NEW PROFESSIONS AND CAREER PATHS IN THE FOOD AND DRINK INDUSTRY: DELIVERING HIGH-LEVEL FOOD INDUSTRY SKILLS IN THE DIGITAL ECONOMY

EXECUTIVE SUMMARY

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INTRODUCTION

The food and drink industry is the leading manufacturing sector in Europe and is inextricably intertwined in Europe's social, cultural and economic fabric, and compared to other manufacturing sectors in the EU, it is a key provider of jobs and a relatively stable employer. Digitalisation in the food and drink sector is a key driver for strategic solutions which contribute to sustainable growth and jobs in Europe. Digital technology and automated systems in all its forms are drastically changing the face of manufacturing in the food and drink industry. Increasingly, due to product innovation, market competitiveness, and technological progress, new skills are required in a wide range of areas.

This report is part of an EU funded social dialogue project which explores current changes in employment alongside work-related challenges. More specifically, it has the aim for the European social partners of the food and drink sector to meet the following objectives:

- Identifying new technologies in the food and drink industry, emerging jobs and the new skills and type of qualifications required;
- Undertaking a forward-looking reflection on what criteria will underpin socially successful adaptation of Food Industry 4.0.

Bearing the above in mind, this report builds on the results of a previous EU funded Social Dialogue project entitled *„Bringing in in new talents and managing an ageing workforce: two sides of the same coin-implementing good practices for a more attractive food and drink industry in Europe"* **http://fooddrinkeurope-effat-toolbox.eu/** which aimed at identifying bottlenecks in recruiting new and skilled employees alongside focusing on potential challenges when companies are confronted with an ageing workforce.

The present project builds on a desk-based mapping exercise for identifying the new digital and automated technologies in the European food industry and the impact on work, required skills and career paths. The project applies an explorative and qualitative research design and includes examples from several EU countries to illustrate local conditions. Regional workshops in Budapest, Copenhagen and Bologna have been conducted as forums for the social partners, companies, trade unions and independent expert organisations for knowledge exchange and discussions and, for forward looking reflections. The project has been jointly managed by EFFAT and FoodDrinkEurope in collaboration with a Steering Group and the team of experts.

The project is carried out by a team of experts:

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INTRODUCING INDUSTRY 4.0 IN THE CONTEXT OF FOOD AND DRINK MANUFACTURING

Industry 4.0 is also known as the Fourth Industrial Revolution to occur in manufacturing. This Fourth industrial revolution will take further the adoption of computers and automation and enhance it with smart and autonomous systems fuelled by data and machine learning. I**ndustry 4.0 is the integration of digital and physical (machines) technologies in applications for production and logistics** . Within this context, the Internet is the backbone of Industry 4.0, and it is the digitally connected machines (computers and processing equipment) that shape the challenges and opportunities of Industry 4.0, **Figure 1**.

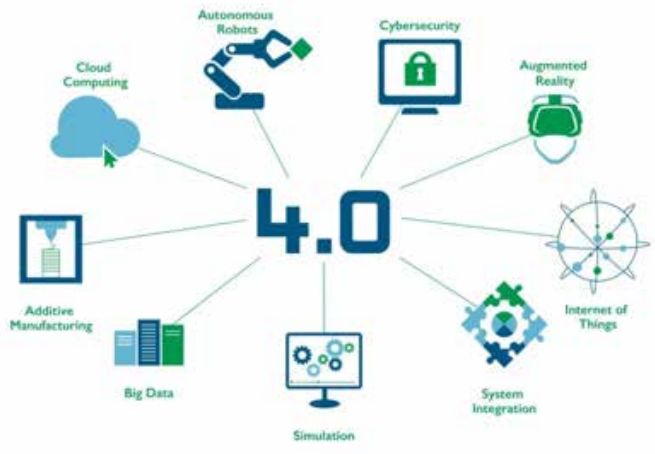

Figure 1: The connectedness of Industry 4.0

Source: https://www.foodmanufacture.co.uk/Article/2017/06/15/Smart-food-factories-move-even-closer

[1] Maier J. (2017): Made Smarter Review

"FOOD INDUSTRY 4.0": ADAPTATION OF TECHNOLOGIES OF INDUSTRY 4.0 INTO FOOD AND DRINK MANUFACTURING

Food Industry 4.0 will lead to changes in the way food and drink manufacturing is carried out and work is organised, as well as lead to changed requirements for skills.

