## 2.2 SUPPLY CHAIN CHARACTERISTICS

The automotive sector is amongst the largest, most competitive, and most internationalised of all industries, with high barriers to entry. It is also a classic example of a producer driven commodity chain. It is characterised by integrated production systems that comprise highly specialised, segment-specific, vertically organised transnational companies. The industry has a high intensity in technology, capital, and skills and is logistically demanding due to lean manufacturing and the system of just-in-time parts delivery[9].

The structure of the automotive supply chain is often compared to a pyramid[10]. These tiered supply chains are very common due to the very complex end-product and the multiple components and sub-assemblies it consists of, which have to comply with stringent quality, manufacturing and business standards.

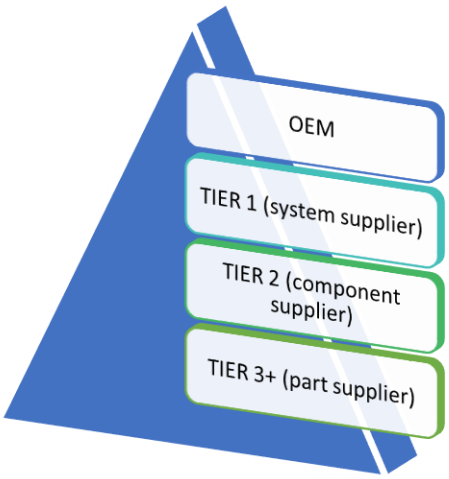



Figure 2 Automotive Supply Chain

On top are the Original Equipment Manufacturer (OEMs) referred to as companies that make the final product for the consumer market (e.g. Audi, BMW, Daimler, VW). Tier 1 companies are directly supplying OEMs with major vehicle systems (such as drive-train, infotainment, motor units) and are themselves supported by Tier 2 companies (supplying components such as vehicle control units, battery management systems). Therefore, in a typical supply chain OEMs are supplied by Tier 1, which are themselves supported by Tier 2, which are supported by Tier 3 and so forth. Tier is a common terminology in the automotive industry and refers to major suppliers of parts.

The automotive aftermarket and aftersales sector is a complex, robust and highly competitive market that provides the support network for Europe's millions of cars, vans, trucks and buses. The automotive aftermarket's multi-faceted and diverse segments cover the whole repair, maintenance and service spectrum from parts supply to fitment and servicing.[8] Vehicle manufacturers are not dominant players in aftermarket maintenance over the lifetime of the average vehicle. Here SME's comprise the mainstay of total aftermarket services.

[10] H. Broekman, D. Ekert, M. Kollenhof, A. Riel, H. Theisens und R. Winter, Working in the Automotive Industry - Mindset, Skill set & Tool set for people working in the automotive industry, Lean Six Sigma Academy (LSSA BV), 2017.

## 2.3 KEY PLAYERS AND NEW COMPETITORS

The automotive OEM and part supplier sector is one of the sectors that are significantly influenced by disruptive trends. However, the leading positions in the industry are still occupied by large global producers. Statista provides several 'top' lists in this regards, e.g. the largest 200 companies in the Automobiles & Automotive Parts sector ranked by revenue[11]. This list comprises mainly international players, like Volkswagen, Toyota Motor, and Ford Motor, but also includes many growing companies in the industry, especially Asian companies.

The global car market share by brands in 2018, ranked Japan's Toyota Motor Corporation the world's largest automaker, while Germany's Volkswagen AG was ranked second[11]. In the Top10 ranking only three European automotive brands appeared Volkswagen (2nd), Mercedes (9th) and Renault (10th). Based on Statista calculations of market share values and rankings, global sales of 93.6 million units were achieved in 2018.

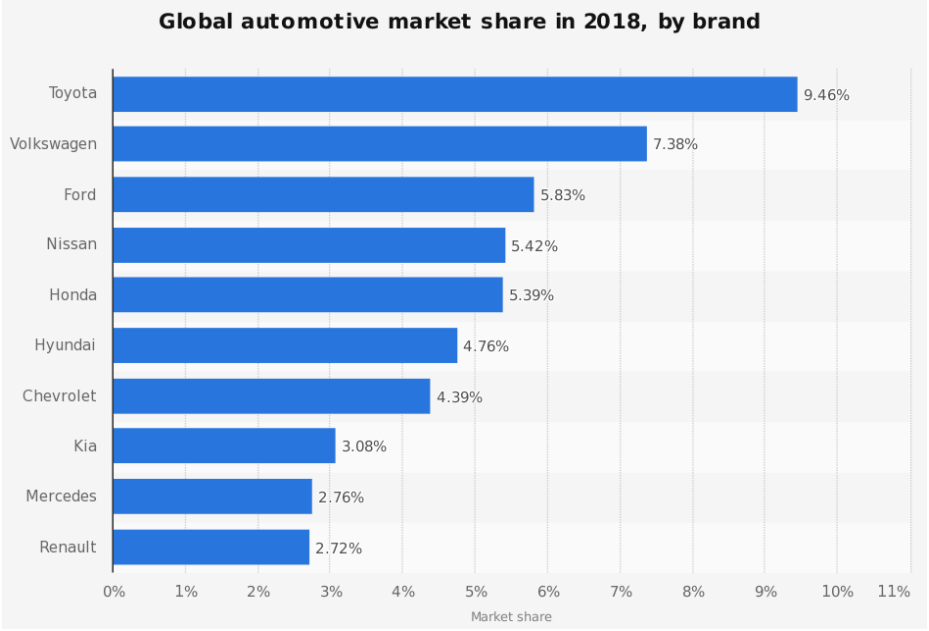



**Figure 3 Global automotive market share in 2018 per brand by Focus2move[12]**

[11] Statista, „Top 200 Companies: Automobiles & Automotive Parts," Statista, 2019. [Online]. Available: https://www.statista.com/study/30861/top-100-automotive-and-automotive-part-companies-global/. [Accessed 10 Nov 2019].

[12] Statista, "Global car market share of the world's largest automobile OEMs in 2018", 2019. Available: https://www.statista.com/statistics/316786/global-market-share-of-the-leading-automakers/. [Accessed 11 Dec 2019]

New types of competitors to the European automotive domain have emerged from the East, including Chinese technology titans (Baidu or Alibaba) and leading battery technology manufacturers and from West, together with novel mobility providers such as Tesla, Uber and Lyft. Furthermore, traditional car manufacturers find themselves increasingly side-lined in a 'parasitic' relationship with tech titans such as Google, Apple and Baidu.

Those new entrants provide disruptive concepts and business models for basic car structures, technology (such as automated driving, voice-assistants like Siri, cloud-based solutions, cyber-protection, etc.) and infotainment systems. Besides the data protection issues that arise when data monopolists enter the car industry, a crucial question is whether car companies can manage to diversify their offer into the technology sector rather than vice versa.

As a counterpoint to these trends, Europe's automotive industry has a very high level of know-how, expertise, R&D, and highly skilled workers. Therefore the entire domain needs to evolve and adapt at a very fast pace to stay ahead of global competition. This is of particular relevance in relation to the segments new to the domain, such as embedded cyber-physical systems and Industrial Internet of Things (IIoT), and includes the building of a European battery supply chain for electric vehicles.

## 2.4 GEOGRAPHICAL PATTERNS OF THE SUPPLY CHAIN

The automotive industry has operated for the past 100 years on a single business model - producing, selling, and servicing vehicles. But radical changes for the global automotive industry are shifting the industry landscape.

The automobile industry particularly in advanced countries, used to be primarily a national industry. This is why automobile manufacturers in advanced nations developed management strategies that centred on their own country.

This changed during the 1990's when globalisation developed rapidly. Major reforms that ranged from product development to production systems in factories and to component purchase approaches led to the globalisation in the 1990's and a free and rapid expansion of business activities beyond the framework of one nation. This globalisation of the automobile industry has also underpinned the development of associated global human and financial networks.

The new ecosystem will not continue to work in the same way; but is instead shaping market networks towards a position where companies will play multiple roles in digitally connected ecosystems.

Economic volatility drives the need for a reconfigured and transparent supply chain that will increasingly focus on issues such as the need to tackle climate change, environmental pollution, traffic congestion and safe travel. These factors are forcing automakers to rethink their product mix and business model – thus revamping their supply chain with new offerings. Therefore, as suppliers add more value in innovative solutions, Europe needs to restructure and adjust its capacity to better match the increased demand, and competition emerging from China. The traditional approaches to improve supply chain performance are not working effectively enough, as the work of Confederation in Indian Industry [13] and other research[14] indicates.

The major issue of sustainability has become highly relevant in the automotive industry in recent years. Thus, the most successful automotive companies make sustainability and corporate social responsibility (CSR) an integral part of the way their vehicles are marketed, purchased and driven; and thus build-up the supply chain accordingly. Global supply chains have a distinct geography straddling production, distribution and consumption[15], and need to address CSR issues.

The other major driver is the transformational introduction by the Internet of things (IoT) and new emerging technologies[16]. Accordingly, vehicles are evolving in a way that vehicle manufacturers, ICT companies, and other stakeholders take advantage of this opportunity and are looking into ways of collaboration to provide innovative services. The whole value chain of the automotive sector is evolving to integrate emerging actors. In this new ecosystem, different industries need to cooperate and compete simultaneously to address new business opportunities.

[13] Confederation of Indian Industry, „Automotive supply chain - Emerging trends for building intelligent supply chain," Confederation of Indian Industry, 2019.
[14] V. FRIGANT und M. ZUMPE, „Are automotive Global Production Networks becoming more global? Comparison of regional and global integration processes based on auto parts trade," https://mpra.ub.uni-muenchen.de/55727/, 2014.
[15] J.-P. Rodrigue, „The Geography of Global Supply Chains: Evidence from Third Party Logistics," Journal of Supply Chain Management, special issue "Global Sourcing-Other Voices".
[16] B. Martínez de Aragon, J. Alonso-Zarate und A. Laya, „How connectivity is transforming the automotive ecosystem," DOI: 10.1002/itl2.14, 2017.

# 3 CHANGING AUTOMOTIVE SKILL NEEDS

## 3.1 CHANGING SKILLS

The shortage of expertise already impacts on the automotive industry today and will become a greater challenge in the future. According to an IBM survey[17], automotive executives expect the industry to spend over USD 33 billion to reskill their employees by 2030[13].

The growing wave of new technologies and trends is about to redefine mobility. Therefore, it is of vital importance that the millions of Europeans working in the automotive industry are sufficiently prepared. Given the fast pace of developments, and with other world regions keen to take the lead, leveraging the strengths of the EU workforce is of utmost importance.

Simultaneously, domain experts and highly skilled engineers cannot keep up with the pace required to stay in sync with these changes. With the fast pace of industry change, skills grow obsolete quickly. More recent analysis shows the half-life of skills[18] is now only five years. Which means the skills learned today are only half as valuable five years from now.

The impact of the digital and energy transition on today's jobs and automotive regions is enormous; the 3.4 million high-skilled jobs in automotive manufacturing (representing more than 11% of the EU's total manufacturing employment) are impacted by these changes as well as the entire European automotive supply chain.

The future of the automotive industry is sustainable, smart and shared, and each of these characteristics is associated with both existing and new challengers. Some of the most important trends the industry is currently facing are[17]:

- Climate change: The automotive sector is one of the major contributors to greenhouse gas emissions. The transport sector is responsible for roughly 22 per cent of overall emissions in the EU.

[17] IBM Institute for Business Values, Automotive 2030 - Racing toward a digital future, Research Insides, 2019.
[18] This means that every five years, that skill is about half as valuable as it was before https://www.weforum.org/agenda/2017/07/skill-reskill-prepare-for-future-of-work/

- Sustainability: An increasing number of countries are introducing new regulations and frameworks limiting fossil fuel powered combustion engines and promoting electric cars. This trend towards greater sustainability is also accompanied by advances in battery storage technology and aiming towards sustainable battery technologies.
- Autonomous driving: The car of the future is not only sustainable, it's also smart. Fitted with sensors, cameras and high-tech electronics, the car is becoming a computer on wheels, rather than relying on a human driver.
- Connected and shared vehicles: Rather than being an isolated, personal transport solution, it is becoming part of a mixed mobility network together with public transport and bicycles. New mobility platforms and business models are emerging. Instead of selling cars, mobility will be sold.
- Cultural and demographic changes: Young people and urban dwellers no longer have a strong desire to own a car, and worry about the inconveniences associated with car ownership.

These trends will all have an impact in terms of changes to existing job roles and associated skills and in a number of cases, in relation to the emergence of new job roles and skill sets. These trends also have implications for EU policy.

The European Sector Skills Council Automotive Industry Report (2013)[19] highlights how changes in the EU automotive sector will require a different mix of skills and a permanent upgrading of skill levels and competences. In particular, increased automation and the introduction of new technologies will lead to a shift to more advanced technical skills and more knowledge intensive work at the same time, that manual assembly line jobs will be reduce drastically, or in some cases disappear.

This poses both challenges and opportunities for the reshaping of the apprenticeship offer across the EU. In 2015, the EU Commission set up a new High-Level Group (HLG) for the automotive industry. The High Level Group named GEAR 2030 was formally established on the basis of the Commission Decision 2015/C 6943/2 (19 October 2015).

[19] European Sector Skill Council: Report, EU Skill Council Automotive Industry, 2013

The objective of the GEAR 2030 High-Level Group was to "help to develop medium and long-term recommendations to address the main challenges and opportunities for the European automotive industry in the run-up to 2030 and beyond."

The resulting GEAR 2030 Report[20] provides detailed insights into the skills and wider labour force challenges facing the industry. The report also identified several steps to tackle the challenges of adapting to new technologies including the need to:

- Support the mobility and transferability of skills;
- Encourage non-formal learning certification; and
- Develop a well-functioning apprenticeship market.

The development of a well-functioning apprenticeship market across the EU is identified as a key component of the package of actions required to address identified challenges facing the sector.
The DRIVES project is seeking help to address this by including it as a key objective of the Project.
The report underlines how the on-going trends in terms of digitalisation, electrification, Computer Aided Design (CAD), the automation of production processes (smart manufacturing & Industry 4.0) and smart mobility, will bring significant structural changes to automotive enterprises and their workforce in the future.

Skills and wider workforce challenges highlighted in the report include:

- Increasing quantitative and qualitative shortages in suitable workers, especially in the areas of engineering, scientific, and soft skills (communication, team leading, consumer-facing skills), linked to the ageing workforce (23% are approaching retirement age)[21]
- The wide diversity of national education systems and cultures
- The ever-accelerating pace of technological change
- The cut back in recruitment as a consequence of the 2008 economic crisis has slowed down the process of substitution of workers approaching retirement age, creating a skills transfer void, as experienced workers are unable to pass on their knowledge to suitably experienced younger colleagues, before retiring.

[20] GEAR 2030, High Level Group on the Competitiveness and Sustainable Growth of the Automotive Industry in the EU, 2017
[21] SWD(2016) A New Skills Agenda for Europe

- Mobility of talent within the entire automotive value chain is impeded by a lack of vocational qualification recognition and standardised approaches to the validation of non-formal learning among Member States, leading to limited transferability across the EU and the automotive value chain.
- Challenges amongst SMEs (which are an important part of the European automotive supply chain) are identified, particularly in relation to greater difficulties in recruiting candidates meeting their particular needs and providing the required learning and development for their employees.
- A poorly functioning apprenticeship market, with a lack of clarity and awareness of the required job profiles and lack of mobility for apprentices.

