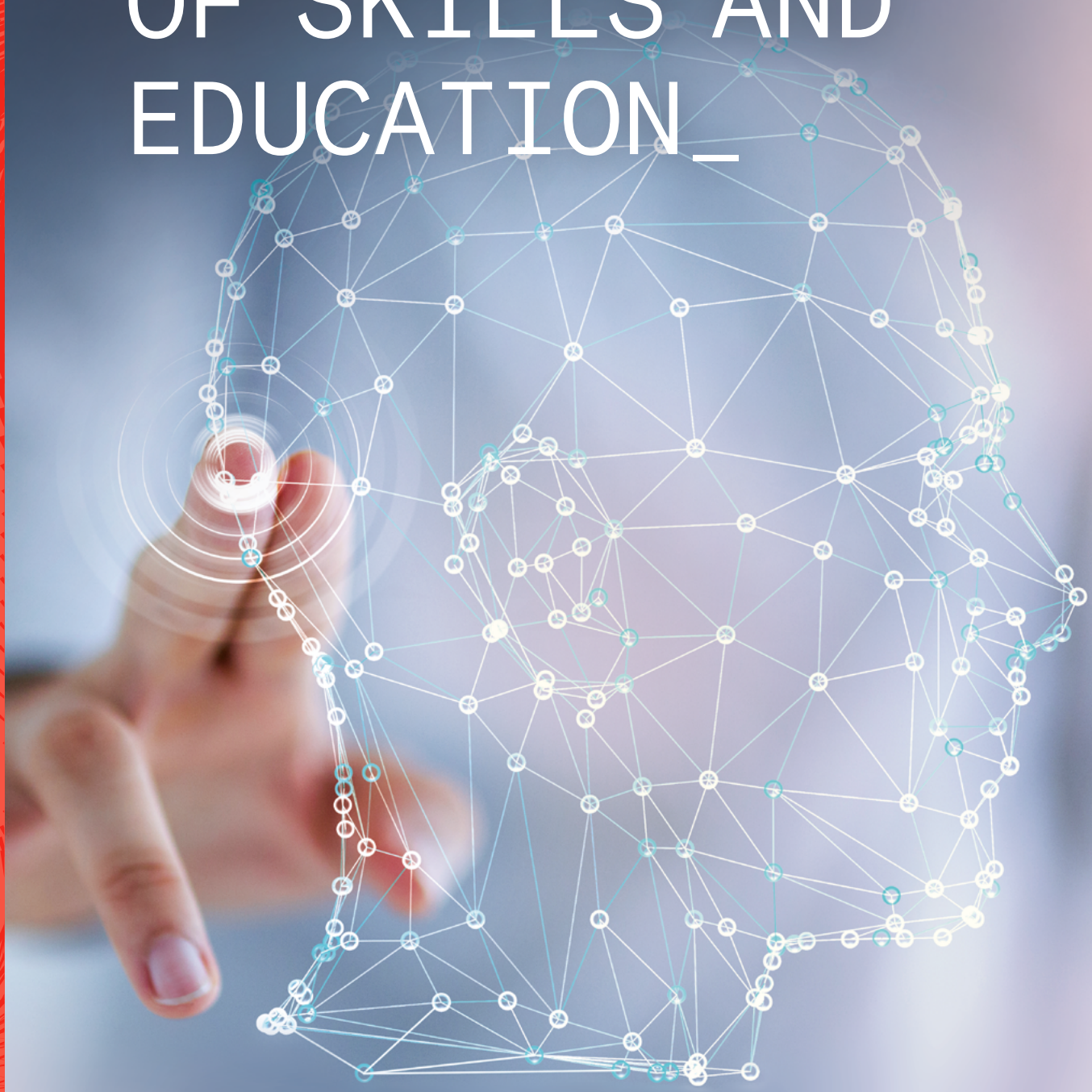
//DIGITALISATION AND THE WORLD OF SKILLS AND EDUCATION_



ceemet European Tech & Industry Employers

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INTRODUCTION

5 KEY LEARNINGS://

- The ever-increasing demand for digital skills in combination with reducing half-time of knowledge is widening the skills gap. Lifelong learning is central in building tech talent and employability, also in view of the demographic changes. It is also part of the solution to tackle social inequality.
- Change structures, less so contents: with the fluidity in digitalisation of labour markets we need a flexible and responsive education and training system for workers to acquire the right skills.
- Skills demand for a digital industry must be addressed by focusing on science, technology, engineering & maths and by making vocational education & training a 1st choice for learners.
- All Member States need to integrate the learning of digital technology & skills across all curricula and develop appropriate teaching methods too. Digital skills should be seen as part of a basic education, such as reading, writing and arithmetic.
- Don't neglect the importance of digitally savvy leadership to create new business (models), transform businesses and inspire a digitally skilled workforce.

Each day, driven by modern technology and digitalisation, businesses and workers are challenged to be even more innovative as it stands for progress and growth. Education and (further) training are a precondition for innovation. Yet, innovation in the world of work is hampered –by various factors such as the lack of relevant skills and rigid education systems and a reluctance to train and learn throughout professional life.

The first report in Ceemet's series on "Digitalisation and the World of Work" (2016) was a starting point for debate, providing necessary and compelling evidence of the fundamental changes taking place in work organisation – from skills demand to working time - as a result of digitalisation. Nevertheless, digital transformation moves with the speed of light. New insights must be generated, input collected and brought together to maintain a relevant and facts-based discussion that offers solutions.