THE SPECIFICITIES OF THE EUROPEAN FOOD AND DRINK INDUSTRY AND AUTOMATION

More than 98 % of companies in the European food and drink industry are SMEs. The food and drink industry is characterised by a range of specificities such as: strict handling and storage requirements for the raw materials used, the complex and diverse supply chains; and technological challenges of automating food processing. This explains why automation of food production is less widespread than automation in other manufacturing sectors. There are a wide range of views and examples resulting from automation and its impact. As identified in this research project, the 'impact' must also take into consideration the local context and not only automation. By 2017, more than 31,000 robots were installed in the European food and drink industry and most in the Northern and Western Member States. The number is expected to increase further in the coming years, **Figure 2**.

Looking at the EU food and drink manufacturing sector it is evident that businesses' patterns for adapting to Industry 4.0 is highly diverse. It has been recognised, through the various project workshops that large companies have already invested significantly in automated and digitalised solutions for the production and logistics of food and drink products while smaller and medium-sized companies tended to be only at the beginning of a journey towards digitalising processes. For example, in a survey[2] of the German food processing industry, it was revealed that two thirds of the respondents were actively implementing digital and automated systems.

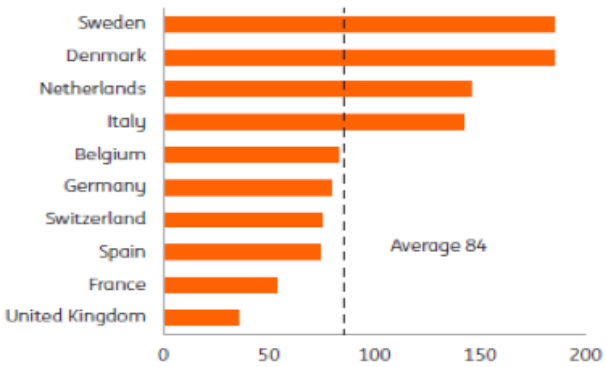

Figure 2: Robot stock in the food and drink industry per 10,000 employees (2017)

Source: ING (2019) – Food Tech: technology in the food industry

EMPLOYMENT IN THE EUROPEAN FOOD AND DRINK INDUSTRY

The food and drink industry is a major contributor to the economy of the European Union, and a relatively stable provider of employment, **Figure 3**. Within the EU manufacturing industry, the food and drink industry has a leading position in terms of turnover and provides employment to 4.7 million people.

Despite increasing automation in the European food and drink industry, there are labour shortages in several Member States. For example, the German food and drink industry is lacking more than 6,000 applicants for vocational training in food-related jobs. The number of unfilled positions is rising and jobs are vacant for a longer time; for food-related jobs more than 140 days in average[3]. Also the UK is struggling to hire workers: A labor shortage gap in food manufacturing of nearly 140,000 workers is foreseen for the coming years and, 40% of companies in food processing and agriculture using temporary workers are struggling to find the necessary (in this case unskilled) workers[4].

WORK IN FOOD INDUSTRY 4.0

Working in a food and drink manufacturing environment where the production and factory lay-out are organised to accommodate the principles of Industry 4.0 is different from working in an environment of assembly lines and manual labour. In the area of production, **workers will be most likely hired for knowledge-based production roles, rather than manual work**. The digital environment impacts the working conditions, i.e. way work is organised, the tasks to be carried out, the technologies used, the workers' right to privacy and the need for certain skills.