A number of skills implications associated with these changes are identified by the report. In particular:

- The move towards electrification will lead to a greater demand for engineers with software and digital skills and most likely a decrease in jobs linked to the production of conventional powertrains (unless the transition to full electric cars is preceded by a prolonged period of hybrid cars which require two powertrains and, thus, more components).
- There will be an increased demand for digital and advanced engineering skills as well as a need to refocus some talent towards basic skills.
- Set against this, a number of traditional job profiles will disappear.

The report also identifies how this in turn has implications for the skills support mechanisms serving the sector including:

- The need for substantial investment in regular upskilling and retraining of staff in order to ensure their effectiveness.
- How changes in approaches must be reflected in both formal and informal education pathways.
- That higher technical education needs to be enhanced in order to address the competence demands associated with digitalisation and electrification.
- How engineering courses currently do not put enough emphasis on fundamental engineering knowledge, such as ICT, programming and system design.

Results from research undertaken as part of the DRIVES project provides a further set of evidence to enhance the understanding of the likely impact of key Drivers of Change on future skill requirements.

In March 2019, DRIVES launched an online survey to support the creation of a strategic roadmap for the sector. Results of this survey[22] indicate that the TOP 15 overall Skills ranked according to the DRIVES Skill Index[23]. Based on the categorisation adopted, four of the fifteen skills are "Technical", three are related 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
- "Software Development" is ranked second
- "Technical Knowledge" is ranked third

This underlines the importance of skills required to adapt to technological change in the sector.

**Overall Skill Index**

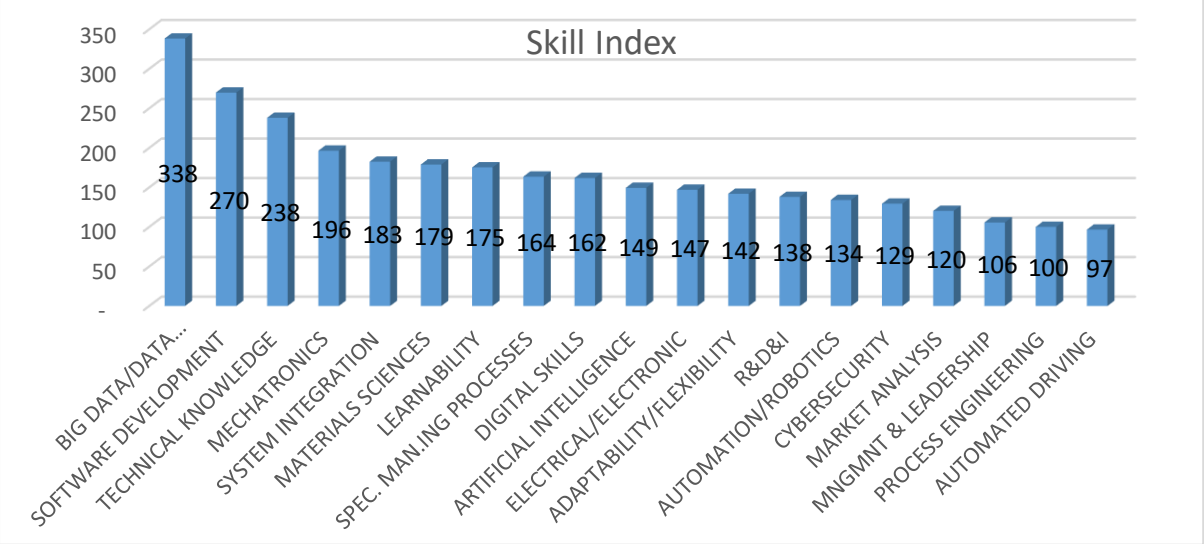



**Figure 4 Automotive Skills Index[24]**

[22] Insights of the Automotive Sector2019 - Deliverable 2.7 Forecasting Dissemination Report Christian Baio, SPIN360, Jakub Stolfa, VSB-TUO, Svatopluk Stolfa, VSB-TUO https://www.project-drives.eu/Media/Publications/6/Publications_6_20190717_81413.pdf

[23] This is calculated by multiplication of occurrence of the skills in the results of the survey and the average of linked Drivers of Change to that particular skill.

[24] Insights of the Automotive Sector2019 - Deliverable 2.7 Forecasting Dissemination Report Christian Baio, SPIN360, Jakub Stolfa, VSB-TUO, Svatopluk Stolfa, VSB-TUO

The survey also indicates that 'Continuous training' and 'Acquisition of new skills' were the two Drivers of Change ranked highest in terms of importance by survey respondents, underlining the priority attached to tackling changing skill requirements by automotive employers.

Other recent research[25] provides further insights as to the changing nature of skills within the automotive sector. The research indicates:

- In relation to skills required, automotive "hard" skills such as engineering or software development are rated as most critical to organisations success. These technical skills have traditionally been essential, but in future alternative autonomous capabilities and ICT connectivity features will also contribute to engineering complexity.

- At the same time, entrepreneurial and automotive process and transformation skills are essential as companies need to change into highly efficient high tech companies.

- The automotive industry is rapidly transforming towards Industry 4.0 with massive advancements in technology development and processes. However, challenges and opportunities of technology adoption and deployment continue to arise and there are few companies that fully recognise the number one challenge of finding qualified talent. Due to the rapid pace of innovation across the automotive industry, academic institutions are struggling to develop curriculums to match in-demand skills from the industry. The need for educational

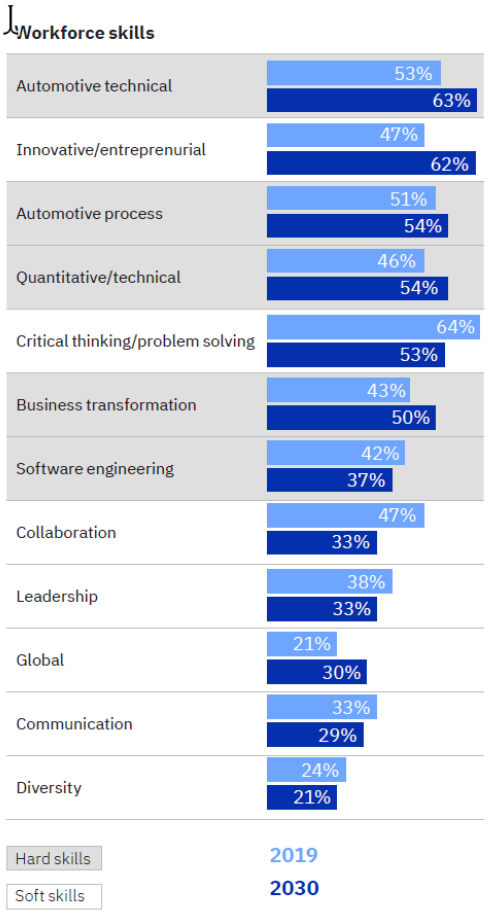



**Figure 5 Analysis of workforce skills required for Automotive Domain in 2030[17]**

[25] T. Fiorelli, K. Dziczek und T. Schlegel, „Automation Adoption & Implications for the Automotive Workforce," 2019.

institutions and industry to partner with one another to close this talent gap for the future workforce is highlighted in this respect[26].

- The rapid pace of skills change underlines the increasing importance of workforce upskilling, with, on average, automotive executives indicating that 16% of the workforce will need to be reskilled by 2030 to meet changing digital requirements, with an expected 31% increase in training/reskilling budgets expected to meet these demands[27].

Specifically, in relation to changing skill requirements amongst automotive production line workers, research undertaken by The Centre for Automotive Research (CAR)[28] provides further evidence of changing skill requirements based on interviews with human resource executives within the sector. The research found:

- There is a greater emphasis on "soft skills." Production line workers are expected to be problem solvers, with the ability to work in collaborative settings. They must be able to understand the "big picture," and be willing to work for the common success of the enterprise.

- Production workers will be given greater responsibility for continuous improvement and routine maintenance.

- New technologies in powertrain, joining and assembly, and electronics, coupled with faster product cadence, will drive skills changes.

- In skilled trades, there will be fewer classifications, more cross-skilling, and more skill needs in electrical, electronics, and software areas.

---

[26] T. Fiorelli, K. Dziczek und T. Schlegel, „Automation Adoption & Implications for the Automotive Workforce," 2019.
[27] T. Fiorelli, K. Dziczek und T. Schlegel, „Automation Adoption & Implications for the Automotive Workforce," 2019.
[28] The Auto Industry: In Search of New Talent amid Changing Skills Requirements: Today's automobile production line requires highly skilled, flexible workers who can rapidly adjust to change.

Dennis Cuneo, Partner, Fisher & Phillips; Kristin Dziczek, Director, Industry, Labor & Economics Group, Center for Automotive Research (CAR)

https://www.areadevelopment.com/Automotive/2013-Auto-Aero-Site-Guide/auto-sector-skilled-workforce-needs-29292741.shtml

In addition to the above, other evidence points to ongoing issues in the sector relating to both the image of the sector and workforce diversity. In particular:

- The GEAR2030 Report[29] highlights how the image of the manufacturing sector in the eyes of young talent, and women of all ages, hampers recruitment, with engineering industries struggling to attract young people, particularly female workers.

- A recent article by the Head of Engineering Talent Project at the Royal Academy of Engineering in the UK highlights how the public perception of engineering is a long way from the reality, with many young people assuming that engineering involves hard, manual work, and male-dominated workplaces and a limited range of job opportunities[30].

- In relation to the gender imbalance generally in engineering, recent evidence indicates that within the EU the highest proportion of women in the engineering workforce are found in Latvia (at 30% of the engineering workforce), with the lowest proportion in the UK at about 9%[31]

- The advantages of addressing wider diversity issues including those relating to ethnicity, disability, sexual orientation, socio-economic background and age are also recognised in terms of increasing the supply of suitably skilled workforce members, in order to reduce the engineering skills gap[32].

[29] GEAR 2030, High Level Group on the Competitiveness and Sustainable Growth of the Automotive Industry in the EU, 2017

[30] Challenging and changing the image of engineering; The Engineer, 13th August 2019; Daniel Rossall Valentine, Head of Engineering Talent Project, Royal Academy of Engineering and campaign lead for "This is Engineering".
https://www.theengineer.co.uk/engineering-image-problem/

[31] UK worst in Europe at attracting women into STEM industries/Press Release | Published: 26 October 2017
https://www.thehrdirector.com/features/stem/uk-women-stem-industries/

[32] Increasing diversity and inclusion in engineering – a case study toolkit; Royal Academy of Engineering 2015
https://www.raeng.org.uk/publications/reports/increasing-diversity-and-inclusion-in-engineering

## 3.2 IMPLICATIONS FOR APPRENTICESHIPS

The pace of technological change within the automotive industry is increasing rapidly, which in turn impacts on **the rate of skills change**. With the fast pace of industry change, skills grow obsolete quickly.

This underlines the need for the apprenticeship offer to be flexible enough to respond to these changes. These changes also imply:

- It is difficult for providers to keep abreast of changing skill requirements
- Future skill requirements are difficult for employers to predict

It has also been pointed out that across a wide range of different sectors, the pace of technological change highlights the need to adapt learning programmes to reflect the critical importance of an interdisciplinary approach to innovation in the workplace[33].

Case study 1 provides a good example of how apprenticeship training for Automotive Business Administrators in Germany has recently been updated to reflect fast changing skill requirements.

Case study 2 provides an example of how a company in Austria ensures training of students about to be employed are involved in learning about the latest technologies and challenges facing the company. Although this is not an apprenticeship scheme it has been included to highlight how one company is ensuring students are equipped with up to date skills required by the company.

The evidence of changing skill requirements within the automotive sector shows how **these changes will impact at all skill levels**. This underlines the importance of developing apprenticeships serving the sector at every level, including higher levels, in order to meet these changing needs.

The current situation across the EU with respect to higher level apprenticeships is quite variable. While the apprenticeship offer in France, Italy, Germany and the UK include higher level pathways the focus in Sweden, Romania and Hungary is lower/intermediate level (EQF levels 2-4).

[33] The Future of Work Jobs and Skills in 2030; UKCES; Z_punkt and the Centre for Research in Futures and Innovation (CRI-FI)

In the UK, higher apprenticeships were first introduced (equivalent to foundation degrees or above) in 2010 and in 2015, Degree Apprenticeships were introduced as part of higher apprenticeship standards, seeing apprentices achieving a full bachelor's or master's degree (Levels 6 and 7)[34] as a core component of the apprenticeship[35]. Both Higher and Degree Apprenticeships must last a minimum of one year; Degree Apprenticeships in particular will last longer, typically up to four years, though there is no fixed maximum duration.

A range of higher level apprenticeships of relevance to the automotive sector are now either in place in England or under development. The introduction of Degree Apprenticeships in England (UK),[36] together with those Degree Apprenticeships of particular relevance to the automotive sector is set out as case study 3.

**Upskilling of existing employees is at least as important as support for new entrants**. This implies the need for appropriately tailored training but also the need to maximise the potential for apprenticeships to support upskilling and provide clear learning pathways between different levels to facilitate continuous upskilling[37].

Case study 4 provides an example of an innovative approach to encouraging smooth progression from entry level through to higher Apprenticeship levels. The Advanced Engineering, Pathways to Apprenticeship Study programmes were introduced across Wales UK from 2012 as a pilot initiative introducing an intensive, Further Education College (FEC) option for young people preparing them for an apprenticeship placement with an employer and providing them with the opportunity to fast-track them through a Level 2 Apprenticeship Framework, allowing seamless progression directly into a Level 3 or Level 4 Apprenticeship under an employed status.

A number of specialist skills are emerging as technology changes within the industry. This implies employers need tailored; **often bite sized solutions to meet their needs**, which in turn have

[34] This is equivalent to EQF levels 6 and 7
[35] https://www.allaboutschoolleavers.co.uk/articles/article/298/what-is-the-difference-between-a-degree-apprenticeship-a-higher-apprenticeship

[36] The Apprenticeship offer together with governance and regulatory arrangements differ in each nation of the UK
[37] There is evidence that traditional preconceptions that apprentices can only be entry-level school leavers or labour-intensive workers are already evolving. See for example https://www.findcourses.co.uk/inspiration/apprenticeships/using-the-apprenticeship-levy-to-train-existing-staff-13125

implications for the design of apprenticeships, with a degree of flexibility required[38]. Case study 5 provides an example of a university in Austria working with employers to help employees meet the particular challenges each employer faces through Life Long Learning for university-level continuing education in engineering and science subjects. Courses are designed by focusing on the needs of target groups in an industrial context and developing innovative subjects and formats to meet these needs. Training is also designed to use up-to-the-minute teaching and learning technologies developed at TU Graz to create flexible learning settings on site[39]. Although the example is not an apprenticeship scheme the case study does provide an insight into how workforce skills development can be delivered flexibly in order to ensure this keeps abreast of fast changing technologies.