This report, "Digitalisation and the World of Skills and Education", seeks to contribute to this process. Honing in on a specific field, this report focuses on education and training as an intrinsic part of work life which digitalisation fundamentally changes as well as is critically dependent upon.

A Context

Digital manufacturing technologies are transforming every link in the manufacturing value chain. From research and development, supply chain, and factory operations to marketing, sales, and service. Digital connectivity among designers, managers, workers, consumers, and physical industrial assets will unlock enormous value and change the manufacturing landscape forever. Despite all the above, humans are - and will continue to be - at the heart of manufacturing.

Digital manufacturing technologies bring vast changes in skills and competence requirements as well as in teaching and learning. Today across the EU, there aren't enough skilled workers to fill all of the skilled manufacturing jobs available. The skills gap, and in particular the mismatch between the skills needed by the manufacturing industry and the skills available, is a major cause of reduced competitiveness for companies.

Ultimately, the lack of relevant skills in Europe puts wealth creation and, consequently, Europe's high social standards at risk. More qualified hands and heads help businesses grow and enable them to make new investments. This increases overall prosperity in Europe for the benefit of the individual and the collective.

The EU and its Member States must act since several of the economies with which EU manufacturers compete globally have embraced the digital agenda and today have access to the skills they need.

B Future of skills

Digitalisation holds great potential for manufacturing companies in Europe and if we get it right, it will have a lasting and positive impact on companies, individuals and society as a whole. The potential to shape and capitalise on the promises of digitalisation largely rests on having an agile workforce with the right skills for jobs that yet have to be created.

Because many manufacturers today have problems recruiting talent, they are wondering about what the future holds. How can more students be encouraged to pursue and successfully finish Science, Technology, Engineering and Mathematics education (STEM) and Vocational, Education and Training (VET)? What can employers do to attract and keep talent? And will the digitalisation of European industry be fast enough to compete on a global market?

SKILLING TODAY FOR TOMORROW:

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Getting employees behind digitalisation – by Smart Working Research

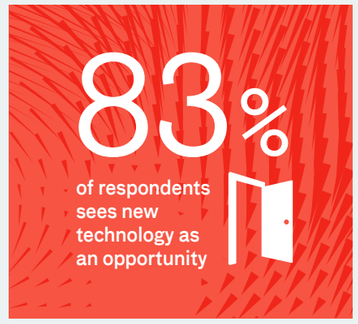
FME, the Dutch employer organisation for the technology industry, asked TIAS School for Business & Society and Berenschot consultancy to research the impact of technological innovation on the workforce. 6,900 employees participated and shared their perception on how they think the future of work will look like and what this means for their jobs.

Innovative technology provides solutions to societal challenges. But how can we engage with, and build support among employees for technological transition? Having insights into employee engagement is indispensable to develop companies that are ready for the future.

Employees are surprisingly positive about the technological sector. They want it all: being informed and involved and have room to experiment.

Further, 91% feel responsible for keeping up with technological developments. In this context it is amazing to note that 99% of the employees surveyed consider lifelong learning as something they actually want to do but also expect to be supported by their employers (76%).

Optimists (67%) and sceptics (14%) can be found in all age groups, independent of level of education.



HAVEN'T WE HEARD THIS BEFORE?_

It is commonplace for too long now to only say that "*no education is far more expensive than education*". The mismatch between skills demand and supply is not a new problem. It has been repeatedly said at various (high-level) events since the publication of the Ceemet report in 2016.

What is different today for training and education institutions as well as for companies is the disruptive force of technological development and the difficulties entailed in responding quickly enough to those changes. Lack of flexibility and effective anticipation combined with problems attracting students to STEM subjects and VET, and in some cases a reluctance to continue training, risks turning the skills gap in Europe into a chasm, with serious socio-economic implications.

A Education & Training systems

Europe has the most educated workforce in its history, yet we miss the mark!

_TARGET_FAILURE_

One of the EUs targets for 2020 is to reduce the share of 15-year old pupils who fail in basic reading, math and science tests to below 15%. Tests carried out every 3 years unveil that not only has the EU been lagging behind this target, it has now moved even further away from it. In 2015, 20.6% of pupils did not achieve basic proficiency in science. This is a rise of 4% points compared to 2012. Worryingly, the difference in the share of low achievers between pupils from the highest and lowest socio-economic backgrounds is striking [1]. Since STEM is pivotal in developing digital competence, this trend is problematic for Europe.

[1] European Commission (2017) Education and Training Monitor 2017

_LACK_OF_RESOURCES_

A serious barrier to developing digital competence - and possibly a contributing factor to the failures described above - is the lack of adequate digital skills and competences in the education systems. 75% to 80% of students are taught by teachers who are not digitally confident [2]. Schools across Europe do not have sufficient resources for relevant technological equipment or for updating or upskilling teacher qualifications. Currently, there are simply not enough schools and universities that are digitally competent in their teaching or highly digitally equipped.

SKILLING TODAY FOR TOMORROW

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Easy access to digital – by School Cloud

Gesamtmetall, the Federation of German Employer Associations in the Metal and Electrical Engineering Industries, supports the association MINT-EC (a national network of schools which excel in STEM subjects). MINT-EC has joined forces with the Hasso-Plattner-Institute (University of Potsdam) for the pilot project "School Cloud" ('Schul-Cloud').