The digital environment frames the worker, the process and the control device, hence, defines the "sphere of work" therefore, adapting to a digital environment can prove sometimes challenging for people. For example, the shifting from routine manual work to activities that require more cognitive skills; or adapting to continuously evolving technologies and new working procedures. Both examples illustrate the need to build digital skills and skills for operating advanced equipment and data systems. Technology is not a solution - it is an enabler, also in Food Industry 4.0. This means that without an adequate skilled workforce, the potential of technology cannot be fully exploited.

[2] Source: Erhährung 4.0 – Status Quo, Chancen und Herausforderungen. Presentation by B. Rohleder (Bitkom Research) and C. Minhoff, (BVE), Berlin, March 26, 2019.The survey was carried out as telephone interviews with a representative sample of 304 companies with more than 20 employees.
https://www.bve-online.de/presse/pressemitteilungen/pm-20190326
[3] ANG, personal communication, 2019
[4] Grand Thornton (2017) – FDF Economic contribution and growth opportunities; and ALP (Association of Labour Providers), (2019): ALF Food Supply Chain Labour Survey Results

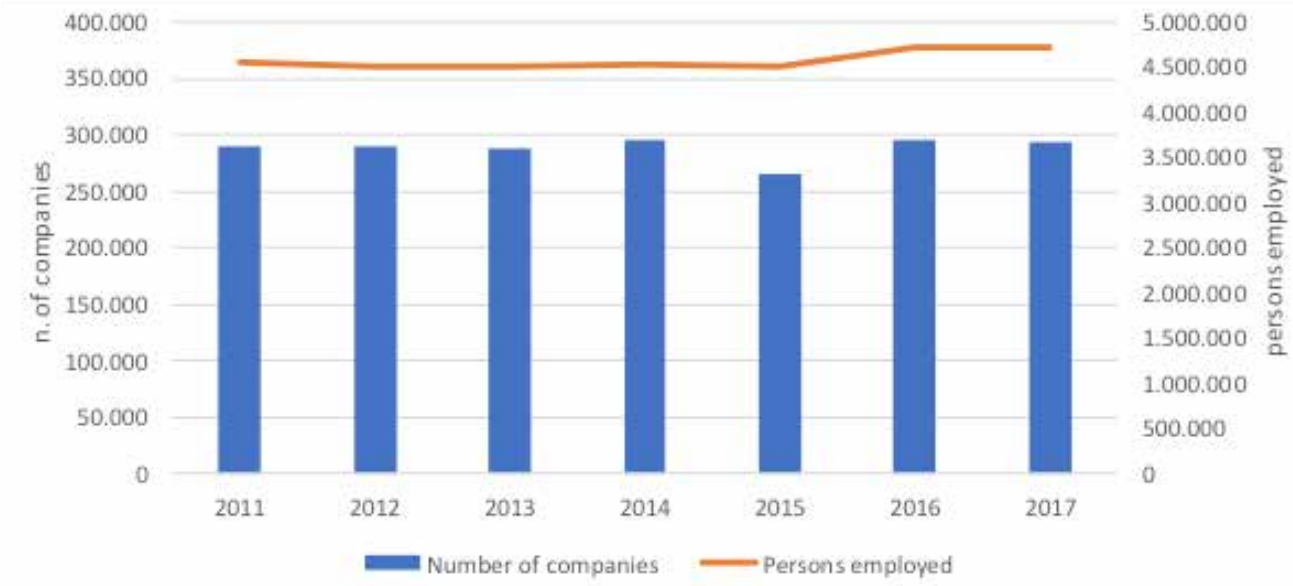

Figure 3: Number of companies and number of persons employed in the EU food and drink industry (2011-2017)

Source: Eurostat (Structural Business Statistics) - https://ec.europa.eu/EURtat/web/structural-business-statistics/overview

REQUIREMENTS FOR SKILLS AND TRAINING

The project has analysed the need for building skills within three categories: manual skills, cognitive skills, and soft skills. In addition, developing digital skills has been considered in a transversal approach. Cognitive skills is, together with manual skills, the category of skills whose relative importance in food production and logistics is expected to increase the most as a result of the implementation of automated and digitalised systems. Cognitive skills relate to the ability of thinking, acting and communicating, therefore **reading, writing, and calculations are core skills** in this category.