Many of the current and likely future skill requirements within the automotive sector are quite complex. It is also the case that apprenticeships need to balance the need for equipping apprentices with the skills required for successful careers in the automotive industry with the need to meet employers specific changing skill requirements. This highlights the importance of not only understanding these requirements in detail, but **the need for a close and continued dialogue between employers in the sector together with schools, colleges, universities and other providers of apprenticeship training to ensure the apprenticeship offer evolves in line with these changing skills requirements**. Case study 6 provides an example of the Automotive Trailblazer Employer Group in England established to drive the design of apprenticeships to meet the specific skill requirements of the automotive sector.

Case study 7 provides an example from Belgium of an apprenticeship programme serving the Belgian automotive aftersales sector that involves close dialogue between schools, automotive retailers/dealerships, major automotive brands and a specialist provider.

The likely impact of **Industry 4.0** on overall changes to skill requirements has already been highlighted (See 3.1). In terms of the potential impacts of these changes on apprenticeships, recent research suggests this is likely to imply the need to attract a higher level of applicant in order to be able to learn rapidly as jobs evolve and also the need to revise qualifications to take account of

[38] The Future of Work Jobs and Skills in 2030; UKCES; Z_punkt and the Centre for Research in Futures and Innovation (CRI-FI)
[39] Website / Link / info: https://www.tugraz.at/en/studying-and-teaching/degree-and-certificate-programmes/continuing-education/life-long-learning/

Industry 4.0 changes[40]. This last point is supported by recent survey work of German companies undertaken between mid-October and December 2017. The research indicates that nearly a third of companies responding to the survey indicated that new training apprenticeship occupations should be created as a result of digitalisation[41].

The need to adapt the Apprenticeship offer to meet these changing skill requirements has been recognised in Australia through the introduction of the Industry 4.0 Higher Apprenticeship Programme[42], which trains technicians to a higher skill covering topics including:

- Advanced manufacturing processes
- Automation and robotics
- Internet of Things
- Cloud computing
- Advanced algorithms
- Smart sensors

Two case studies (8 and 9), one from Spain and one form Finland provide good examples of initiatives developed to tackle the growing need for digital skills within the automotive industry within the EU.

- Case study 8 provides an example of an international learning programme for current workforce upskilling and young graduate digital talent attraction in the automotive industry, based in Spain.

- Case study 9 provides an example of a digital academy established in Finland (MERINOVA Digitalisation Academy[43]). It runs an interdisciplinary programme for university students at VAMK, Novia and University of Vaasa on their last year of studies, seeking internships and thesis work with an emphasis on the Energy Cluster and Digitalisation. The Academy is a unique regional programme managed by universities, digitalisation companies and large international organisations from the local energy cluster EnergyVaasa. It offers students a

[40] Apprenticeships and 'future work': are we ready? Erica Smith, 2019 https://rdcu.be/bQRIx

[41] Digitalisation of Apprenticeship in German Companies; 2019 joint Cedefop and OECD symposium The next steps for apprenticeship; October 2019 / Dr. Regina Flake, German Economic Institute

[42] https://www.industry.gov.au/funding-and-incentives/manufacturing/industry-40

[43] Webside / Link / info: https://www.digitalisationacademy.fi/about-academy/

highly interesting programme that enables them to learn from professionals in the energy industry and get the latest knowledge in digitalisation.

Although both these case studies are not apprenticeship schemes they do provide innovative examples of programmes designed to tackle the growing need for digital skills within the automotive industry.

There are also significant implications of digitalisation in relation to the way apprenticeships should be delivered in the future, in particular the increased use of digital technologies as part of apprenticeship programme delivery. In some countries there has already been a rapid increase in such approaches. For example, evidence indicates that about 1 in 4 companies in Germany already engage intensively in the digitalisation of VET[44].

The same research[45] also highlights the scope for adopting a more strategic approach to the digitalisation of apprenticeships. It is pointed out that

- Cooperation between learning venues need to be improved;
- There is significant need for orientation / support (in particular in relation to SMEs); and
- Increased dissemination of examples of good practice can motivate more companies to engage in the digitalisation of their apprenticeships

Case study 10 provides a good example of the innovative use of e learning in relation to two apprentices within a German metalworking company.

The automotive sector across the EU is facing a common set of skills challenges. It is the scale of impact in different areas of automotive supply chain that is likely to differ in each country, linked primarily to differing composition of national and regional automotive supply chains. The common skills challenges faced across the EU automotive supply chain further underline **the importance of improving mobility of labour through improved qualification recognition between Member States** and in the case of apprenticeships, through the potential development of a single market for apprentices across the EU by linking regional, national and European apprenticeship initiatives.

[44] Digitalisation of Apprenticeship in German Companies; 2019 joint Cedefop and OECD symposium The next steps for apprenticeship; October 2019 / Dr. Regina Flake, German Economic Institute
[45] Digitalisation of Apprenticeship in German Companies; 2019 joint Cedefop and OECD symposium The next steps for apprenticeship; October 2019 / Dr. Regina Flake, German Economic Institute

It is well documented that the **automotive sector suffers from a poor image** amongst young people in a number of EU countries (See section 3.1). A range of innovative solutions are required to address this. Case study 11 highlights how a national campaign in the UK, encourages more young people to consider a career as a technician. The campaign links up with World Skills UK to showcase jobs young people may not have considered in order to try and attract young people into the automotive and other industries employing technicians.

It is also clear that there is **a gender imbalance across the automotive sector as a whole and particularly in relation to certain occupations** and that more could be done to ensure the industry is an attractive option for all groups[46]. **If the industry is to tackle changing future recruitment and skills challenges effectively it will be crucial that steps are taken not only to tackle the gender imbalance but to ensure the skills of all demographic groups are maximised**. Case study 12 provides an example from Germany of a programme to successfully encourage refugees into the automotive industry.

[46] https://www.motortrader.com/motor-trader-news/automotive-news/driving-better-gender-balance-motor-business-15-03-2018

# 4 UNDERSTANDING THE EU APPRENTICESHIP MARKETPLACE

## 4.1 SIMILARITIES AND DIFFERENCES

This chapter focuses on understanding different apprenticeship models adopted across the EU and the implications of these different approaches for the automotive sector.

In order to do this the chapter focusses on those countries with a significant concentration of automotive sector activity.

For the purposes of this analysis this has been defined as the 'top 10' EU countries based on direct automotive employment in 2017. These ten countries are listed below:

**Direct Automotive Employment – 2017**

- Germany (870,000 jobs)
- France (223,000)
- Poland (203,000)
- United Kingdom (186,000)
- Romania (185,000)
- Czech Republic (177,156)
- Italy (162,876)
- Spain (157,610)
- Hungary (97,688)
- Sweden (79,600)

**Figure 6 Direct Automotive Employment – 2017[47]**

In order to identify the different apprenticeship models in operation in these ten counties, the chapter draws on a wide range of research undertaken by CEDEFOP. In particular, a major cross nation review was published in 2018 that established a framework for categorising different apprenticeship approaches by country[48].

[47] The Automobile Industry Pocket Guide 2019-2020, ACEA
[48] Apprenticeship Schemes in European countries – A cross-nation Review – CEDEFOP 2018

The study explores different apprenticeship definitions used in different countries and identifies the changes that apprenticeships are undergoing in practice in order to highlight the different functions and purposes that apprenticeship policies fulfil in different countries. As a reference point for this analysis the study uses the following definition of apprenticeships:

'*Systematic, long-term training alternating periods at the workplace and in an education institution or training centre. The apprentice is contractually linked to the employer and receives remuneration (wage or allowance). The employer assumes responsibility for providing the trainee with training leading to a specific occupation'*[49].

In order to understand different apprenticeship models adopted in different EU countries, the chapter focusses on the 'top 10' automotive countries measured in relation to direct automotive manufacturing employment and compares the apprenticeship system in each of these selected 'key automotive countries' using available information and a standardised assessment criteria, including:

- Typical duration of apprenticeships
- The minimum volume of in-company training per year
- The requirements on employers in relation to provision of learning and arrangements and responsibilities for accreditation and monitoring
- The minimum age of eligibility, age range eligibility and education level eligibility
- Funding
- Quality Assurance
- Uptake
- Governance

The analysis indicates that there are wide variations across these countries not only in terms of overall apprenticeship models adopted, but in terms of patterns of school-company alternation, typical duration of apprenticeships, volume of in-company training per year, requirements placed on both employers and wider labour market stakeholders and age and educational level eligibility criteria.

The recently adopted European Framework for Quality and Effective Apprenticeships (EFQEA) recommendations provides a more detailed accepted framework against which the current

[49] Apprenticeship Schemes in European countries – A cross-nation Review – CEDEFOP 2018

automotive Apprenticeship market place within selected countries can be benchmarked. There are 14 recommendations that have been adopted that form a standardised criterion for both learning and working conditions and framework conditions. This benchmarking process has been applied to 6 key EU automotive countries selected to highlight divergences in approach to apprenticeships, these being Sweden, Spain, Portugal, Czech Republic, Germany and the UK. These countries were selected in order to represent different approaches to apprenticeships and also to reflect a range of differing sizes in terms of automotive sector employment. The results of this assessment are summarised in the diagram below.

The assessment is based on available evidence and points generally higher scores in Germany and the UK reflecting the relatively formalised apprenticeship infrastructures in both countries and somewhat lower scores in the Czech Republic, Spain and Sweden. However, it should be noted these assessments should only be treated as a guide, given the current difficulties involved in the assessment process based on information available.

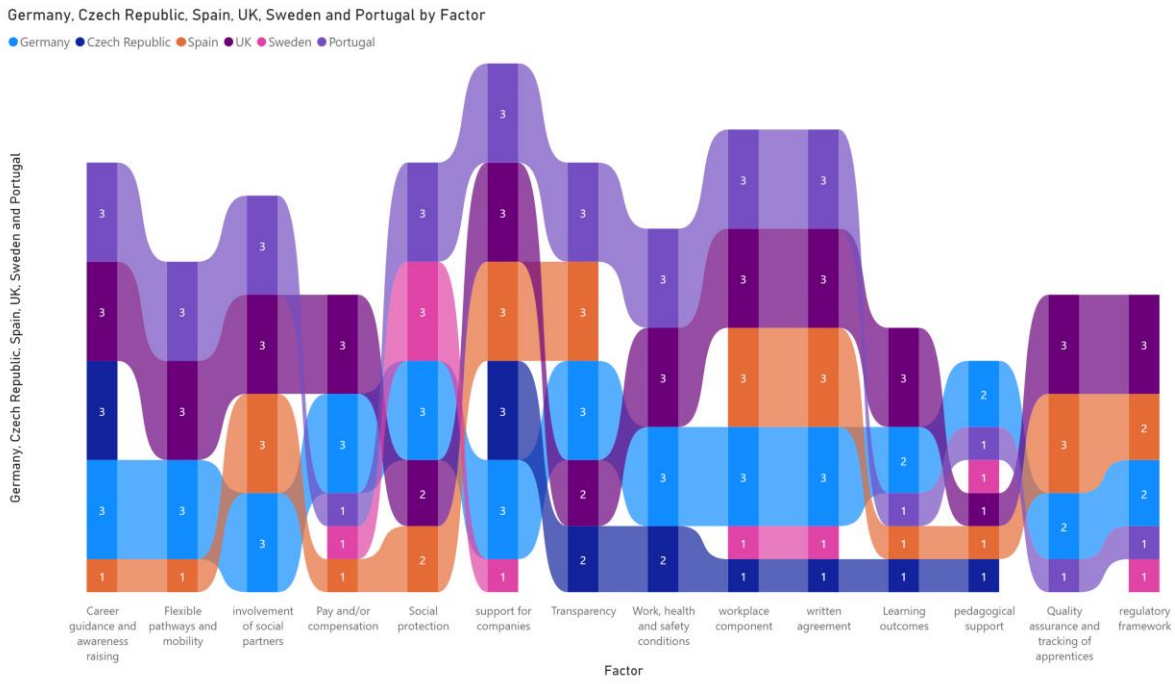



**Figure 7 Benchmarking the apprenticeship systems from six different countries**

## 4.2 IMPLICATIONS FOR APPRENTICESHIPS SERVING THE EU AUTOMOTIVE SECTOR

At present there are a number of aspects of the current apprenticeship market serving the EU automotive sector that impede efficient operation, with a number of factors potentially restricting labour mobility across the EU automotive sector. In particular:

- Some overall apprenticeship models are likely to encourage greater inter-industry mobility than other models. In relation to the countries focussed on in this Report it is possible to split apprenticeship models into two broad types[50] these being:
  - An approach towards apprenticeships that fits the criteria of an education and training system which is aimed at providing people with full competency and capability in an occupation or trade suitable for apprenticeships (Model A).
  - Apprenticeship as a type of VET delivery aimed at providing a diverse way to achieve formal VET qualifications by bringing people into the labour market (Model B).
- Countries that have adopted an approach towards apprenticeships that fits the criteria of Model A are likely to provide apprentices with greater prospects for mobility between companies than those counties adopting the Model B approach, typified by less regulation and greater variations in apprenticeship length and content.

- Labour mobility is currently further restricted by the wide inter-country variations, not only in terms of the overall apprenticeship models adopted, but in terms of patterns of school-company alternation, typical duration of apprenticeships, volume of in-company training per year, requirements placed on both employers and wider labour market stakeholders and age and educational level eligibility criteria.

- Based on research undertaken as part of the DRIVES project it is clear that within individual EU nations, skills provision serving the automotive sector can be characterised by a complicated mix of colleges, universities, private providers and employers' own training which can be particularly confusing for employers and potential trainees alike. Understanding and comparing different apprenticeship offers across different EU countries is currently a significantly more difficult challenge.

[50] See Apprenticeship Schemes in European countries – A cross-nation Review – CEDEFOP 2018

These challenges require innovative solutions to help both employers and trainees maximise the value of apprenticeships in meeting fast changing skill requirements.

**The EU apprenticeship market poses particular challenges for automotive SME's** (which are vital to the efficient functioning of the automotive supply chain) both in relation to greater difficulties in recruiting candidates which meet their particular needs and providing the required learning and development for their employees.

Specifically, SME's often struggle to provide apprenticeship opportunities. Some of the most common reasons cited for this include: a lack of training infrastructure and personnel to supervise apprentices, as well as insufficient expertise and capacity to manage complex rules, employment law and administrative requirements[51]. This implies the need for the development of innovative approaches to help SME's attract apprentices and support to ensure the capability to provide the required training support.

Recent action research undertaken as part of the EU Erasmus funded COTRAIN project[52] relating to collaborative approaches to apprenticeship training further underline the particular challenges SME's face and how collaborative arrangements can benefit apprentices, SME's and industry as a whole[53].