School Cloud is designed to provide the technical foundation for teachers and students to use modern digital teaching and learning content in any classroom, just as apps can be used on smartphones or tablets. For schools, this implies no costs to purchase server space nor manage it

Cloud infrastructure assures the easiest access, independent from hardware and digital literacy level. The aim is to support the digital transition by familiarising children at the earliest age with the advantages digitalisation brings. The upscaling of the pilot project can easily be done because of cloud technology.

During the initial test phase from the beginning of 2017 and until April 2018, 25 selected schools in 14 regions ('Länder') will contribute to the (further) development of the prototype. The second phase of the project will run from May 2018 to April 2021 and covers all 300 network schools.

_THE_GOLDEN_TICKET_ NO_ONE_WANTS_

In addition, it remains difficult to attract young women and men to study STEM related subjects or choose vocational education even though labour market demand for STEM and VET competence remains high - and will continue to grow. Regarding STEM, there is still a strong connection between the gender stereotypical image STEM suffers and affinity for STEM among the female population. While strategies to attract more girls and women to STEM have increased female talent in the subjects, it is not at the rate hoped for.

When it comes to VET, there is still not enough emphasis on excellence in VET and its well-paid jobs [3].

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Redraw The Balance – by Inspiring The Future

Education and Employers

Young people aspire to be what they see around them in their everyday life. But it is difficult to aspire to a future that you never see and don't know exists.

As online match-making platform Inspiring The Future was launched in 2012 by the Education And Employers Charity. The objective is to connect schools and colleges with volunteers from all backgrounds and from a range of sectors and professions going beyond what young people know and see.

One of the greatest requests from primary schools is help in broadening the aspirations and interests of children regarding jobs and careers. As research shows, gender stereotypes are developed at a very young age. In 2016, as part of the inspiring women campaign, the Redraw the Balance video was recorded to inspire and help eradicate bias. Within 3 months after release, the video had been viewed 25 million times.

[2] COM(2016) 381 final: A new skills Agenda for Europe
[3] Ceemet Chief Economists Report 2017

B Lifelong learning (LLL)

The reduction of the "half-life" of knowledge is driven primarily by ever-shorter innovation cycles and the speed of technological development.

Employers largely recognise the importance of continuing training and are the biggest contributors to adult learning, accounting for roughly 50% of all spending [4]. This does not mean they do not struggle with LLL. Small and Medium Sized companies (SMEs), the majority of companies Ceemet represents, often find it problematic to train. Either they are too small to provide training themselves, they cannot find education and training institutes with training offers that suit their needs, or it is difficult to find a temporary replacement for the worker on training.

Another dimension of the problem for employers, however, is the low level of uptake of training offers among those already employed. This challenge is compounded by the demographic development of most European countries. Less than 11% of Europeans aged between 25 and 64 are engaged in LLL [5]. This percentage develops contrarily to age, when digital right-skilling becomes more pronounced. And although LLL is a shared responsibility between employees, governments and employers, more than anything it requires motivation and self-management on the part of workers.

Trying to determine how we can deliver training that will meet the rapidly emerging demands is perhaps the most pressing question in the MET sector. Both in terms of the existing workforce as well as in the education and training systems as a whole. The stakes are high – both for industry and for Social Europe.

SKILLING TODAY FOR TOMORROW:

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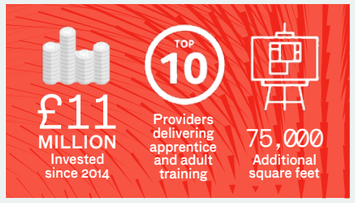
A hub to jump further – by Technology Hub

Aston, Birmingham, hosts the UK's premier facility for training and development for apprentices and professionals in manufacturing and engineering. The UK training and skills landscape has changed significantly. UK manufacturers have to navigate these changes whilst continuing to train and invest in their workforce.

Significant changes such as the apprenticeship levy have had a profound negative impact on the delivery of apprenticeship and skills training by providers, and the ability of manufacturers to access high quality training for their workforce. Yet, over a quarter of UK manufacturers say that a lack of suitable training provision is a barrier to recruiting more apprentices.

A primary driver in EEF opening their own Technology Training centre was the variability in training that manufacturers would be able to access. The Technology Hub has been designed and equipped to replicate real-life modern engineering and manufacturing workplaces and is responsible for delivering vital technical skills.



The new facility boasts 280 IT stations, £1.3 million of equipment and tools and has a wide range of areas devoted to developing technological skills, including robotics, electronics and rapid prototyping. The Technology Training Centre currently runs over 50 different technical training courses, works in partnership with 70 employers and trains approximately 400 apprentices a year. Since its opening in 2014 this represents over 900 apprentices in programmes over the various year groups for some 150 employers across 240 locations.

[4] Ceemet Chief Economists Report 2017
[5] European Political Strategy Centre (2017) '10 trends transforming education as we know it'

DIGITALISATION AND THE WORLD OF SKILLS AND EDUCATION

7 ESSENTIALS WE LOOK FOR_

65% of the children entering primary school today will likely work in job types that do not exist yet[6]. Therefore, it is a tricky business to predict exact skills requirements. Nevertheless, we can identify a range of skills to cope with the new occupations and tasks.

1 Interdisciplinary skills

What – refers to a broad set of knowledge, skills and work habits that are critically important for success.