Skills for operating digitalised production equipment are essential and taking over some tasks traditionally under manual labour. This suggests that there is a need for providing workers with skills to operate advanced manufacturing equipment. For example, skills for understanding the process flow, the limitations and options of the machinery. There is also a need for providing workers with the necessary preventive and protective measures such as ensuring that each worker has received the necessary health and safety information and training. The shift in skills requirements also points to the need to integrate digital competencies in tasks such as monitoring, registration or controlling equipment. The project has demonstrated the need to provide basic digital skills for all workers.
The project has identified the anticipated skills set by the future Food Industry 4.0 worker as illustrated by these examples:

- The future worker will be a highly specialised "**super-technician**" with adequate IT skills, flexibility, capacity to interpret the emerging and ever-changing needs of modern food processing, and high propensity to change. The job will be centred round implementing Industry 4.0 technologies.
- The future worker in the European food and drink industry will have to **deal with matters of increased complexity**, and to bear more responsibility; the worker will have to master a broader skills set, and to be flexible enough to shift seamlessly between different tasks (**multitasking vs. specialisation**).
- The future worker will have to cope with an increased sense of external control due to the **online and real-time** data flows and monitoring activities resulting from Food Industry 4.0.

It is claimed that several hundred thousands of food and drink industry workers are in need of re-skilling or up-skilling to meet the requirements for adapting to Food Industry 4.0. There are major issues connected with this situation: workers who do not have an employment contract have no access or right to paid training; contemporary curriculums for vocational education and training are lacking in many countries; and the views on the necessary skills base varies greatly. The Social Partners play a crucial role for encouraging proper training of the workforce. Initiatives motivated by trade unions (e.g. funds to pay for training), or collaborative measures to map the present skills base and the skills needed for the jobs to come, are just a few examples of how to overcome challenges related to training and the skills base. This goes hand in hand with fostering employment opportunities to affected personnel (job losses) with the best grounds for moving on and, to find other career opportunities.

DELIVERING HIGH-LEVEL SKILLS FOR FOOD INDUSTRY 4.0

Vocational education and training have to include the provision of digital skills, training in operating automated equipment, and to find ways for strengthening the building of soft skills (e.g. process organization, process-thinking, collaboration and teamwork). Several examples from the project have demonstrated how important it is for workers to have strong social skills, abilities to communicate, and be able to interact with many different nationalities and staff groups in a company. The following examples[5] could be relevant subjects for including in an upgraded VET (vocational education and training) targeted at food processing in the digital era:

- Acquiring skills for controlling the production process through a man-machine interface applied to food manufacturing processes;
- Understanding the integration of the supply chain and inventory systems, and gaining skills for working with RFID-tags or other advanced technologies to monitor and oversee digitalised production processes and logistics;

Interviews, projects workshops and literature have pointed to the fact that the majority of workers in the food and drink industry are trained for their job through colleagues' instructions and support. It is therefore a critical issue to ensure that the skills held by experienced workers are passed on to new (and younger) colleagues and, that the skills passed on are contemporary. This is relevant for manual, cognitive and soft skills and, for digital skills, however, when it comes to acquiring skills for operating equipment and data-systems in the frame of Food Industry 4.0 it is more unclear to what degree skills are passed on between colleagues.

CONCLUSION

The competition in the market is the major driving force for adapting to Food Industry 4.0 and, the food and drink industry's taking to Food Industry 4.0 is only increasing in speed. This process does have benefits for labour and capital, but severe social challenges must not be overlooked. There is one common conclusion about the impact from adapting Industry 4.0 technologies in the European food and drink industry: **without a workforce there is no production**. Securing an adequate workforce is fundamental and needs the attention of both employers and workers. This places the Social Partners in a central position for ensuring a **socially robust adaptation to Food Industry 4.0**; a process that is relevant and accepted by workers and employers, and where adequate and proper attention is given to the social and human aspect of adapting to digitalised and automated systems.