In relation to challenges faced by SME's trying to train apprentices alone the research[54] highlights issues relating to the:

- Increased workload apprenticeships generate;
- Involvement of in-company trainers;
- Impact of training on daily production activities;

[51] Services for Apprenticeships (SERFA) Erasmus Plus Project Transnational Report; Apprenticeships across eight European countries: Current situation, best practiceand SMEs' needs Prepared by Roland Löfflerand and Martin Mayerl (öibf) May 2017
https://www.serfa-project.eu/sites/default/files/upload/projet/transnational_report_final_version.pdf

[52] The idea behind developing the COTRAIN project was to contribute to increasing the quality of dual training, based on an understanding of the inadequacies of a "one-company one-training" model in relation to tackling skills mismatches

[53] 2019 joint Cedefopand OECD symposium: The next steps for apprenticeship; 7 October 2019, Paris: Creating collaborative training - Learning and working in a network of companies to meet training requirements more adequately; CoTrain; Cepag, Isabelle Michel, Education/Training Advisor COTRAIN project manager

[54] Creating Collaborative Training - Methodological guide; Edited by Isabelle Michel(CEPAG, Be)
https://www.cepag.be/sites/default/files/pages/methodological_guide_-_final_version_1.pdf

- Lack of resources of many SME's and that they often do not have all the equipment and machines required for teaching the occupation targeted.

Given the complex nature of supply chains associated with the companies in the automotive sector, it is also clear that SME's in particular are often quite specialised and therefore cannot provide apprentices with the range of skills in a work environment that might be appropriate to complete particular apprenticeship programmes.

The position of SME's undertaking vocational training in an industrial context using a 'one-company' vocational training system is summed up as[55], either SMEs cannot train apprentices, or if they train them, part of the training programme will not be covered on a real production line, with the necessary time to practice, repeat gestures and acquire skills.

The same research[56] also highlights how SME's (and other companies) can improve their training and education capacity through shared arrangements with other companies. In particular, such arrangements can make it possible for apprentices to gain a complete knowledge and awareness regarding the entire work process, from design to production and maintenance. Two case studies highlight different ways of trying to address these issues:

- Case study 13 highlights how a collaborative training agreement between two companies in Italy, one specialising in technical drawings and in innovative mechanical production technologies and the other in electric upsetting and forging benefited both the companies involved and the trainee[57].

- Case study 14 highlights a 'Shared Apprenticeship' training model in Wales where a central management organisation holds the responsibility of the apprentices training contract but where apprentices move between different employers who share the responsibility for the Apprentice's true work experience and performance criteria.

[55] Creating Collaborative Training - Methodological guide; Edited by Isabelle Michel(CEPAG, Be) https://www.cepag.be/sites/default/files/pages/methodological_guide_-_final_version_1.pdf
[56] Creating Collaborative Training - Methodological guide; Edited by Isabelle Michel(CEPAG, Be) https://www.cepag.be/sites/default/files/pages/methodological_guide_-_final_version_1.pdf

[57] Creating Collaborative Training - Methodological guide; Edited by Isabelle Michel(CEPAG, Be) https://www.cepag.be/sites/default/files/pages/methodological_guide_-_final_version_1.pdf

Increased globalisation has impacted across all sectors, but particularly in relation to the automotive sector, with **increasingly complex and global Supply Chain Management patterns**.

As automotive supply chains become increasingly globalised in nature, by contrast apprenticeships tend to be focussed nationally or even more locally, with wide variations in approach, delivery mechanisms, employer involvement and commitment. This poses challenges for employers when choosing whether to participate in the apprenticeship systems of those countries they operate in and for the mobility of apprentices seeking employment across national boundaries. Recognition of apprenticeships by different employers is also a problem in some cases.

Recent research undertaken in relation to the future direction of apprenticeships[58] highlights the challenges this can pose for apprenticeships. The report points out that many workers are employed in companies whose headquarters are in other countries, and hence their employers may or may not choose to participate in the apprenticeship systems of the country of operation.

This underlines the importance of developing a single market for automotive apprentices across the EU by linking regional, national and European apprenticeship initiatives.

Further work undertaken in Germany[59] has examined the different training strategies adopted by German companies operating in other countries. Case study 15 provides an example of how one German multinational automotive company has approached this issue by rolling out their German apprenticeship model to their operations in Mexico.

[58] Apprenticeships and 'future work': are we ready? Erica Smith; First published: 21 January 2019 https://doi.org/10.1111/ijtd.12145

[59] Fachkräftesicherung deutscher Unternehmen im Ausland –Erfahrungen bei der Übertragung dualer Ausbildungselemente Unterstützt durch die Robert-Bosch-Stiftung
Körbel, Markus; Pierenkemper, Sarah; Zibrowius, Michael
Institut der deutschen Wirtschaft Köln

# 5 THE EU AUTOMOTIVE APPRENTICESHIP MARKETPLACE

This chapter uses a range of different sources to draw up a picture of the current apprenticeship market place serving the EU automotive industry including:

- Results of a major online survey of automotive employers undertaken as part of the DRIVES Project[60] which provides direct feedback from employers and stakeholders with respect to the current apprenticeship market place within the automotive sector.

- Results of an online survey of VET providers supporting the automotive sector undertaken as part of the DRIVES Project[61] which provides direct feedback from VET providers involved in delivering training to support the automotive sector.

- Detailed analysis of the specific apprenticeship offer serving the automotive sector in three selected countries, these being the UK (England) Germany and Portugal based on research undertaken as part of this Report.

## 5.1 FEEDBACK FROM AUTOMOTIVE EMPLOYERS IN RELATION TO APPRENTICESHIPS

A key component of the DRIVES project has been the gathering of direct feedback from employers and stakeholders. This has been achieved through a major online survey of employers undertaken as part of the DRIVES Project.

The survey included a number of questions relating directly to apprenticeships which provide valuable insights into the current apprenticeship market place within the EU automotive sector, particularly in relation to:

- The uptake of apprenticeships within the sector
- Expectations in relation to uptake over the next 5 years

[60] Insights of the Automotive Sector2019 - Deliverable 2.7 Forecasting Dissemination Report Christian Baio, SPIN360, Jakub Stolfa, VSB-TUO, Svatopluk Stolfa, VSB-TUO https://www.project-drives.eu/Media/Publications/6/Publications_6_20190717_81413.pdf

[61] See DRIVES D2.8 SKILLS NEEDS AND GAPS, Christian Baio, Spin360, 2020

- The current and likely future occupational profile of apprentices
- Methods of recruitment, effectiveness of these methods and recruitment challenges

### 5.1.1 The uptake of apprenticeships within the sector

Figure 8 indicates that 39% of all automotive enterprises responding to the survey employed at least one apprentice. Of these, almost 6 in 10 enterprises (59%) employed 10 or fewer apprentices, almost a fifth (19%) employed between 11-49 apprentices and a total of 22% employed 50 or more apprentices.

**Number of apprentices currently employed**

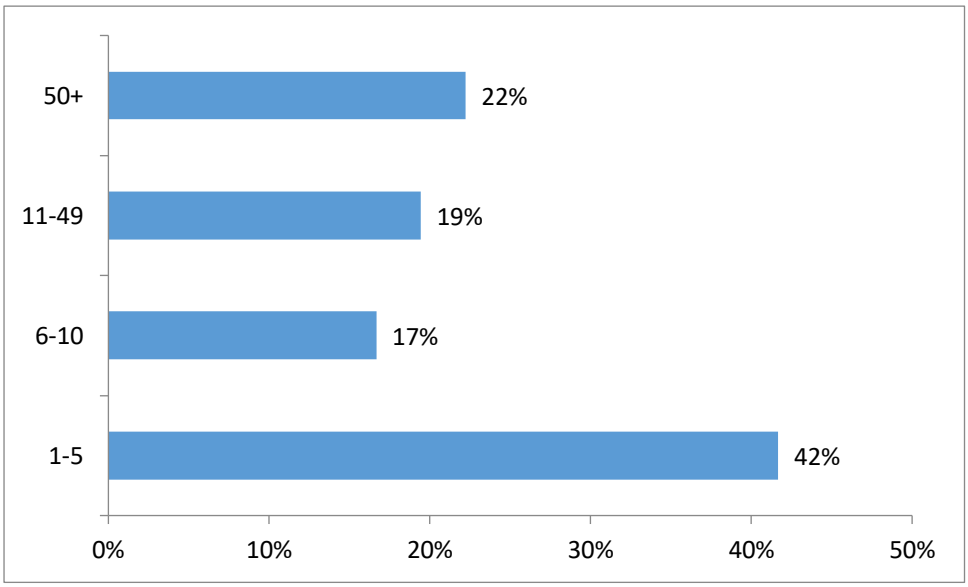



**Figure 8 Number of apprentices currently employed[62]**

*Base: 72 respondents employing at least one apprentice*

Participation levels in the apprenticeship system is strongly linked to enterprise size. The relatively low proportion of micro enterprises (14%) employing apprentices is likely to be linked to the well documented challenges faced by small companies in terms of employing apprentices, including difficulties faced recruiting apprentices as well as providing the learning and development support required (See Figure 9).

[62] DRIVES WP2 Survey

**Percentage of all enterprises employing at least one apprentice by enterprise size**

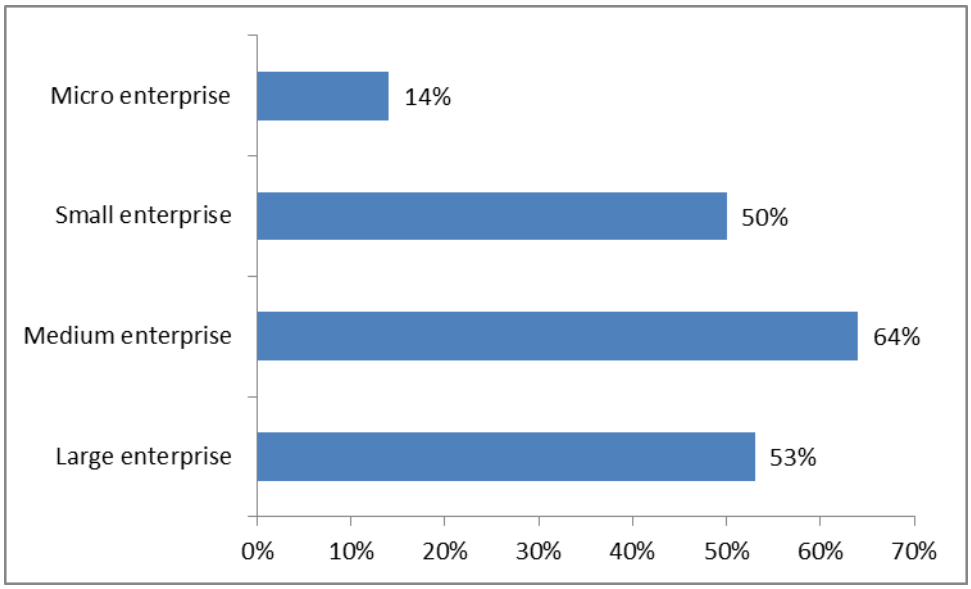



Figure 9 Percentage of all enterprises employing at least one apprentice by enterprise size[63]

Not surprisingly, the number of apprentices employed is also strongly linked to enterprise size, with the likelihood of employing any apprentices increasing as enterprise size increases together, with the likelihood of employing a greater number of apprentices (See Figure 10).

**Number of apprentices by enterprise size**

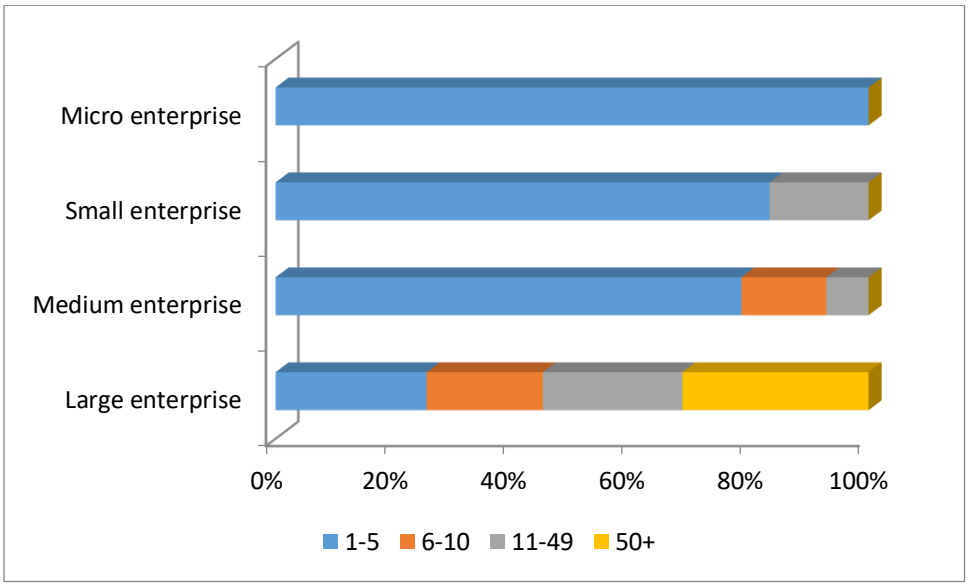



Figure 10 Number of apprentices by enterprise size[64]

*Base: 72 respondents employing at least one apprentice*

[63] DRIVES WP2 Survey

[64] DRIVES WP2 Survey

Analysis of apprenticeship participation by sub sector[65] points to participation of enterprises across all key areas of the automotive value chain.

### 5.1.2 Expectations in relation to future apprenticeship uptake

95 enterprises responded to the question, 'what do you expect to happen to the number of apprentices you employ over the next 5 years?' Of these enterprises, just over half expected numbers to remain stable over this period, but a significant positive net balance of enterprises expected an increase, or significant increase, rather than a decrease, or significant decrease (a positive net balance of +46% (See Figure 11).

**What do you expect to happen to the number of apprentices you employ over the next 5 years?**

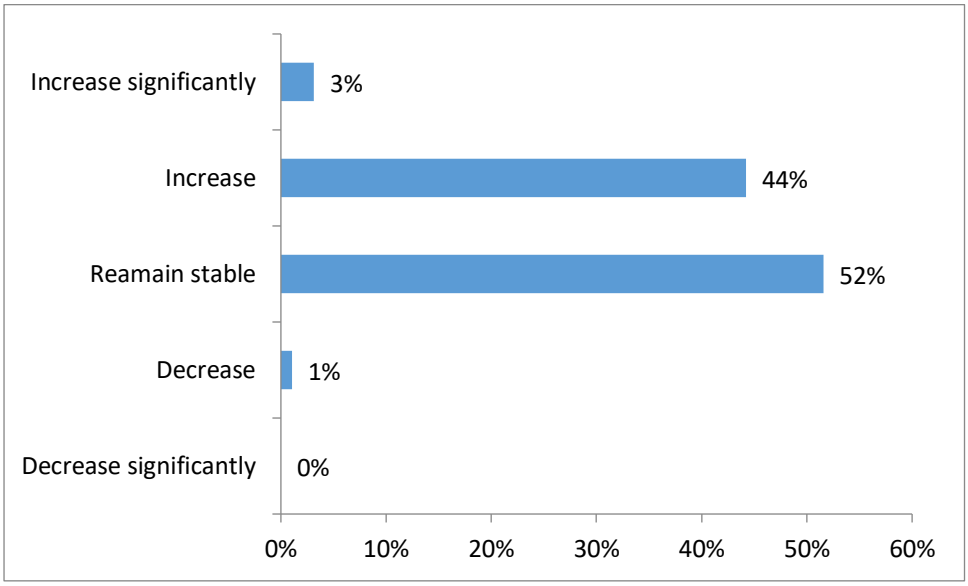



**Figure 11 What do you expect to happen to the number of apprentices you employ over the next 5 years?[66]**

### 5.1.3 The current and likely future occupational profile of apprentices

Survey respondents indicate apprentices are employed in a wide range of roles including:

- Engineering related roles (Mechatronics, innovation, design, development, maintenance, process and product)

[65] NACE code
[66] DRIVES WP2 Survey

- Production
- Quality and testing
- CAD
- R & D
- Specific technical roles (rubber production, welding)
- Sales/customer service
- Logistics
- IT/Data management
- HR/administrative

When enterprises were asked to indicate what new roles they thought there might be opportunities to recruit apprentices into over the next 5 years, a wide range of suggestions were made.