Why – interdisciplinarity is critical to developing and applying innovative solutions to complex challenges, e.g. the use of data analysis tools and production processes or mechatronics.

2 Computational thinking

What – is the thought processes involved in formulating a problem and expressing its solution(s).

Why – with an increasing importance of man-machine interaction and cobotisation, knowing in what way a computer—human and/or machine—can effectively carry out the solution, will be part of the business model.

3 Analytical skills

What – the ability to work with big data (analysis and use), make data-based decisions and create new business models based on data information.

Why – it will become increasingly important in particular for employees who operate production equipment as they have to understand the continuously automated and autonomous processes. The amount of digital information generated from sensors, equipment and platforms keeps increasing exponentially.

4 System design skills

What – the understanding of how systems work and how to create added value.

Why – at the time that existing business models are under pressure, continuing their development and/or reinventing them will decide to what extent that business will have a future.

[6] WEF, 'The future of Jobs and Skills", 2016

5 Cybersecurity skills

What – knowledge of how to regulate access to computer files, develop firewalls, perform risk assessments and test data processing systems to verify security measures as cyber threats are everywhere and come in various forms.

Why – data is the new currency. The success of data mining and the protection of databases, networks, hardware, firewalls and encryption decides if business is, not only secure, but also successful.

6 Creative & entrepreneurial leadership

What – an understanding of how to create and transform new and existing businesses and create digital era firms, both in terms of value chains and products.

Why – new businesses, products and services are developed at a rapid pace. Humans will be needed to build, lead, maintain and market them. Leaders will have to develop the ability to encourage radical or unconventional thinking and build mechanisms to reward innovative thinking.

7 Soft skills

What – the way we interact with each other, or interpersonal skills. The ability to e.g. cooperate, communicate (across different -business- cultures) and solve problems.

Why – in addition to technical competence, maintaining social and emotional intelligence in a complex production chain and agile working environment is instrumental.

SKILLING TODAY FOR TOMORROW:

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Maintaining the future – by industry-dufutur.org

"Alliance of Industry for the Future" (AIF) is a structure co-founded by UIMM uniting professional representatives. It is part of the 11 strategic plans defined in 2015 by the Minister of Economy at the time, aiming to improve modernity and excellence of French industry.

In collaboration with two well-known high schools (Arts et Métiers ParisTech and Institut Mines–Telecom) UIMM launched a study on the effects of digitalisation on skills by the example of 'maintenance' jobs. We know that digitalisation is changing the world of work, but so far there is no scientific and industry-based study looking at what skills a certain profession will require. Maintenance jobs were chosen as focus of the 1st analysis. Today these jobs are centred around correction and prevention.

Tomorrow, these exact same professions will be focussing on improvement and prediction. The result of the study should help define the objectives of what maintenance will look like in the future.

In December 2017, the outcome of the large study carried out by researchers and industry experts was presented. Jobs in maintenance are developing quickly. Future maintenance professionals will, for example, need to know what the risks of cybercrime are and how prevent it.

Workers will occupy a new place within the (global) value chain. This results in a more fluid zone between maintenance and production. The working environment will be multicultural and multidisciplinary. In terms of skills, the analysis unveiled that curiosity and inventiveness are assets. Equally rigour, methodological thinking and being open to any improvement that is suggested on a worldwide scale are skills that will be in demand.

A 2nd analysis focused on 'management' related jobs is being carried out, while the 3rd analysis is in a preparatory phase and will focus on 'logistics and production'.

DIGITALISATION AND THE WORLD OF SKILLS AND EDUCATION

OBJECTIVES – LIFTING INDUSTRY & INCREASING DIGITAL SKILLS_

There are long standing, traditional definitions of what basic skills in literacy and numeracy are. A commonly recognised definition of basic skills must continuously updated to include digital skills, identifying a minimum level of literacy, numeracy and digital skills.

Technology and digital skills must steadily fill the entire education and training system at all levels. The general level of digitalisation and technology sense of students and workers needs to increase. The level of skills must reflect the development that is taking place in the industry and on the labour market in general. After all, skills and education are the best tool to tackle social inequalities.

A Improve anticipation

Simply investing in more skills will not be sufficient – it has to be the right skills. This requires better anticipation of skills needs through improved quality and use of supply and demand data, including:

- Closer cooperation with companies (particularly SMEs), social partners and other industry stakeholders. In particular supporting in identifying skills needs.
- More flexibility on the side of education and training institutions to be willing and able to quickly respond to new technology developments.
- Remove the bottleneck of knowledge by a wider sharing of good practices.
- Better coordination and streamlining in the policy response as there is much digital learning experimentation ongoing across Europe right now, but little coordination and scientific evaluation of the outcomes.

It is obvious that, with digitalisation and the next exponential leaps that will come with artificial intelligence (AI), it will be close to impossible to achieve an exact anticipation of skills in an ongoing process with an open end. However, all efforts must be made to anticipate the broad developments and the competences and skills which will require to be mastered and shaped.

B Speed up transition to individualised learning

We are slowly moving from a one-size-fits-all, standardised approach to learning towards more individual learning pathways.

Customised learning can help students and workers develop their innate talents and capabilities. While previously a costly form of learning, the increase of digital tools has lowered the cost for individualisation significantly and it is now a real option.

It should be possible to more freely combine studies from different (VET) programmes (e.g. automation technology, mechanical and software engineering) and courses from different educational levels (e.g. from VET education and practice-oriented higher education). This is essential in enabling education to reflect the enhanced or new skills requirements.