Bridging the gap between automation and people is crucial for a successful transition to Food Industry 4.0.

The project has demonstrated that a very large share of the workforce in the European food and drink industry is in need for considerable re-skilling or up-skilling. This situation underlines the importance of providing proper training and the necessity of involving providers of education and training into the dialogue of how to equip the workforce with contemporary skills. The companies producing digital systems and automated production lines can benefit from knowing more about working routines in food manufacturing, and food companies can learn more about how Industry 4.0 solutions can be implemented into an existing context. This calls for an open and extended dialogue involving more stakeholder groups – including providers of education and the suppliers of processing equipment and digital solutions.

The European food and drink industry will remain a central and large manufacturing sector with a huge and beneficial contribution to society. The Social Partners have a role to play for ensuring this position of the food and drink industry. Teaming up with providers of education, suppliers of production systems, and policy makers could make for a strong route towards a socially cohesive and prosperous Food Industry 4.0.

In the following section (**Figures 4-6**) you will find Recommended Actions defined for the stakeholder groups: the Social Partners; Providers of education; Providers of digital systems and automated production lines; and Policy makers. Recommended Actions are organised in three themes. The Theme 1 is about securing employment and its diversity. Theme 2 addresses how to share the benefits of Food Industry 4.0 by focusing on people; and Theme 3 is about how people and the food and drink industry can have a prosperous development from working with technology.

[5] New education pathways for new positions (Based on presentation by Prof. Marco Dalla Rosa, Bologna workshop, June 2019

FIGURE 4:
RECOMMENDED ACTIONS FOR THEME 1:
SECURING EMPLOYMENT AND ITS DIVERSITY

THEME 1: SECURING EMPLOYMENT AND ITS DIVERSITY

SOCIAL PARTNERS

(the social partners are the bodies representing the two sides of industry: the employers and the employees)

- Champion the Social Dialogue to promote the food and drink industry as an attractive place to work;
- Outline an ambitious training policy including workers' right to training and paid education leave and, with access to adequate training facilities;
- Provide a Skills Guarantee Certificate for skills and competences of the low-skilled worker;
- Provide gender-harmonized measures to close digital divides, especially for female workers;
- Define proper work and job functions and include options for education;
- Elaborate Skills Maps to clarify the match between skills and tasks, and to ensure motivation for up/re-skilling;
- Consider implementing a system for Personal Development Plans for workers;
- Develop training programs building on worker's present skills base;
- Develop an approach for knowledge transfer between workers;
- Develop an open culture to modern ways of learning;
- Involve workers' representatives in discussions about social aspects;
- Ensure that actions and policies are inclusive to accommodate also the needs of less educated workers;
- Gender aspects need to be included in dialogue and policy making, particularly relevant for women and socially vulnerable workers;
- Include Social Partners in the process of modernising education programs targeted at the food and drink sector;
- Creation of social funds that makes training programs accessible for all companies including SMEs
- Joint approach to address the "being online option" in respect of worker's right to be off outside working hours;

POLICY MAKERS AND GOVERNMENT

- Ensure young people are ready to work and that they have obtained basic literacy, numeracy, digital, linguistic and, soft skills;
- Develop contemporary curriculums for the vocational education facilities targeted at young talents and experienced workers;
- Provide framework conditions allowing for modernisation of the way vocational training is organised and carried out;
- Support and collaborate with food and drink companies with the aim of promoting the food and drink industry as a career path
- Set up recognised certification systems to value and recognise skills;
- Outline upskilling and reskilling policies to forestall the obsolescence of the jobs and professions concerned
- Develop preventive health and safety policies (i.e stress, burn-out, etc).