These were a mixture of:

- Roles already common place throughout the automotive sector, including engineering functions; sales/after sales; design; IT; assembly/production; maintenance; logistics; accounts/ finance/ administration and hardware/software expertise

- Emerging roles or roles less well known currently, including virtual reality; digital roles; big data analytics; robotics and sensory fusion (often linked to autonomous vehicles).

### 5.1.4 Methods of recruitment, effectiveness of methods and recruitment challenges

Figure 12 indicates that the most frequently cited methods to recruit apprentices were use of 'links with educational institutes or training providers' (64% of all respondents) and 'on line job boards and websites' (63%). This was followed by 'recruitment events' and 'social networks, such as Facebook and LinkedIn' (47%).

More than a third of enterprises responding indicated more informal 'word of mouth' (35%) methods were used and 12% used 'advertising in newspapers/other press'.

By far the least frequently used method was 'use of the Drop'pin@EURES or other EU recruitment services' (2%), probably linked to the relatively localised focus of much apprenticeship recruitment.

**What are the main methods currently used by your organisation to recruit apprentices?**

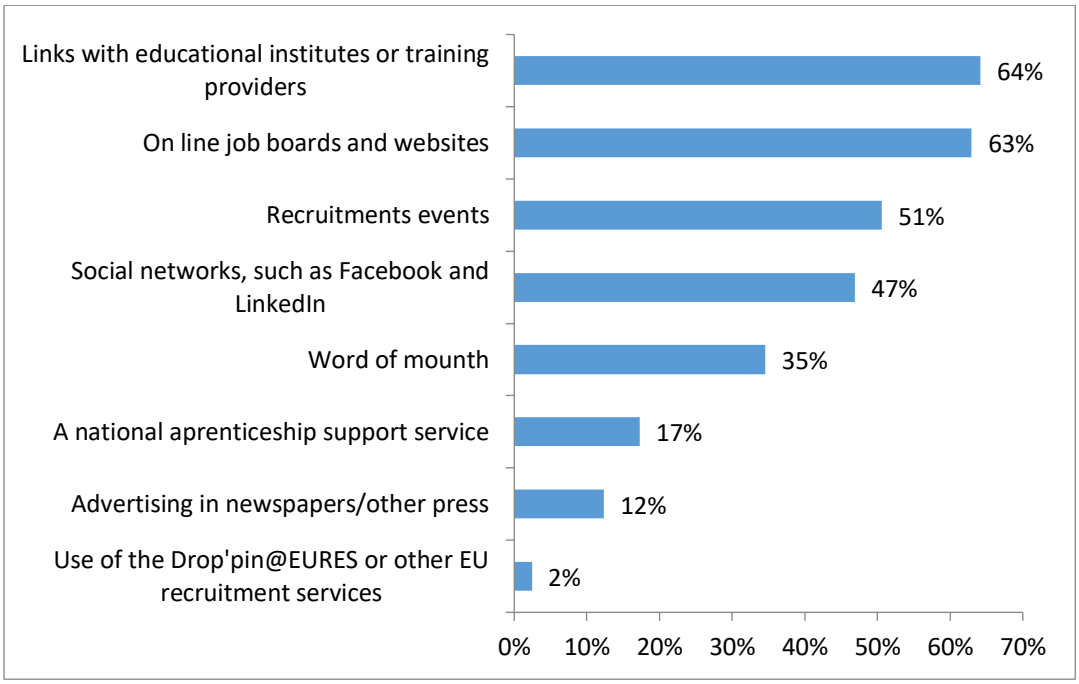



**Figure 12 What are the main methods currently used by your organisation to recruit apprentices?**[67]

*Base: 81 enterprises responding to the question*

*Note: Enterprises often used more than one method, so % figures do not add to 100%*

Respondents were generally satisfied with the methods used to recruit apprentices as outlined in Figure 13. When those enterprises employing apprentices were asked about the effectiveness of methods currently used to recruit apprentices, a positive net balance of +79% indicated these methods were effective, or very effective, rather than not effective, or not effective at all. Just over a fifth of respondents had no opinion either way on this.

However, almost two thirds (63%) of these enterprises answered yes to the question, 'would your organisation be interested in a service that matches apprenticeship candidates with vacancies in your organisation and other companies in the automotive sector?' - pointing to widespread recognition of the potential to improve current recruitment approaches.

[67] DRIVES WP2 Survey

**Overall, how effective would you say the methods you currently use to recruit apprentices are?**

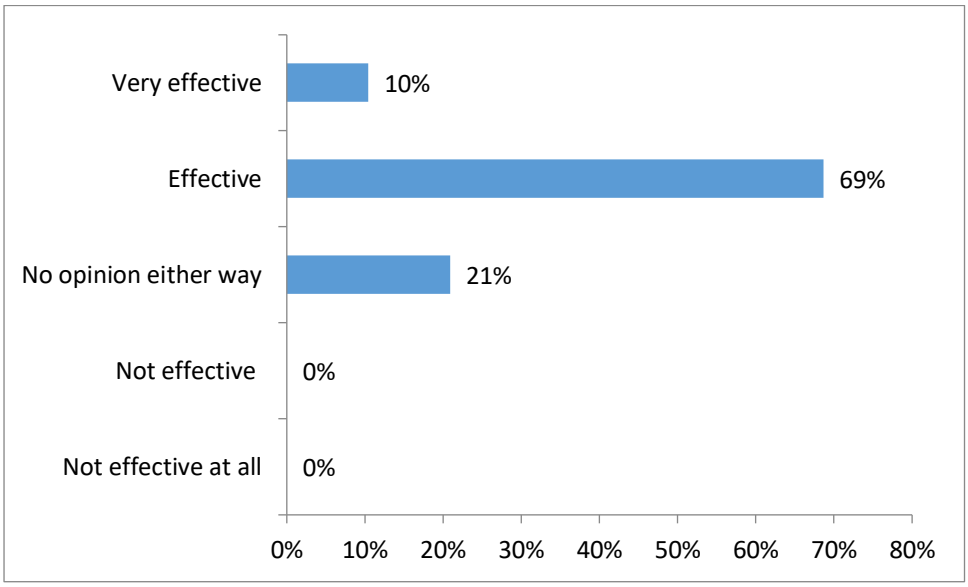



**Figure 13 Overall, how effective would you say the methods you currently use to recruit apprentices are?**[68]

*Base: 67 respondents employing at least one apprentice and responding to the question*

A wide range of issues were cited by enterprises in relation to challenges faced[69] when recruiting including:

- The need to make the sector more attractive to young people/lack of interest amongst young people
- Finding recruits with the right attitude
- Competition for the best candidates/with other companies
- Lack of existing apprenticeships in certain EU countries
- Difficulties accessing accurate information on the profile, skills and competences of candidates/evaluating the potential of candidates
- Internal company limitations/capabilities
- Lack of IAG/careers advice in schools
- Lack of certain skills amongst candidates (language skills, soft skills, specific technical skills)
- Difficulties combining class based and company based schedules

[68] DRIVES WP2 Survey

[69] There were 38 responses to this question

## 5.2 FEEDBACK FROM VET PROVIDERS

The results of an online survey of VET providers undertaken as part of the DRIVES Project provide an insight into the prevalence of apprenticeship provision serving the automotive sector. The survey indicates that:

- Just over half of VET organisations responding to the survey indicated that they currently offer courses for Apprentices within the Automotive sector. Looking at the apprenticeship offer in more detail, almost half of these organisations offer this provision at EQF level 3, more than 8 in 10 at EQF level 4, 22% at level 5, 19% at level 6 and 7% at level 7.

- A quarter of private companies responding to the survey currently offer courses for Apprentices within the Automotive sector, with half indicating this was not the case and the remaining quarter didn't know. 67% of those private companies offering this provision do so at EQF level 3, all at EQF level 4, 33% at level 5 and the same proportion at 6.

## 5.3 DETAILED ANALYSIS OF THE SPECIFIC APPRENTICESHIP OFFER SERVING THE AUTOMOTIVE SECTOR IN THREE SELECTED COUNTRIES

This section sets out the results of analysis of the specific apprenticeship offer serving the automotive sector in three selected countries, these being the UK (England) Germany and Portugal.

The countries were selected as they have each developed different approaches to apprenticeships generally and have strong automotive sectors. The analysis has been undertaken in order to:

- Provide a more detailed understanding of the specific apprenticeship offer serving the automotive sector in these three selected countries

- Provide an insight into the scale of apprenticeship take up in relation to the automotive sector relative to the size of the workforce

- Examine the respective focus of the current apprenticeship offer in relation to educational level

- Identify the extent to which the current apprenticeship offer is addressing new and emerging skills rather than traditional skills associated with the sector.

Apprenticeship data relating to uptake on to automotive apprenticeships or those strongly related to the automotive sector were examined. Taking the latest year the data was available for from each country a combined total of just over 71,000 relevent apprentice starts were recorded, 62% from Germany, 32% from England and 1% from Portugal.

Just over a quarter of these apprenticeships were accounted for by those supporting the automotive sector directly rather than a wider range of sectors including the automotive sector.

While this analysis should only be treated as indicative it does provide an insight as to the current scale of apprenticeship training and the focus of this training in relation to different skill areas and EQF levels.

If those apprenticeships supporting the automotive sector directly are considered it is clear that almost all current provision focusses on EQF levels 4 and below (98% of apprenticeship starts) with only 2% of this provision at EQF level 5 or above measured on this basis.

In terms of skill areas, more work is planned as part of the DRIVES project to try and identify the extent to which the current offer is meeting new and emerging skill requirements. However, there is some evidence that the apprenticeship offer is evolving to try and meet new skills. For example, in England, for R&D technology/vehicle development, the existing apprenticeship offer includes Level 6 Product Design and Development Engineer, Level 6 Control Technical Support Engineer and Level 6 Electrical/Electronic Technical Support Engineer Apprenticeships. For Software Engineers, Data Analysts and Network Engineers a Level 6 Digital and Technology Solutions apprenticeship is available..

Apprenticeships relating to Automation and Controls Engineer Technician (Approved July 2019), Lean Manufacturing Operative (Approved July 2019) and Propulsion Technician (Approved September 2018) have also recently been approved but these are, for the most part, not reflected in available apprenticeship start data yet.

# 6 CONCLUSIONS AND MOVING FORWARD

This Report has been developed in order to underpin practical action and intervention within the EU automotive apprenticeship marketplace.

A number of potential practical actions to try and tackle issues set out in this report are suggested, which can be summed up under four main headings:

**1. Set up a centralised resource with examples of good practice**

A number of examples of innovative practice have been highlighted in the Report including in relation to dealing with the challenges faced by SME's, implementing apprenticeships across national borders, initiatives aimed at tackling diversity issues, and responding to industry 4.0. A range of easily accessible examples of particular relevance to the automotive sector located on one site would provide a valuable resource for employers, providers and others involved in trying to develop and implement apprenticeships to meet the fast changing requirements of the sector.

Setting up such a centralised resource clearly has potential links with the DRIVES Apprenticeship LinkedIn Group (DAAN)[70] and would need to build on and be undertaken in collaboration with the European Alliance for Apprenticeships (EAfA)[71] and CEDEFOP[72] to ensure existing resources are maximised.

[70] The DRIVES WP5.1 DAAN LinkedIn Group has been established in order to share ideas, approaches and activities pertaining to apprenticeships in the EU's automotive sector. This forum welcomes contributions that relate to both youth and adult apprenticeships.

[71] The European Alliance for Apprenticeships (EAfA) is a multi-stakeholder platform aiming at:

- Strengthening the **quality, supply and image** of apprenticeships in Europe
- Promoting the **mobility of apprentices**

These aims are promoted through **national commitments** and **voluntary pledges** from stakeholders.
https://ec.europa.eu/social/main.jsp?catId=1147&intPageId=5235&langId=en

[72] https://www.cedefop.europa.eu/en

**2. Establish an intelligence service to track skills changes for employers and providers and act as an accessible resource for both employers and providers.**

The difficulties faced by both employers and providers in identifying how automotive sector related skills are changing and the implications of these changes for provision is well documented in this report.

An important aspect of work being undertaken as part of the DRIVES Project is how key outcomes from the Project can be sustained after funding ceases. Establishing self-sustaining, forward looking automotive skills intelligence service needs to be an important component of DRIVES Sustainability plans. This would help employers, providers and other stakeholders identify how the current apprenticeship (and other training) needs to adapt to meet changing skill requirements.

**3. Establish an Apprenticeship comparison tool to try and help both employers and individuals** to navigate the confusing apprenticeship landscape and compare offers in different countries.

As this report has identified such comparison is very difficult at present. A key component of the DRIVES Project is the establishment of an online brokerage tool to source training serving specific new and evolving job roles within the EU automotive sector. The purpose of this tool is to simplify the search and matching of training with the needs of the automotive sector and to widen access to all stakeholders. This is termed the DRIVES Framework. It has been agreed that the scope of the Framework will be extended to encompass apprenticeships in order to help comparison of different apprenticeship offers. It is envisaged this will enable simple comparison between different apprenticeships in relation to:

- EQF level
- Job role(s) covered
- Occupation(s) covered
- Relevant skills/skills domains
- Duration of apprenticeship
- Countries apprenticeship is available
- Provider type/location

4. **Adopting more innovative ways of designing apprenticeships** such as ensuring increased flexibility, just in time design to respond to rapid skill changes, and making sure the apprenticeship offer supports upskilling of existing employees as well as new entrants to the sector. As a basis for discussion we have put forward one suggestion highlighting how the design of apprenticeships could be improved by adopting an approach comprising self-contained modules which would make it easier for employers and trainees to opt into the specific skills they require. Case study 16 in the Appendix outlines these ideas.

The Table below summarises the key issues identified in the Report under 12 key themes, these being:

- The pace of skills change
- The impact of skills change on different educational levels
- The importance of upskilling of existing employees
- The specific nature of skill changes
- Apprenticeships need to reflect employer needs
- The implications of Industry 4.0
- The confusing nature of the current apprenticeship offer
- The need to encourage learning from good practice
- The need to improve the image of the sector
- The need to encourage greater workforce diversity
- Challenges faced by SME's
- The global nature of the automotive industry versus the local focus of apprenticeships

Against each of these issues the Table sets out more detailed initial ideas on practical actions designed to tackle the specific issue and/or case studies highlighting innovative ways which have been put in place to try and tackle the issues highlighted.