SKILLING TODAY FOR TOMORROW:

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Securing talent pipelines – by FITech

Finnish Institute of Technology (FITech) is a network of 7 universities with engineering programmes, Teknologiateollisuus (Technology Industries of Finland), and the Academic Engineers and Architects. Companies, regional representatives, student associations and the Ministry of Education & Culture are also close partners.

The purpose is to offer students, via individualised learning paths, a wider variety of possibilities to complete their master's thesis, internships and course projects in companies based in Southwestern Finland. Several training programs and learning modules have also been designed for people already in work.

FITech's aim is to develop Finland's innovation potential with the help of high-quality higher education, research and innovation through cooperation between universities and the business sector. Its first task is to support the economic growth in Southwest Finland by increasing the number of technology experts in the area. The recruitment need for higher education graduates in companies based in the region is expected to double between 2017 – 2021 to 850 - 900 graduates annually. Furthermore, fast developing technologies such as machine learning and artificial intelligence call for new skills and competences and close co-operation between universities and companies. Taking action to improve cooperation should tackle the existing mismatch and simultaneously design ways to anticipate and respond to fast changes in the industry and work life.

Previous experience of strategic university-industry co-operation (e.g. Aalto-university and #Tampere3) have shown the potential and results of well-functioning cooperation. FITech pools together expertise and resources from several universities, industry and other partners in an effective and agile way. It provides the possibility to experiment and to adapt if need be. The Finnish government supports this entrepreneurial spirit and has allocated €12m for this cooperation for the period 2017–21.

C Rethink education & teaching

Digitalisation also changes the functioning of our society. Consequently, education and training must adapt by focusing on the following areas:

1 Cooperation

- The educational revolution is built upon an intensive and extensive collaboration between relevant players. This means that governments, industry and social partners have to create an environment ensuring that individuals can invest the time, motivation and means to (right)skill.
- Cooperation between education providers and industry is important in moving towards a more relevant, effective and transformative use of digital technologies. Employers need to play a role in the design and development of curricula, making sure that courses reflect the development taking place in industry and the labour market. Where possible, government should facilitate teachers spending time in industry through work placements.
- Strategic cooperation between industry and higher education is imperative. E.g. integration of project-based learning in universities. Higher education institutions often have links to large global companies, but SMEs have less access. Platforms could help higher education institutions cooperate with SMEs and industry as a whole.
- Education providers need to develop more attractive, open and inclusive ways to bring people in different phases of their life and professional cycles back into education. This requires more flexible education and training systems, which work closely with industry, so workers can right-skill when and where needed.
- There is no need for the creation of completely new VET qualifications – instead, the already existing qualifications should be interlinked and adapted. It is therefore necessary to identify and develop with industry additional qualifications and qualifying components that should be taught in VET.

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Alternating school and work - by ULISSE project

The ULISSE project represents an innovative model of teaching - proposed for the first time in an Italian public university - to meet the demand for students with skills relevant to the the world of work.

Teachers from the 'Università degli Studi di Milano' and companies together developed the training scheme. The first year takes place entirely in the University; the second year 60% of the time is spent in University and the remaining 40% in a company; the third year 60% of the time is spent in a company and 40% in University, with the possibility to be recruited after on an apprenticeship contract.

At the end of the ULISSE project training scheme, the students will have learned skills useful in a work context. Students benefit from the short cycles while companies profit by preparing students for the real needs of companies. In addition, the recruitment process is shortened and access to talent becomes much easier.

The project is an opportunity to test models and results of work-study alternation projects carried out with schools, higher technical institutes and universities at a territorial level.

After the initial test phase, the project is now in its 3rd edition. So far, this unique project in Italy has modernised education by defining a new model of study-work alternation that will be repeatable in diverse environments. Currently, initiators Assolombarda (the territorial employers' organisation covering the provinces of Milan, Lodi and Monza and Brianza) and the University of Milan are looking into how the ULISSE project can be expanded to other confined courses.

- The success shows that the Digital Innovation Hubs (DIH) play a key role as one-stop-shops on a local level to (re)train SME employees. The skills output from these hubs are important for industry and need to be further documented and made available for wider use.

2 Digital literacy

- Basic coding is where it all starts. Coding should be introduced in every classroom across the EU, together with logical and critical thinking. This requires investments in teachers to be on track of latest developments.
- Digital learning, both the learning of digital skills and use of digital technology, need to be integrated across all curricula.
- Teaching in all subjects should provide students with an understanding of how technology and IT work and the possibilities, risks and limitations that technology has.
- Work-based learning is an effective way of getting digital literacy into the workforce, not least through 'reverse mentoring'. This interwoven concept builds bridges in companies between young learners with a high degree of digital literacy and their senior colleagues.
- Both science universities and universities of applied sciences provide studies in analytics and cybersecurity, mainly for degree students. The competence base is improving in width and depth. It should be further improved to ensure flexible, extensive and high-level education and training in this rapidly changing environment, particularly the possibility of workers taking modules at higher education level.