THEME 1: SECURING EMPLOYMENT AND ITS DIVERSITY

PROVIDERS OF EDUCATION AND TRAINING

- Modernise technical colleges and vocational education and training (VET) systems to accommodate skills for working in a digitalised and automated environment;
- Develop education targeted at young people entering into a food and drink industry career and experienced workers in need of re-skilling and up-skilling;
- Develop contemporary education programs that include craftsmanship skills and digital skills; soft skills, language and basic literary, numeracy skills and computers;
- Modernise apprenticeship programs in collaboration with food and drink industry representatives and trade unions to ensure the relevance of the education, the inclusion of advanced and evolving manufacturing techniques, and for making a food and drink industry apprenticeship attractive for starting a career;
- Apprenticeship programs should include forms of dual learning (work-study programs); yet develop the VET system towards generalist occupations instead of narrow, specialist occupations;
- Include in curriculums ways to develop soft skills;
- Consider new ways to organise training by linking up with technology providers, food companies, educators, and other stakeholders

PROVIDERS OF DIGITAL AND AUTOMATED SOLUTIONS

- Collaborate with Social Partners to develop a system for capturing of skills (skills mapping platform) and job functions;
- Make sure that the systems and production equipment are user-friendly and motivating for the workers, and allow for off-time;
- Include workers' experience when designing automatic production equipment to ensure sound working conditions
- Develop production systems that meet the requirements of a heterogeneous group of people that have to work together in teams;
- Collaborate with the Social Partners to ensure a proper and involving process for implementing digitalised and automated production systems including instructions, training and support for re-organising workflows

FIGURE 5:
RECOMMENDED ACTIONS FOR THEME 2: SHARING THE BENEFITS FROM INDUSTRY 4.0 – A HUMAN CENTRED APPROACH

THEME 2: SHARING BENEFITS FROM INDUSTRY 4.0 – A HUMAN CENTRED APPROACH

SOCIAL PARTNERS[6]

- Champion the Social Dialogue to ensure that workers are in the centre of the adaptation of Food Industry 4.0;
- Promote policies that redistribute the value of digital ownership. In this context, collective bargaining rights are important.
- Promote transparency and involvement in decisions about implementation of digitalised and automated systems (reasons, costs, benefits and risk);
- Robust risk assessment and management systems to ensure that digital processes and automated systems are safe, fast and reliable; ergonomics and a human factors approach play a key role.
- Involve workers' representatives to improve working conditions, reduce hazardous and dangerous work and for organising work in the context of Food Industry 4.0;
- Build further on the technological options for creating jobs for socially vulnerable people (e.g. ageing workers);
- Continue the Social Dialogue to ensure transparent working conditions in an automated working environment aiming for a Working Time Charter;
- Further develop a joint approach (employees and employers) to the worker's right to privacy and human dignity through collective negotiation (discussions on use of cameras and digital surveillance in the workplace);
- Further develop a joint approach (employees and employers) to generally implementing digital or automated systems.
- Collaborate to develop jobs and tasks that ensure worker's motivation, options for personal development and best application of skills;
- Update job descriptions and take-into-account the new skills, responsibilities and ways of working, and adjust renumeration of workers

POLICY MAKERS AND GOVERNMENT

- Provide public funds for promoting the adaptation of Food Industry 4.0 including funds for training of workers;
- Provide funding for improving the quality of statistics about work and economics related to automated manufacturing and by industry;
- Involve national (employment) agencies in order to support SMEs for the re-skilling and up-skilling of workers;
- Include the right and access to training, paid education leave and the worker's right to disconnect in national legislation;
- Reinforcing of the European Globalisation Adjustment Fund in case of jobs lost from adapting to Food Industry 4.0;
- Provide forums or platforms to promote knowledge exchange and collaboration among stakeholders in Food Industry 4.0

[6] The social partners are the bodies representing the two sides of industry: the employers and the employees.