**Summary of issues and potential solutions**

| Theme | Specific issues to be addressed | Potential solutions |
|---|---|---|
| The pace of skills change | The pace of technological change is increasing which impacts on the rate of skills change. This means:<br>• It is difficult for providers to keep abreast of changing skill requirements<br>• Future skill requirements are difficult for employers to predict<br>• Apprenticeships need to be flexible enough to adapt to these changes without long delays | Establish an intelligence service to track skills changes for employers and providers and act as an accessible resource for both employers and providers.<br>This could be achieved by taking forward the idea of establishing such a service as part of the DRIVES Sustainability plans.<br><br>Case study 1 provides a good example of how apprenticeship training for Automotive Business Administrators in Germany has recently been updated to reflect fast changing skill requirements.<br>Case study 2 provides an example of how a company in Austria ensures training of students who are potential future employees are involved in learning about the latest technologies and challenges facing the company |

| | | |
|---|---|---|
| The impact of skills change on different educational levels | Skills change will impact at all educational levels. In a number of EU countries the historical focus of apprenticeships has been on entry level/lower level skills. Whilst this is very important, the impact of skills changes will be felt at all levels, including higher levels. This needs to be reflected in the apprenticeship offer | Develop apprenticeship offers that straddle all levels.<br>The introduction of Degree Apprenticeships in England together with those Degree Apprenticeships of particular relevance to the automotive sector is set out as case study 3. |
| The importance of upskilling of existing employees | Upskilling of existing employees is at least as important as support for new entrants. This implies the need for the apprenticeship offer to support clear progression routes to higher skills levels | Case study 4 provides an example of an innovative approach to encouraging smooth progression from entry level through to higher Apprenticeship levels in Wales (UK). |
| The specific nature of skill changes | A number of specialist skills are emerging as technology changes within the industry. This implies employers need tailored; often bite sized solutions to meet their needs. This has implications for the design of apprenticeships, with a degree of flexibility required. | Case study 5 provides an example of a university in Austria working with employers to help employees meet the particular challenges each employer faces |

| | | |
|---|---|---|
| Apprenticeships need to reflect employer needs | Apprenticeships need to balance the need for equipping apprentices with the skills required for successful careers in the automotive industry with the need to meet employers specific changing skill requirements | Involve both employers and providers (colleges, schools, universities and others) directly in the design of automotive apprenticeships.<br>Case study 6 provides an example of the Automotive Trailblazer Employer Group in England established to drive the design of apprenticeships to meet the specific skill requirements of the automotive sector.<br>Case study 7 provides an example from Belgium of a programme serving the automotive aftersales sector that involves close dialogue between schools, automotive retailers/dealerships, major automotive brands and a specialist provider. |
| The implications of Industry 4.0 | These changes are likely to imply the need to attract a higher level of applicant in order to be able to learn rapidly as jobs evolve and also the need to revise qualifications to take account of Industry 4.0 changes.<br><br>There are also significant implications of digitalisation in relation to the way apprenticeships should be delivered in the future, in particular the increased use of digital technologies as part of the | Two case studies, one from Spain and one from Finland provide good examples of initiatives developed to tackle the growing need for digital skills within the automotive industry within the EU.<br>• Case study 8 provides an example of an international learning programme for current workforce upskilling and young graduate digital talent attraction in the automotive industry, based in Spain |

| | | |
|---|---|---|
| | delivery of apprenticeship programmes. | • Case study 9 provides an example of a digital academy established in Finland<br>• Case study 10 provides a good example of the innovative use of e learning in relation to two trainees within a German metalworking company. |
| The confusing nature of the current apprenticeship offer | The current apprenticeship provision is complicated for both potential apprentices and employers to navigate, particularly when trying to compare the different apprenticeship offers of different nations. For individuals it is difficult to know what apprenticeships will be recognised between different countries. For international automotive companies it is difficult to manage apprenticeship requirements between different countries | Establish an Apprenticeship comparison tool to try and help both employers and individuals navigate the confusing apprenticeship landscape and compare offers in different countries.<br><br>A key component of the DRIVES Project is the establishment of an online brokerage tool to source training serving specific new and evolving job roles within the EU automotive sector. It has been agreed that the scope of the Framework will be extended to encompass apprenticeships in order to help comparison of different apprenticeship offers. The tool could be developed to enable simple comparison between different apprenticeships in relation to:<br>• EQF level<br>• Job role(s) covered |

| | | |
|---|---|---|
| | | • Occupation(s) covered<br>• Relevant skills/skills domains<br>• Duration of apprenticeship<br>• Countries apprenticeship is available<br>• Provider type/location |
| The need to encourage learning from good practice | There are a wide range of examples of good practice within the automotive sector with respect to apprenticeships across Europe. However, there is currently no structured system of disseminating this good practice and no central source of good practice information serving the sector. | Develop a cross EU tool to capture and disseminate apprenticeship good practice within the automotive sector. A range of easily accessible examples of particular relevance to the automotive sector located on one site would provide a valuable resource for employers, providers and others involved in trying to develop and implement apprenticeships to meet the fast changing requirements of the sector.<br>Setting up such a centralised resource clearly has potential links with the DRIVES LinkedIn Group (DAAN) and potential links with the work of the European Alliance for Apprenticeships (EAfA). |
| The need to improve the image of the sector | It is well documented that the automotive sector suffers from a poor image amongst young people. Innovative solutions are required to address this. | Highlight good practice in terms of work with schools/young people. This could be included in the proposed good practice tool set out above.<br>As an output from DRIVES (a) produce a well-designed document/infographic highlighting the exciting |

| | | |
|---|---|---|
| | | opportunities emerging in the automotive sector (b) Develop this in other mediums.<br>Link the above to DRIVES dissemination work programme (WP6)<br>Case study 11 highlights how a national campaign in the UK to encourage more young people to consider a career as a technician links up with World Skills UK to showcase jobs young people may not have considered in order to try and attract young people into the automotive and other industries employing technicians. |
| The need to encourage greater workforce diversity | There is a clear gender imbalance across the automotive sector as a whole and particularly in relation to certain occupations and more could be done to ensure the industry is an attractive option for all groups. In order to tackle changing future recruitment and skills challenges effectively it will be crucial that steps are taken to ensure the skills of all demographic groups are maximised. | Case study 12 provides an example from Germany of a programme to successfully encourage refugees into the industry. |

| | | |
|---|---|---|
| Challenges faced by SME's | Lack of capacity of many SME's often restricts involvement with apprenticeships. This includes difficulties faced recruiting apprentices as well as providing the learning and development support required.<br>Many SME's also struggle to offer the range of skills required in a work setting, given their particular specialisms | Provide collaborative and shared apprenticeship opportunities. Two particular case studies highlight different ways of trying to address these issues:<br>Case study 13 highlights how a collaborative training agreement between two companies in Italy, one specialising in technical drawings and in innovative mechanical production technologies and the other in electric upsetting and forging benefited both the companies involved and the trainee.<br>Case study 14 highlights a 'Shared Apprenticeship' training model in Wales where a central management organisation holds the responsibility of the apprentices training contract but where apprentices move between different employers who share the responsibility for the Apprentice's true work experience and performance criteria. |

| | | |
|---|---|---|
| The global nature of the automotive industry versus the local focus of apprenticeships | As automotive supply chains become increasingly globalised in nature, by contrast, apprenticeships tend to be focussed nationally or even more locally, with wide variations in approach, delivery mechanisms, employer involvement and commitment. This poses particular challenges for employers when choosing whether to participate in the apprenticeship systems of those countries they operate in and for the mobility of apprentices seeking employment across national boundaries. Recognition of apprenticeships by different employers is also a problem in some cases. | Encourage development of internationally recognised apprenticeships<br>Encourage adoption of a 'pan-European approach to apprenticeship design<br><br>Case study 15 provides an example of how one German multinational automotive company has approached this issue by rolling out their own German apprenticeship model to their operations in Mexico. |

# 7 APPENDICES

## 7.1 APPENDIX 1 - CASE STUDIES

**Case study 1: Updating of Apprenticeship training for Automotive Business Administrators (Germany)**

This case study provides a good example of how apprenticeship training for Automotive Business Administrators in Germany has recently been updated to reflect fast changing skill requirements[73].

Automobile Business Administrators work predominantly in car dealerships but also at vehicle importers and with automotive manufacturers.

The number of trainees has increased continually since the introduction of the training occupation in 1998. In 2016, over 5,100 people signed a new training contract as an Automobile Business Administrator.

The Federal Institute for Vocational Education and Training (BIBB) has updated the apprenticeship for Automobile Business Administrators in order to reflect changing employer requirements. This provides a good example of an automotive related apprenticeship that has been adapted and updated to meet identified changes in skill requirements.

These changes include greater involvement of the different areas of operation. For example, training in relation to customer service and servicing has been further developed to include aspects of customer mobility and the use of digital information systems. Greater emphasis has also been placed on communication skills, changes to legal frameworks, data protection and data security. An increased focus on sustainability and environmental awareness in relation to the disposal of vehicle components and operating with materials in an environmentally friendly manner has also been introduced.

[73] https://www.bibb.de/en/pressemitteilung_60884.php

The updated Apprenticeship has been structured to focus on competencies in relation to company-based working and business processes[74]. All trainees experience the main areas of the operation — parts and accessories, workshop, customer service and servicing, marketing, vehicle trade and distribution, financial services, personnel, and commercial management and control. The current division into areas of operation has been removed.

[74] P. Vroonhof, N. Durazzi, J. Secher, J. Stoumann, S. Broek, L. de Haan, I. van den Ende and S. van Loo, "Business cooperating with vocational education and training providers for quality skills and attractive futures" doi: 10.2767/231864, European Union, 2017.

**Case study 2: AVL System Engineering Labour (Austria)**

AVL is an Austrian-based automotive consulting company and independent research institute. AVL List GmbH is the world's largest independent company for the development, simulation and testing of all types of powertrain systems (hybrid, combustion engine, transmission, electric drive, batteries, fuel cell and control technology), and integration into the vehicle, with more than 10,400 employees worldwide. AVL is increasingly taking on new tasks in the field of assisted and autonomous driving as well as data intelligence. The company provides industry-leading technologies and services based on highest quality and innovation standards to help customers reduce complexity and add value.

AVLs SE (Sytems Engineering) Labor [75] is a training initiative geared towards brand integration and specific skill training of students prior to employment in AVLs skill teams. The SE Lab Group is not directly involved in daily company business, but run independently on a self-organised basis by participating students. Through this initiative, participating students can develop their individual skills and fields of interest, while at the same time experiencing the different areas of expertise of the development teams in order to establish the best fit between teams and individuals.

The SE Lab currently comprises 33 Students (ranging from EQF level 5 to 7), working on more than 20 projects across 23 divisions of all AVL departments. The students (and potential future employees) come from various fields of studies ranging from computer science & engineering to economics & law and are embedded in an interdisciplinary working environment to support their scientific work, thesis and dissertations, as well as providing Systems Engineering services for the AVL company divisions.

The overall approach of the SE Lab is to maximise the benefits of cross-divisional networks and constant exchange of students. This is achieved through self-managed project work combined with comprehensive project documentation through implementation of continuous mutual training of the students and engineers across departments, together with in-depth collaboration across AVL business units.

The overall aim of the SE Lab is to support the establishment of holistic Systems Engineering approaches across all AVL business units[76]. Development and testing of advanced SE methods,

[75] AVL List GmbH Info-Flyer, Innovators and Incubators Workshop Graz, 2018.
[76] AVL 4Weeks November 2016

processes and tools in an industrial context together with SE knowledge gain through cross-divisional exchange of ideas are seen as key benefits of this approach. The second important aspect for the SE Lab initiative is identified as the education of future Systems Engineers and development of connections between established teams, together with scientific students and young researchers in order to support all AVL employees.

**Case study 3 – Degree Apprenticeships (England)**

This case study provides a good example of how the apprenticeship offer in England is adapting to higher level skill requirements including those relevant to the automotive sector.

'Higher Apprenticeships' were introduced in England in 2010 and refer to all apprenticeships in England that include the achievement of academic and vocational qualifications from UK Level 4 up to bachelor's and master's degree at level 6-7[77].

Degree Apprenticeships are the latest model to be developed as part of higher apprenticeship standards and were introduced in England in 2015, giving apprentices the opportunity to achieve a full bachelor's or master's degree (Levels 6 and 7) as a core component of the apprenticeship[78].

Both Higher and Degree Apprenticeships must last a minimum of one year, but Degree Apprenticeships will typically last up to four years, although there is no fixed maximum duration[79].

The key aspect of Degree Apprenticeships can be summarised as follows[80]:

- They are designed to introduce students into the world of work and fill high-level skills gaps by tailoring learning to specific business needs.
- They combine full-time paid work and part-time university study to offer candidates the opportunity to gain a full Bachelors or Master's degree while partaking in practical, on-the-job training.
- They are created by partnerships between employers and universities or colleges.
- Candidates study using whichever flexible study method suits their employer's needs – this can include distance learning, blended learning or block mode learning (where the apprentice takes a period of full-time study away from their full-time work).
- Apprentices hold full-time employment status rather than student status. However, while higher apprentices have the option to gain a Bachelors-level qualification, university study is mandatory in degree apprenticeships.

[77] Level 4 in the UK is equivalent to EQF levels 4 or 5 and UK level 6 and 7 are equivalent to the same EQF levels
[78] https://www.allaboutschoolleavers.co.uk/articles/article/288/what-is-a-degree-apprenticeship

[79] https://www.allaboutschoolleavers.co.uk/articles/article/288/what-is-a-degree-apprenticeship

[80] https://www.prospects.ac.uk/jobs-and-work-experience/apprenticeships/degree-apprenticeships

- As well as receiving a wage throughout the course, an apprentice's tuition fees and training costs are settled between their education institution and employer.

Degree apprenticeships currently developed that are of particular relevance to the automotive sector, given the skills and knowledge sets they cover include[81]:

- Electrical / Electronic Technical Support Engineer
- Embedded Electronic Systems Design and Development Engineer
- Manufacturing Engineer
- Non-Destructive Testing Engineer
- Product Design and Development Engineer
- Systems Engineering

[81] https://www.instituteforapprenticeships.org/apprenticeship-standards/

**Case study 4: Pathways to Apprenticeship/Enhanced Engineering Programmes of Study**

This case study provides an example of an innovative approach to encouraging smooth progression from entry level through to higher Apprenticeship levels. The Advanced Engineering, Pathways to Apprenticeship Study programmes were introduced across Wales, UK from 2012 as a pilot initiative introducing an intensive, Further Education College (FEC) option for young people preparing them for an apprenticeship placement with an employer. It is a year-long training programme for learners aged between 16 and 25 to fast-track them through a UK Level 2 Apprenticeship Framework (EQF level 3), allowing seamless progression directly into a Level 3 or Level 4 Apprenticeship under an employed status. Its innovative design allowed the Level 2 Framework to consist of either a Level 2 or Level 3 Knowledge Qualification coupled to a Level 2 Competence Skills Qualification.

The FECs are approved by Awarding Organisations, due to their resources, as acceptable “sheltered working” environments allowing all programme content to be accessed as if the actions were taking place in a true working environment and all learners attended a work placement for 20% of the programme.

Employers are involved throughout; from planning of content (Knowledge and Competence Modular Design), through to the review and evaluation in an effort to guarantee the learner has the correct attributes to support business needs immediately upon employed status.
Learners were subsidised through Government Grants to attend with no cost to the employer, allowing hard and soft skills gained to be assessed directly by employers.