3 Changing mindsets

- We really do have to change the way we think about lifelong learning and act accordingly. The notion of training and learning throughout life needs to be introduced already in early childhood education. Lifelong learning needs to be understood in positive terms, and as something for which individuals also are willing to give of their own time outside of work.
- Ongoing training is a win-win situation for employees and companies. They should therefore both commit to, and participate in, the effort and accept responsibility. The employer by allocating resources and the worker by investing time outside of working hours.
- Initiatives such as Vocational Skills Week are a good start but do not replace an investment offensive in first-class vocational schools.
- Policy makers ensure parity of esteem and means between general education and vocational schools. VET must be perceived as what it is: a 1st choice leading to quality jobs.
- There is no talent to waste! Increasing female STEM talent is vital for industry. In order to attract more girls and women to STEM, it is important to evaluate the impact of measures and actions already taken and to pursue long-term strategies based on proven results.

SKILLING TODAY FOR TOMORROW:

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Vlogger testing technology – by Therese Testar Teknik

Youtube video blogger (vlogger) Therese Lindgren became a face for women interested in tech when she in 2016 decided to take her interest in technology to the web through her Youtube channel. She started making videos testing products in a fun, unpretentious and accessible way. Swedish employer organisation Teknikföretagen seized the opportunity and proposed a cooperation. The cooperation sprung from the difficulties employers have finding (right skilled) workers when the number of students choosing for science, technology, engineering and mathematics (STEM) keeps on decreasing.

The aim is to inspire young people in general, and girls in particular, to choose technical education and occupations. In addition, the communication has been focused on youth and industrial digitalisation. Through Therese Lindgren, technology companies can reach out to the target group of young girls when they are about to choose their high school programs. Since the 1st season was produced, 'Therese Testar Teknik' videos have had 1,4 million viewers. Her channel has +600,000 subscribers and her videos have won prestigious awards. In 2017, for the first time, the number of girls registering for STEM courses in Sweden increased.

DELIVERING IDEAS – EACH PARTNER ITS FAIR SHARE_

The recommendations in this publication are the result of discussions among industry experts concerning actions that the EU, national governments, education and training providers, social partners, employers and individuals could take to close the digital skills gap. It is clear that we are in the midst of a dynamic process of which the result cannot be anticipated. Therefore, all stakeholders have to be more open to trying new pathways and solutions.

One main conclusion is that the skills gap is mostly linked to the fact that the education and training systems in Europe are currently not able to catch up with the pace of technological change. A positive effect is that, if properly dealt with, a good digital skills set can narrow the social inequality gap. This means as well that not embracing the need to step it up is self-defeating and putting the social Europe as we know it at risk.

If the European Union wants to strengthen its leadership and stay ahead of the global economy and society impacting technologies, it must act on the following:

A EU level

Within its remit, the EU has recently been accelerating its efforts to highlight the importance of digital skills, STEM disciplines and entrepreneurial competences. However, these good initiatives alone will not be sufficient.

SKILLING TODAY FOR TOMORROW

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ERASMUS+ 4 Change – by Change 4 Industry

The consortium strives to tackle the skills gaps of metalworkers through enhancing the responsiveness of VET systems to manufacturing sector-specific labour market needs, and in particular the demand for new digital and entrepreneurial skills.

For this purpose interactive training material and Computer Numerical Control (CNC) simulation software will be developed, in line with the European Qualifications Framework (EQF) for VET programmes. Such a digital training programme will be the first state-of-the-art interactive programme in the Baltic countries. Professional coaching is offered to maximize potential and unlock latent sources of productivity.

Metalwork graduates from VET institutions from the countries involved lack skills to operate CNC machines. Because of the limited interaction between VET institutions and the private sector, skills development as well as hands-on training is of paramount importance to industrial growth. A first step is to train the trainers via an integrated coaching methodology.

The project outputs will be developed in close cooperation between private sector and VET providers to enable the creation of VET programmes that respond to changing skills needs in companies and society.

By the end of the project, the consortium intends to translate these into innovative, learning outcome-oriented vocational curricula including periods of work-based learning, applying the European Credit System for Vocational Education and Training (ECVET).

_EVENTUALLY_ACTING_

As follow up to the Commission's Communication "Towards a European Education Area by 2025"; an "Education package" was adopted at the beginning 2018. It comprises a Council Recommendation putting the focus on the need to develop basic skills and soft competences in the context of lifelong learning. The package also includes a Digital Education Action Plan to support the overall development of digital skills and competences.

The initiatives of the Recommendation e.g. propose to raise the attractiveness of STEM studies and careers for -in particular- women and youngsters, is something Ceemet has been consistently calling for. Its members have been active on the topic as this report shows.

As digital skills are permanently evolving, Ceemet has often underlined the need to regularly update the definition of digital skills. Ceemet welcomes that the Commission did so by including coding, cybersecurity and citizenship aspects. This fits with the additional priority the Commission identified: boosting entrepreneurial competences and digital entrepreneurship.

_KEEPING_THE_OVERVIEW_

However, for companies it is difficult to keep an overview of what and where initiatives are taking place and how to get easily involved in them in order to overcome their "digitising challenges".