THEME 2: SHARING BENEFITS FROM INDUSTRY 4.0 – A HUMAN CENTRED APPROACH

PROVIDERS OF EDUCATION AND TRAINING	• Develop new ways of learning including on-line training courses for food and drink industry workers (so training can take place during working hours); • Maintain training programs that provide the craftsmanship skills and traditional courses offered to workers in the food and drink industry; • Develop education programs and courses that aim for building generic skills rather than specialist skills;
PROVIDERS OF DIGITAL AND AUTOMATED SOLUTIONS	• Collaborate with the Social Partners to promote a proper process towards implementation of automated systems; • Include workers' knowledge and experience when designing production equipment

FIGURE 6:
RECOMMENDED ACTIONS FOR THEME 3: GROWING WITH TECHNOLOGY – PERSONALLY AND TECHNOLOGICALLY

THEME 3: GROWING WITH TECHNOLOGY – PERSONALLY AND TECHNOLOGICALLY	
SOCIAL PARTNERS[6]	• Champion the Social Dialogue to promote the Food Industry 4.0 with a view to career paths, recruitment and proper working conditions; • Use the collective bargaining as a tool to shape the digital transformation of work; • Equip the workforce with skills enabling them to carry out their duties in a digitalised environment; • Develop a learning culture that includes the use of digital interactions; • Involve workers' representatives in the planning of new skills to be acquired in order to reduce worker's stress from demands for learning; • Collaborate with providers of Industry 4.0 solutions to explore the opportunities and challenges for using cloud computing with a view to learn how such technologies can contribute to improve working conditions; • Promote knowledge sharing across companies to increase the understanding of the benefits and challenges from accessing Industry 4.0 solutions; • Train supervisors and managers in the use of digital tools and support their teams
POLICY MAKERS AND GOVERNMENT	• Promote the use of digital systems for learning in schools, VET places and at workplaces; • Safeguard social dialogue and collective bargaining rights, including the right to information and consultation for workers' representatives; • Provide support for developing a system or platform that encourages knowledge sharing among businesses (particularly SMEs and small-scale companies) on how to approach Industry 4.0; • Establish a pilot-scale Industry 4.0 food processing facility to discuss and promote the understanding of modern technologies for product development, value chains, company performance and working conditions; • Clear legal framework for data security; • Practical data privacy; • More investments in research and skill building for the food and drink industry

 [6] The social partners are the bodies representing the two sides of industry: the employers and the employees.

THEME 3: GROWING WITH TECHNOLOGY – PERSONALLY AND TECHNOLOGICALLY

PROVIDERS OF EDUCATION AND TRAINING

- Promote the inclusive use of digital systems and automated manufacturing equipment in food and drink industry education and training programs;
- Develop in collaboration with the Social Partners learning programs targeted at up-skilling of present workers in a short-term and mid-term view;
- Collaborate with the Social Partners for implementing a life-long-learning approach in the food and drink industry;
- Collaborate with providers of automated systems and digitalised solutions for keeping educations up to technological standards;
- Consider developing a system for Food Industry 4.0 Apprenticeship in collaboration with the Social Partners, and include measures that allow for adding further education to an "apprentice degree"

PROVIDERS OF DIGITAL AND AUTOMATED SOLUTIONS

- Collaborate with providers of education and training to include digital systems and automated equipment in programmes targeted at the food and drink industry;
- Collaborate with Social Partners to encourage knowledge sharing (across countries or sectors) about best practices for implementing Industry 4.0

EFFAT is the European Federation of Food, Agriculture and Tourism Trade Unions, also representing domestic workers. As a European Trade Union Federation representing 120 national trade unions from 35 European countries, EFFAT defends the interests of more than 22 million workers towards the European Institutions, European employers' associations and transnational companies. EFFAT is a member of the ETUC and the European regional organisation of the IUF.

FoodDrinkEurope is the representative body for Europe's food and drink industry- the largest manufacturing sector in the EU in terms of turnover, employment and value added.
It brings together 25 national food and drink federations, including 1 observer, 27 European sector associations and 22 major food and drink companies.

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