Due to its successful outcomes and outputs, in 2016 the pilot programme was renamed as the Enhanced Engineering Programme and accepted as a main important element of Apprenticeship design and implementation in Wales.

Key aspects of the programme are:

- Employer Designed
- No Employer Cost
- Right Trainee - Right Time – Right Employer
- Caters for entry ability of Learners to progress at relevant pace for industry need

**Case study 5: TU Graz Life Long Learning (Austria)**

This case study provides an example of a university in Austria working with employers to help employees meet the particular challenges each employer faces. The case study focuses on Life Long Learning at TU Graz[82] for university-level continuing education in engineering and science subjects. Courses are designed by focusing on the needs of target groups in an industrial context and developing innovative subjects and formats to meet those needs. Training is also designed using up-to-the-minute teaching and learning technologies developed at TU Graz to create flexible learning settings on site. TU Graz supports companies in bringing their staff up to date with the latest developments in science, commerce and technology. Therefore, continuing education courses can also be organised as in-house training sessions. Furthermore, companies can talk to lecturers and adapt the courses to their individual needs. Together with selected partners, TU Graz offers a continuing education programme with several types of courses. The courses are designed for university and college graduates, experts from industry and TU Graz students. On completion of these courses trainees receive either a certificate of attendance, confirming that they have taken the course, or a TU Graz certificate, if the course ends with an examination. Also, European-wide Certificates (such as ECQA Certified Automotive Quality Manager) are available[83]. These courses and seminars cover a wide range of subjects and have a large practical component, such as:

- AI Essentials
- Automotive Mechatronics
- Automotive Quality Manager
- Big Data Essentials
- High Voltage Engineering: Principles and Practical Application
- International Welding Engineer
- Introduction to Electric Drive Systems

Additionally, part-time master's programmes and university programmes give graduates with relevant degrees and skilled personnel with several years of relevant professional experience in their field the opportunity to gain further qualifications in their area of expertise, or develop a specialisation. The programmes are blocked over a period of several semesters, which means that they are ideal for students who are already working. Some courses have an international focus and

[82] https://www.tugraz.at/en/studying-and-teaching/degree-and-certificate-programmes/continuing-education/life-long-learning/

[83] http://www.ecqa.org/index.php?id=386

are taught in English. Depending on the course and an individuals' level of education, participants graduate with a certificate, as an academic expert or with a Master of Engineering (MEng).

Decisions on admittance to a doctoral programme at TU Graz after completing a master's programme (Master of Engineering)[84] are taken on an individual basis.

[84] https://www.tugraz.at/en/studying-and-teaching/degree-and-certificate-programmes/continuing-education/part-time-masters-programmes-and-university-programmes/overview-part-time-masters-programmes-and-university-programmes/

**Case study 6: Automotive Trailblazer Group – England**

New apprenticeship standards being introduced in England are developed by employer groups known as 'trailblazers'. These provide a good example of how apprenticeship development in England is adapting to reflect the need for a close and continued dialogue between employers in the sector and providers of apprenticeship training to ensure the apprenticeship offer evolves in line with changing skills requirements.

The Automotive Trailblazer Employer Group was formed in November 2013. The employers who from the group are – Toyota, JLR, Ford, BMW, JCB, Nissan, Perkins, Honda, GTA England (representing SME's), Siemens, Bentley, Plastic Omnium, Lander Automotive, Mahle, and Sertec. The employers are supported by a range of training providers together with professional institutes and bodies. Both EAL and Pearson support the group from an awarding organisation point of view.

The automotive (and other) Trailblazer Employer Groups were a national UK Government initiative set up to review the skills landscape they worked in and identify occupational roles that could be supported by the development of an apprenticeship standard aligned to national guidance issued in relation to these standards.

Once the employer group has identified the occupational job roles they agree are a priority, they start work on developing the occupational standard assessment plan, end point assessment[85] and related knowledge, skills and behaviours required by someone to be able to carry out the occupational role.

The standards they have developed to date are:

- 3 pathways within the Engineering Technician standard (Mechatronics Maintenance Technician, Product Design and Development Technician, Toolmaker and Tool and Die Maintenance Technician), Level 2[86] Lean manufacturing Operative (sub group)[87]

[85] The purpose of the end point assessment (EPA) is to test that an apprentice is fully capable of doing their job before they receive their apprenticeship certificate. It also helps to demonstrate that what an apprentice has learned can be applied in the real world. They were introduced ion England for apprenticeships following a major review that found that continuous assessment did not allow all apprentices to demonstrate that they can carry out the whole of their job. Employers wanted assurance that former apprentices they employed or planned to employ were fully competent.
https://apprenticeships.blog.gov.uk/2017/08/14/end-point-assessment/
[86] Note: These are UK levels – UK level 2 is equivalent to EQF level 3

- Level 2 Engineering Operative (sub group)
- Level 3 Metal fabricator (sub group)
- Level 6 Product design and development engineer (degree)
- Level 6 Control technical support engineer (degree), electrical/electronic technical support engineer (degree)
- Level 6 Manufacturing engineer (degree)
- Level 3 Heritage engineering technician
- Level 4 Process leader (sub group)
- Level 4 Propulsion Technician (sub group)

https://www.instituteforapprenticeships.org/developing-new-apprenticeships/forming-a-trailblazer-group/

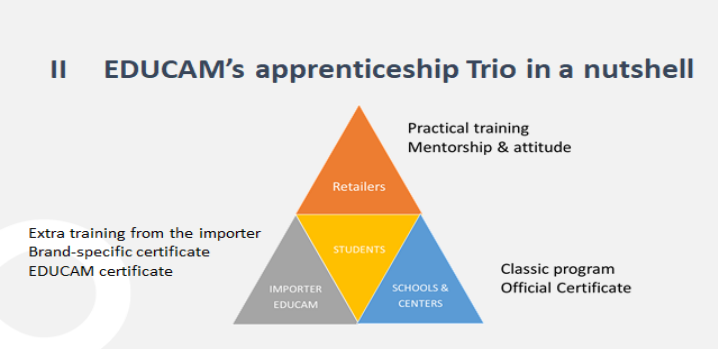
[87] Where the standard has sub group in brackets this denotes that the standard was developed by a sub group which reported to the larger automotive group.

**Case study 7: EDUCAM Tripartite Apprenticeship Case Study - Belgium**

EDUCAM is based in Belgium and was established by and for the aftersales automotive sector and related industries. Next to continuous training /updating of skills (500.000 hours/year), the core aims of EDUCAM are to help students access up to date automotive aftersales training and stimulate new young skilled people to take up employment in the aftersales sector. The organisation has 60 trainers, 8 training facilities and represents about 100,000 aftersales workers in Belgium.

The EDUCAM tripartite Apprenticeship links aftersales related workplace training from key brands such as Mercedes (termed the 'importer') with additional training provided by EDUCAM and existing school diplomas.

This approach is summarised in the diagram below:




The programme enhances, but does not alter existing school diplomas and is provided free of charge for students and schools. The additional training provided by 'the importer' and EDUCAM is delivered while the learner is undertaking their apprenticeship at the workplace (dealership/retailer).

A more detailed overview of the programme is set out below:

| SCHOOL / CENTER | RETAILERS | IMPORTER - EDUCAM |
|---|---|---|
| First Level trainings<br>First Level practice lessons<br>Theoretical knowledge | Practical skills and behavior | Extra adapted trainings<br>(on demand) |
| Official Certificate | | IMPORTER Certificate<br>EDUCAM Certificate |

Funding is provided by EDUCAM who pay for all EDUCAM additional training and the importer/brand pay for 'brand specific' training.

Currently the programme is only operating in Belgium but Mercedes is also working on implementing the same system in the Netherlands, with importers looking at drawing up best practice guidelines for their headquarters in other countries. Benefits of the programme can be summarised as follows:

- It provides high quality industry relevant training
- Helps attract and retain talent into the industry
- Promotes the brand image of participating partners
- Is free for students and schools
- Provides a platform for stimulating dialogue between schools, automotive retailers/dealers and importers
- Provides flexibility of choice for participating students (they can change brands)
- Does not interfere with existing school programmes but provides support to participating schools and teachers
- Enables students to enhance certification by adding both the importers brand and EDUCAM certificates to their school diploma
- Is attractive to car dealers that can prepare potential new employees with the skills, attitude and knowledge required to work in the sector

Brands active in the EDUCAM tripartite apprenticeship:


Four additional major brands are expected to participate in the school year 2020/2021.

Source: Alexis Roelandt, Manager Partnerships, aroelandt@educam.be
www.educam.be

**Case study 8: GTI International Master Programme for Automotive Workforce Transition to Future Zero Defect Manufacturing (ZDM) Working Environments: Innovalia "Automotive Engineering in Quality and Metrology" Case Study[88]- Spain**

This case study provides an innovative example of an initiative in Spain developed to tackle the growing need for digital skills within the automotive industry within the EU. Digital transformation spending by businesses worldwide is expected to hit 1.7 trillion dollars in 2019, while 70% of employees have not yet mastered the digital skills they need for their current jobs today and/or their future career development. The automotive sector is identified as being one of the most demanding in terms of quality, improvements to cost-effectiveness, and adoption of zero defect manufacturing strategies to ensure high quality products. This implies the need for implementation of innovative manufacturing processes and tasks incorporating augmented and assisted decision workflows, supported by an increasingly intensive use of digital tools and platforms.

In recognition of this, Gestamp Technology Institute (GTI), in collaboration with Innovalia, established an international learning programme for current workforce upskilling and young graduate digital talent attraction, in order to master digital engineering and manufacturing platforms and ensure a competitive transitioning towards future zero defect manufacturing shop-floor operations and connected factory digital processes. The programme is unique in relation to its international dimension, hosting local and international students from more than 20 countries worldwide making GTI at the vanguard Automotive Intelligence Centre (AIC) in Boroa (Basque Country, Spain) an international hub for highly specialised knowledge and talent development within the automotive sector. The programme centralises training excellence in new Gestamp digital technologies on a global scale; training the workforce for a digital future through active development of new skills and competences.

The "Automotive Engineering in Quality and Metrology" programme has access to over 1600m$^2$ of lecturing theatres and high quality training facilities provided by GTI pilot lines and Innovalia Zero Defect Manufacturing (ZDM) Digital Innovation Hub (DIH) teaching factories. Using these facilities, the programme puts in practice a "learning by doing" methodology, firstly providing a solid scientific foundation in relation to metrology, followed by the theoretical-practical knowledge and skills

[88] Alicia Gonzalez (Director of Innovalia Academy, Automotive Intelligence Center (AIC) Unit, Innovalia). Francisco Alvarez, (Corporate Learning and Development Director at Gestamp), Cayetana Aranzadi (Corporate Learning and Development Talent Attraction Manager at Gestamp), Amaia Elorriaga (Gestamp Technology Institute (GTI) Talent Attraction & International Programs Coordinator)

development for quality system tools, data analytics and cutting-edge industrial metrology digital platforms applied to automatic measurement, reverse engineering and data analytics and statistical process control reporting, utilising real automotive parts.

The students develop knowledge in core resources and abilities according to recognised Standards such as ISO-TS 16949 and other tools and techniques like Lean Six Sigma applied to Industry 4.0, Cyber Physical Production Systems (CPPS) and Industrial Internet of Things (IIoT) manufacturing processes. Following this, and based on the same “learning by doing” methodology, the students complete the upskilling training over six months by further developing and applying the skills and competences gained in a real working environment at any of the Gestamp’s factories and R&D centres worldwide. The programme is not only an international hub of excellence and digital talent attraction for the automotive sector, but also an international digital transformation catalyst at corporate and sectoral level.

By December 2018, more than 4000 students had enrolled in training programmes at GTI. The GTI & Innovalia Academy private partnership has been running for 3 years. 96% of the students finishing the programme have been able to find a job inside the automotive sector.

The Basque Government organisation for employment, Lanbide, which also supports the programme for transitioning of unemployed qualified people towards digital jobs in the automotive sector, has formally endorsed the programme, which was also recognised in 2016 with the “Award to the best skill training initiative” in Spain.

**Case study 9: MERINOVA Digitalisation Academy (Finland)**

This case study provides a further innovative example of an initiative in Finland developed to tackle the growing digital skill requirements within the EU automotive industry. The Digitalisation Academy[89] is a unique regional program managed by universities, digitalisation companies and large international organisations from the local energy cluster EnergyVaasa. The interdisciplinary programme is intended for university students at VAMK, Novia and University of Vaasa on their last year of studies, seeking internships and thesis work, with emphasis on the Energy Cluster and Digitalisation. The Academy offers students a highly interesting programme that enables learning from professionals in the energy sector and acquisition of the latest knowledge in digitalisation. The programme is mainly financed by the partner companies and sponsors. The EnergyVaasa cluster[90] consists of 140 companies, most of them large international companies, enabling good possibilities to work in international projects in Vaasa.

The pilot phase of the programme is running between 2019-2021. The Digitalisation Academy has its own classroom at the Campus in Technobothnia.

Students can get 15 credits (ECTS) when participating, from their own university (VAMK, Novia and University of Vaasa), but to get into the programme, students first need to apply for the programme. Based on the applications 20-24 students (7-8 students per university) will be accepted.

The Academy programme consists of 3 main themes:

- Cyber Security
- Data Science
- Digitalisation.

During the study programme, students receive applied training and participate in different projects about digitalisation (based on these 3 themes), as a part of their general study programme. Students also get subjects for thesis work for their final year.

The Digitalisation Academy uses a study method “flipped classroom” and an online platform called Udemy (www.udemy.com) as tool for learning the basics. Teachers from Industry (mainly experts from partner companies) provide inside knowledge from different projects in the energy industry.

[89] https://www.digitalisationacademy.fi/
[90] http://energyvaasa.vaasanseutu.fi/energyvaasa-shortly/

**Case study 10: e-learning use-case study: Germany**

This case study provides a good example of the increased use of digital technologies as part of apprenticeship programme delivery. REUTER TECHNOLOGIE GmbH, a Bavarian metalworking company, is heavily involved in the digitisation of the production process and the networking of machines.

The company produces components for vacuum technology and vacuum physics. Employees are specialists in copper processing, vacuum brazing and the production of thermodynamic components.

Two trainees are currently completing their apprenticeship as precision mechanics in this environment. The company report that many trainees find the mathematical requirements in the training difficult, but that young people usually have very good computer knowledge and digital skills, making it easier for them to access information via smartphones or their PC rather than to learn from books. Reuter has set themselves the goal of identifying the interests and learning preferences of young people, which is why e-learning courses have been introduced for the two new trainees.

At REUTER, one hour of e-learning per week is an integral part of the training. The investment in online learning courses to accompany the training was discussed by the management with the team leaders and the training manager before it was purchased. The training manager Marco Roth commented:

*"We intensively tested a demo version of eCademy. We found that the multimedia content, such as videos or simulations, complements the content of the vocational school very well. We then asked our trainees whether they could imagine working with the programme,"*

*"It was important to us not to order e-learning from above - it doesn't make sense to buy a programme that the trainees don't feel like using."*

Once a week, the trainees should spend at least one hour working on the multimedia learning content. The exchange between instructor and trainee is also identified as important in e-learning. One of the trainees commented:

*"In any case, it is good for me if I can repeat or deepen the theory from the vocational school with the e-learning programme"*

All content is presented in three steps. First a general introduction, then an application example – such as an interactive simulation and at the end a test.