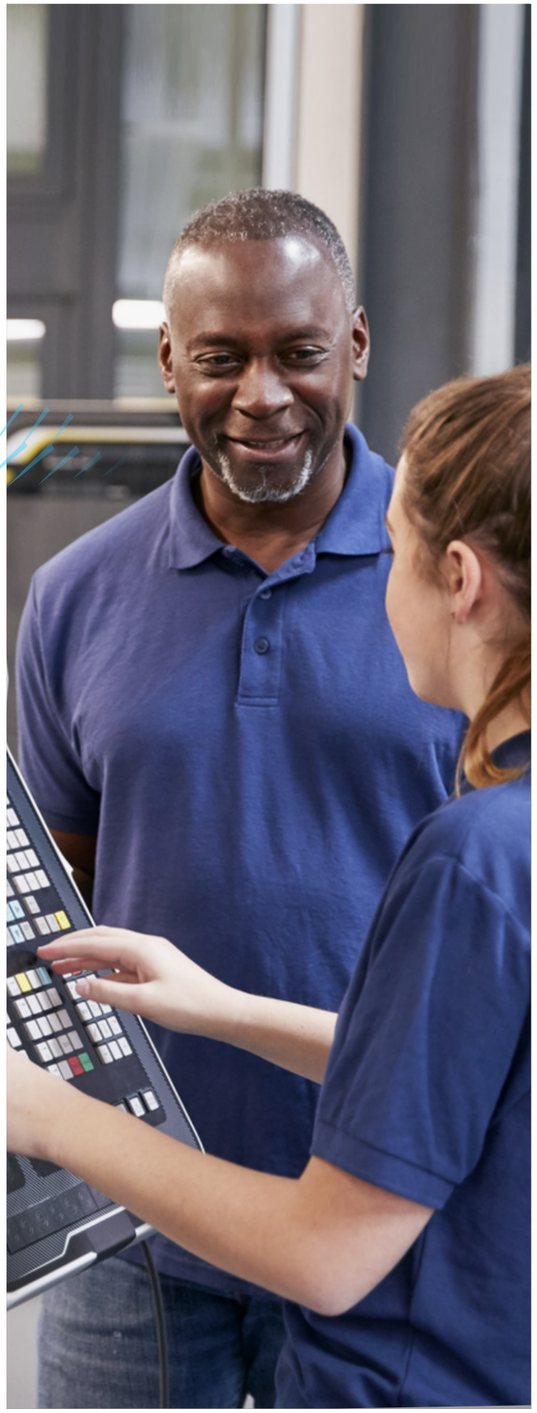
The so called "European platform of platforms" on digitising the industry, launched in March 2017, is a good starting point to streamline and coordinate the different initiatives that exist at national level. This will facilitate the uptake of digital technologies and training by the manufacturing industry.

A user friendly "EU one-stop-shop", would help companies, especially SMEs, to tackle their skills gap.

_SUSTAINABLE_FINANCING_

The post 2020 Multiannual Financial Framework must allocate more funding, including for sector or company level initiatives, for adapting the different facets of (initial) education and training to a “digitalised world of work”.

Well intended programmes make no sense if they are not easily accessible for industry. Or if there are no tangible results required.



B National stakeholders

The “digital labour market” should be understood as being a fluid labour market. Companies have the possibility to easily make use of the digital technologies to adapt to a changing reality.

1 Education policy

Member States must recognise this reality and shape their policy adequately. Education and training systems able to adapt to the future (digital) skills needs of industry are the key to keep, create and grow industry in Europe.

_LIFELONG_LEARNING_

Member States should focus on how training systems fully can live up to their responsibilities by involving companies in the (re)education and training of skilled workers. This includes companies, SMEs in particular, that cannot provide a full education programme.
Where these training systems are not practical, facilitate the use of online tools such as high-quality and labour market relevant VOOCs to allow small and medium sized companies to, as possible, train their employees with the least disruption to production.

VOCATIONAL,EDUCATION & TRAINING

Governments need to contribute to shifting the perception of VET. This can be achieved through greater industry – school cooperation in governance as well as through offering work-based learning, teacher exchanges and apprenticeships. Fostering permeability between VET, general and higher education will make it easier for students to move between systems and thus increase its attractiveness. Consistent follow-up on the goals of vocational education reform is needed, including quality assessment and offers to ambitious students.

SKILLING TODAY
FOR TOMORROW

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Managing change successfully –
by Social Partner Agreement

In Germany the Social Partners of the Metal, Engineering & Technology-based industries (MET), Gesamtmetall, IG Metall, VDMA and ZVEI, negotiated an agreement signed in April 2016 titled “Training & Qualification for Industry 4.0 – Managing change successfully.”

The Social Partners committed to analysing all relevant vocational education and training occupations and advanced vocational training with the goal of assessing whether they need to be updated to fit the requirements of industry 4.0. Social Partners organized this process and involved company experts as well as scientists in order to develop concrete proposals for further measures.

They came to the conclusion that VET and CVET in the German MET industries must be updated to fit the world of industry 4.0 but that there is no need for completely new job profiles or to shift the practical orientation of existing occupations. They agree that the training regulations of the industrial metal and electrical occupations need to be partially revised.

The concrete recommendations for action published early 2017 are currently being worked through by the competent ministries and key decision makers and being put in place via an accelerated procedure so that companies can train according to the updated training regulations as of August 2018.

_GENERAL & HIGHER EDUCATION

Member States who do not already have a digital or technology pact intended to strengthen and promote digital education at general and vocational schools should seek to emulate good practice around them. Both industry and universities must join forces and support government in the development of new curricula and training programmes. A concrete way of increasing digital skills in Europe would be through the introduction of Chief Digital Officers in schools. This would give schools the opportunity to stay ahead of the digital curve in relation to the digital education of young Europeans.

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Managing competences for the future –
by Smart-COMET

Smart-Comet is a joint project between the Turkish employers’ association of metal industries, MESS, Dekra Akademie GMBH, Fundacion Laboral del Metal, MESS Training Foundation and the Turkish Ministry of National Education that will develop, pilot and implement a competence management system for the metal sector.

Within the framework of the project, on a pilot basis, a school-enterprise cooperation system will be designed and implemented for metal sector companies using a competence management (COMET) approach.

It aims to improve enterprise and school capacity to manage human resource challenges including, but not limited to, the ability to better manage and anticipate skill needs over a strategic horizon.

The objective is to help participating schools to better adapt to evolving labour market needs by working closer together with metal enterprises.

2 Social partners

Social partner activities will add value to embracing and the uptake of digitalisation in the industry. Within their dialogue, the partners can take their natural role of facilitators towards education providers, government bodies, companies and employees.

This consists of i) making concrete recommendations on the development of education policy and curricula and ii) accompanying the digital transition on the work floor by developing facilitating appropriate training models for workers in the transition period.

3 Employees

Ongoing vocational training and LLL is a function of benefits and interests for the employees. The responsibility for it lies not exclusively with authorities and employers. Therefore, employees should participate appropriately in the effort and accept to bring in their share. Dedicating a part of their free time constitutes a good possibility for the employee to contribute to the ongoing training effort.

By consequence, it will facilitate the upgrading of skills and qualifications of employees in the metal sector in partnership with schools.

At the end of 2018, the project partners will present their outcomes, including:

- School-enterprise cooperation model study drafted and disseminated
- Learning outcome-based COMET framework and IT tool to be developed and used by metal enterprises and schools in partnership with European experience.

C Industry

Industry's role can be summed up in C3: Cooperation, Coordination & Communication.

COOPERATION

Employers should accelerate their engagement with schools, colleges and universities to better articulate the skills needs of industry and to encourage young people into the industry. Equally companies need to reinforce their commitment in partnerships with education and training providers.

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Skills in Metal and Electro Industry – by SkillME

The MET employers' organisations GZS (SL), MASOC (LV), HUP (HR) & ZEP (SK) joined forces in 2014 with national VET providers and regulatory bodies.

Purpose was to identify the most pressing skill gaps and develop trainings to close those. The wider objective was maintaining a productive workforce that can successfully compete on a global level while facilitating workforce mobility, flexicurity and cooperation among EU members.

SkillME developed curricula and training materials following the European Credit system for Vocational Education & Training (ECVET) and European Quality Assurance in Vocational Education & Training (EQAVET) principles.

+ 400 students and workers participated in pilot trainings developing their skills and increasing their competences. Since end 2017, all materials are freely available for open use and distribution on the project website. Following the success of the project, the Alliance for advancement of VET was launched to keep the momentum.

COORDINATION

Employers must understand that the benefits of offering training and career perspectives to (future) employees are mutual and can be used to attract and retain top talent. Companies must adopt a learning approach to cope with their own organisations different (digital) learning requirements. SME's should consider how they, with lesser resources, make themselves capable of speeding up learning.

Employers should keep an eye on the big picture and not let the need for technical skills overshadow the need for creativity and soft skills. See them as equally important and invest in them accordingly.

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Looking beyond 2020 with 4D – by 3D digital imaging

The Bulgarian Branch Chamber Machine Building (BBCMB) supports its member companies by offering training in cooperation with specialized training providers. Aim? Improve digital skills.

This essential contribution focusses on small and short-term pilot projects. These are carried out in close cooperation with the Bulgarian Academy of Sciences departments dealing with 3D models, simulations, optimisation and corresponding resolution.

The required skill set for software development is key for the digitalisation of products and competitiveness beyond 2020. This is the next step to the following level of 4D digital imaging.

A national training network for training providers from machine building companies is being set up. The network will partner with the Bulgarian Academy of Sciences departments and other leading training providers.

By facilitating access to equipment and knowledge, the number of experts and expertise in 3D will grow. Which is necessary to prepare the next step: 4D

COMMUNICATION

There is no point in cooperating and coordinating long-term efforts without communicating about it. This has to be done via the right channels and credible messengers, in the appropriate language of -next generation - workforce, schools and other stakeholders.

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Let the games begin – by STEM video game challenge

The challenge is focussing on upper-primary and secondary school students to design a video game and develop skills and engagement with STEM areas. By the development of a video game creativity, problem solving, team work and ingenuity is demonstrated.

While dedicated research into the relationship between playing video games and education may still be relatively new, games in many forms (both digital and otherwise) are already widely used by teachers, parents, schools and other institutions with an interest in teaching and learning.

The Australian STEM Video Game Challenge was developed to expose students to STEM-related disciplines in creative and exciting ways during their school years. This to inspire a genuine interest in further study, and ultimately successful careers, in STEM. The Australian STEM Video Game Challenge was established in 2014 by the Australian Council for Educational Research (ACER) through the ACER Foundation and has since grown to encompass a community of more than 3,000 students across Australia.

ceemet

European Tech &
Industry Employers

Who is Ceemet?

- Ceemet represents the **Metal, Engineering and Technology-based industries (MET)** employers in Europe, covering sectors such as metal goods, mechanical engineering, electronics, ICT, vehicle and transport manufacturing.
- Our member organisations represent **200 000 companies** in Europe, providing over **17 million direct jobs and 35 million indirect jobs.**
- Ceemet is a recognised **European social partner** at industrial sector level. Our vocation is promoting global competitiveness for European industries through consulation and social dialogue.