However, it was stressed that e-learning needs intensive support, and very important that the young people involved do not work on the programme separately, but that there is a regular exchange of information on learning progress. In order to facilitate this exchange, regular statistics on the software are possible. This includes information on exactly how much time the trainees have spent on which learning content and performance in relation to their test results. This makes it possible to specifically ask why there are difficulties in certain areas and identify if help is needed.

https://www.kofa.de/dossiers/digital-aus-und-weiterbilden/praxisbeispiele/e-learning-in-der-ausbildung

**Case study 11 – Technicians Make It Happen work with WorldSkills UK**

Technicians Make It Happen is a national campaign in the UK to encourage more young people to consider a career as a technician. The campaign has worked with WorldSkills UK for over two years, joining forces to celebrate technical careers and support young people as they join the industry.

Technicians Make It Happen chose to exhibit at WorldSkills UK LIVE – the UK's largest apprenticeship and skills event – to celebrate the fantastic work technicians do across a range of sectors. The organisation uses the three-day event and 70,000+ footfall to showcase jobs young people may not have considered, bringing along games and imagery to explore the skills they need to become a technician. Through an interactive, hands-on stand, it demonstrates the variety of career paths available for budding technicians. *"We bring simple, fun activities that show young visitors that the skills they use every day could be the very skills that would make them an excellent technician," says Agnes Donnelly, Communications Officer for Technicians Make It Happen. "Our activities and resources are complemented by the event as a whole. There are connections between our work and the other exhibitors, employers and competitions on show – from BIM to welding and everything in between. Competitions are a great way of showing technical skills in action, helping young people understand how their skills can be used in the real world."*

Technicians Make It Happen knows that engagement with teachers and lecturers is critical to helping young people kick-start their careers. By getting involved with the Parent and Teacher Hub at WorldSkills UK LIVE, the organisation is able to share information on benchmarking and highlight resources that will help support young people. *"We find that after the event teachers are more aware of our work," says Agnes. "Our newsletter distribution list always grows and traffic to our website increases, with more people getting in touch for resources or further information."*

World Skills UK LIVE is also a great opportunity for Technicians Make It Happen to network with apprentice employers. The organisation relies on employers to share case studies and promote the initiative among young learners, and so relishes the opportunity to engage over 200 employers at the event.

https://www.technicians.org.uk/

https://worldskillsuk.org/directions/worldskills-uk-live?gclid=EAIaIQobChMI-c3dpMWA6AIVEtTeCh3TCQBVEAAYASAAEgLBYfD_BwE

**Case study 12 Kofa.de - Refugees in practical training -a project – Germany**

This project was preceded by consultation with local companies, municipalities and the Märkischer Arbeitgeberverband, which organised a panel discussion on the subject of 'refugees – an opportunity for the labour market.

The following conclusion was reached as a result of the panel discussion:
*"The discussion showed that the joint efforts of the economy, administration, authorities and educational institutions are necessary to give the refugees a chance in the labour and training market. In addition, the framework conditions for integration must be further improved".* (Märkischer Arbeitgeberverband e.V, Iserlohn, 2016)

As part of the refugee project at thyssenkrupp Bilstein, 5 refugees from different countries were qualified for a further 3-month internship in a modular training programme.

This comprised, among other things:
- Improvements in basic knowledge
- Language skills extended (job-related vocabulary in addition to everyday vocabulary),
- German values such as punctuality,
- practical skills proven through defined work assignments in 3 modules.

A retired skilled worker - Ekkehart Just - and the training workshop of the thyssenkrupp Bilstein company were available to them as instructors in the practical elements of the training.

This marked the beginning of an intensive period for both the prospective interns and the employer. Given it was a small group of 5 possible trainees; the supervisor was able to take optimal care of the individual refugees and answer their questions.

The refugees came with a maximum of 4 years of primary school knowledge and were also partially traumatised. This meant that basic knowledge had to be delivered quickly. The teacher also had to assess the different levels of trainees and decide if they were suitable for working life in the automotive industry.

Individual work assignments were considered in advance so that the teacher could assess the knowledge levels of each refugee. In addition, ambition, punctuality and willingness to learn were also assessed.

Based on this, if a candidate (max. 2) suited the company, they were rewarded with a 3-month internship, which could then be followed by an apprenticeship.

https://www.kofa.de/storytelling/fluechtlinge-im-praktikum

https://www.uibk.ac.at/iol/goodvet/2019-08-08-best-practices_engl_final.pdf

**Case Study 13 – Collaborative training COTRAIN example (Italy) – Example of Salvatore**

Collaborative training is the term used when one company provides vocational training in collaboration with another company, or other companies, based on the complementarity of their activities. This case study highlights the potential benefits of collaborative training with an example drawn from the COTRAIN European action-research project pilot activities in Italy[91].

Collaborative training is already quite common in certain countries including Austria and Germany.

This COTRAIN example involved one student, Salvatore, and two companies. Salvatore started in X MEM, where he stayed for 104 training hours. After that, he continued his training with Elettrostamperie Poppi for 120 training hours. Salvatore then returned to X MEM for the last 76 training hours, finishing his practical courses following his individual training plan.

The Lead company (A) • X MEM SRL is a very innovative company specialising in technical drawings and in mechanical production technologies and plants. It follows the complete mechanical design process: analysis, 2D and 3D projects for a number of sectors including automotive, as well as 2D and 3D assistance of CAD hardware and software.

The first step of the practical courses in X MEM allowed Salvatore to increase his awareness regarding the whole mechanical drawing process and technologies in use. He also had the opportunity to gain specific skills and expertise, concerning both mechanical design and concept and physical design of mechanical elements, and applying the knowledge and capabilities learnt during the theoretical part of the course in a practical setting. Salvatore also had the opportunity to use advanced design software (even more advanced than the one available in the VET centre's labs), enhancing his own competence profile and increasing future employment prospects.

The Collaborative company (B) • Elettrostamperie Poppi Srl is a production company specialised in the electric upsetting and forging of all kinds of parts based on drawings, and using all types of steel. Salvatore joined the production department enabling him to deepen his knowledge and skills concerning the technology of materials, specifics of the production process, production techniques and systems for developing moulds.

[91] https://www.cepag.be/sites/default/files/pages/methodological_guide_-_final_version_1.pdf

Returning to Company A • Salvatore brought with him his newly acquired knowledge and capabilities. Salvatore could carry out technical drawings with a better awareness of the entire production process, from idea to implementation. He also had the opportunity of evaluating how design could take into account certain aspects of the production phase and specific needs in order to reduce production time and, most of all, to reduce non-compliance of the final product.

In terms of the outcomes of this approach, benefits for both the intern and participating employers were identified. In particular:

- In relation to the intern, the work experience carried out in two different professional contexts was extremely useful in reinforcing organisational and relational competences, not only technical skills.
- Regarding the core of the mechanical process, thanks to the rotation in two companies – the one specialised in design and technical drawings, the other in production – the intern acquired knowledge relating to the whole supply chain, not only the concept phase of the process itself.
- The evaluation indicated that both companies considered COTRAIN to be a powerful tool for reinforcing their competitiveness in the medium to long term, thanks to the new competences brought by the intern as well as the new relation (potential commercial partnership) built with the other company.

**Case study 14: Shared Apprenticeships - Wales**[92]

Shared Apprenticeships were a UK government initiative developed, implemented and managed with the support of the Engineering Sector Skills Council (Enginuity). The pilot (2008) was intended to test the viability of operating a Shared Apprentice Scheme of 90 Apprentices in the engineering sector and operated from three geographic locations, one in each of North, Mid and South West Wales.

A 'Shared Apprenticeship' is a training model where a central management organisation holds the responsibility of the apprentices training contract but where apprentices move between different employers who share the responsibility for the Apprentice's true work experience and performance criteria.

The innovative approach was used to support mainly, Small to Medium Enterprises (SME's) overcome some of the challenges outlined in section 4.2 of this report that such employers face when trying to employ apprentices. Specifically, the approach was used to support SME's wishing to employ apprentices but struggling with the following: -

- Not having the facilities to offer the range of content for a full apprenticeship outcome
- Only wishing to train and employ a fractional apprenticeship trainee due to amount of work available in relation to the company business plan
- Rurality of companies trying to entice trainees into underrepresented regions.

Overall, implementation and delivery were very successful. Outcomes for Apprentices in the pilots, appeared to be stronger than for Apprentices in standard Apprenticeships.

A wage subsidy from the Welsh Government helped engineering sector employers and strongly incentivised their participation. The pilot programme established robust recruitment procedures to ensure that high calibre apprenticeship candidates were recruited. Employer engagement was on-going to ensure there were ample placements available for apprentices and to build sustainability into the Shared Apprentice approach.

The role of training officers and training managers was deemed critical in ensuring good communications between apprentices, employers and training providers, and in providing additional support to apprentices experiencing problems

[92] https://dera.ioe.ac.uk/19750/1/140319-evaluation-shared-apprenticeship-pilots-en.pdf

Gaining experience of working with different employers was viewed by apprentices as being a strength of the Shared Apprenticeship pilot and they were highly satisfied with their learning and employment experiences.

Most employers who have experienced the Shared approach and of traditional Apprenticeships believed that the Shared Apprenticeship programme compared very well with the traditional Apprenticeship modes of delivery.

**Case study 15: German VET system transfer to other countries[93]**

This case study provides an example of a German multinational automotive company rolling out their German apprenticeship model to their operations in Puebla in Mexico.

In cooperation with the German-Mexican chamber of commerce and industry (CAMEXA) collaboration commenced in 2012 to train toolmakers and industrial mechanics at a training centre and at German supplier companies; based on the German dual training framework. Mexico could not assure the required German level for the training and it was not the goal to obtain a Mexican recognition /certification of the degree, therefore no agreements with the Mexican state were necessary and the German oriented competence training could be established.

Since 2012 approximately 25 trainees of the German car manufacturer's cluster in Puebla are trained every year at the training centre. Apprentices receive a German vocational qualification which is audited by AHK (CAMEXA). The training centre has been built up by the initiating company to carry out training for its own needs and currently for 15 additional different customers.

[93] Fachkräftesicherung deutscher Unternehmen im Ausland –Erfahrungen bei der Übertragung dualer Ausbildungselemente Unterstützt durch die Robert-Bosch-Stiftung
Körbel, Markus; Pierenkemper, Sarah; Zibrowius, Michael
Institut der deutschen Wirtschaft Köln

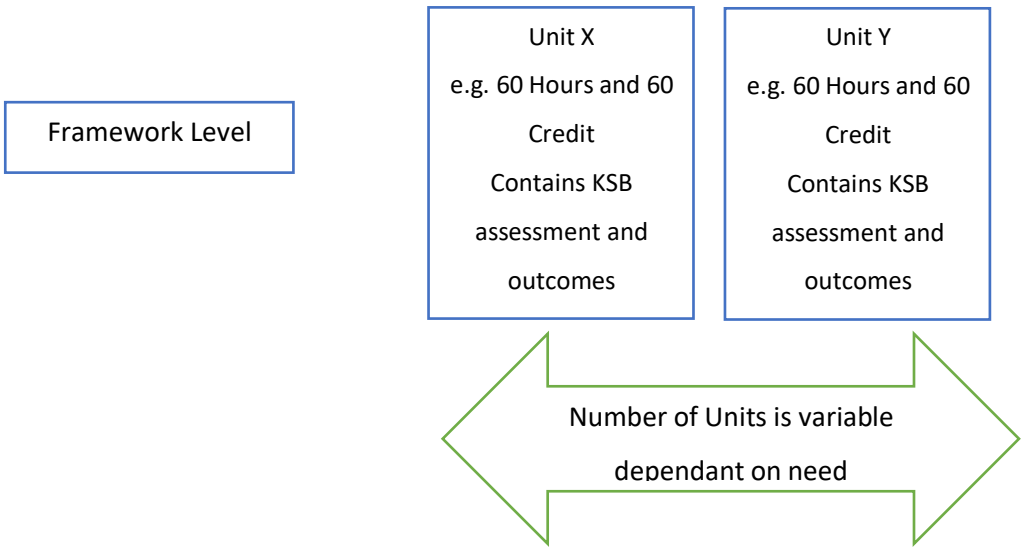
**Case study 16: Towards a more flexible approach to apprenticeship design**

At present the apprenticeship offer across the EU is confusing, often with little flexibility in meeting the ever-changing skills requirements of industry, with comparison of the different offers between countries highly problematic.

Apprenticeship systems based on a funding mechanism directly linked to achieving a complete apprenticeship framework before progression (as is currently the case in many countries) is surely not fit for purpose in meeting industry needs for skills development of new staff and upskilling of existing staff. It defines that all learners have the same ability and will follow the same content apart from being allowed to choose different Skills units, but underpinned by a common Knowledge Qualification.

A key concern is that the 'knowledge' outcome is separate to the 'skills' outcome and does not allow a skill module to be undertaken in isolation or as part of a tailored upskilling package without reference to the knowledge "underpinning" element.

There is a need to allow learners to top-up or upskill which may be an element of an apprenticeship framework but not the whole framework. Improvement in the concept of modular delivery and funding is therefore needed in apprenticeship designs for the future.
In order to stimulate discussion and help tackle this issue we have suggested a new approach to apprenticeship design, the key elements of which are summarised as follows:



Any new structure at all Levels must have: -

Skills modular units which are self – contained, with a 'knowledge' element (as well as 'skills' and 'behaviour' elements) included. This will allow credit to be applied at level and size and can be accessed as standalone or grouped to guarantee the right learning and skills for the right company at the right time. With this model each unit would contain a knowledge, skills and behaviour assessment and outcomes (KSB) and, because of its self-containment, could be offered as a module as part of the apprenticeship or as a module for upskilling to existing staff, or both.

By adopting a self-contained learning and assessment module structure, apprenticeship programmes can be designed specifically for the trainee and individual company need (inclusive of SMEs) meeting individual progression possibilities. The modules could be delivered in the Workplace, Further Education organisations or a combination of both and each would allow learners/trainees to build credit and level towards an industry agreed outcome deemed as the "Competence Threshold".

The key benefits of this approach can be summarised as follows:

- The differential between apprenticeships and upskilling of existing workers that currently exist would no longer be relevant as both can attain skills using the same modular delivery.
- Apprenticeship frameworks can be traversed and allow access of different levels to form an individually designed apprenticeship outcome consisting of various modules from different levels of a framework. This allows total flexibility of design to meet learner and company need.
- Funding is easier to apply to a credit-based outcome. The module would have a common credit and therefore common funding policy.
- It would make it easier for SME's to participate by allowing them to opt for modules that are relevant to the skill and level requirements of trainee and company.
- Comparability of apprenticeships across national boundaries would become much easier as all countries could state the maximum credit needed to achieve an apprenticeship outcome but not be restricted to a single level descriptor.
- Mobility of of labour would improve at all levels as skills analysis would easily identify employee skill needs and an appropriate option to address this need.