WHITE PAPER

STRENGTHENING TALENT AND SKILLS IN THE MANUFACTURING INDUSTRY AND IN INDUSTRIES WITH MANUFACTURING CHALLENGES

FLANDERS MAKE

DRIVING INNOVATION IN MANUFACTURING

Many thanks to Case New Holland Industrial (Paul Snauwert, Marc Bomberna and Luc Nauwynck), ZF Wind Power Antwerp (Joris Peeters), Atlas Copco (An Debruyne) and Punch Powertrain (Karel Vergote) for their valuable suggestions for the draft version of this white paper.

LABOUR MARKET PERSPECTIVES FOR THE MANUFACTURING INDUSTRY IN FLANDERS

INTRODUCTION

More and more companies are struggling to fill vacancies and retain employees as the active workforce is ageing and decreasing in numbers. At the same time, the influx of relevant profiles is too low to compensate for the outflow.

In addition, company employees will in the coming years need different expertise and skills because customers expect unique products at the price of batch products, which will require increased customisation. Or because companies, for example in the automotive sector, are investing in the standardisation of (sub)systems or (sub)products. This will enable them to continue offering their customers unique end products in complex conditions with strict regulations that have an impact on the development and validation process.

The proper operation of smart production lines and products, evolving from mechanical to mechatronic, are also increasingly dependent on sensors, electronics and associated software, data acquisition, storage and processing. This growing trend also brings upskilling and reskilling needs. The resulting increased focus on digitalisation and automation leads to different services and smart, connected products in the manufacturing industry.

We are also in the midst of a transition towards a sustainable industry, which requires a lot of efforts from companies and their employees: value chains must be built and business models will change.

This transition is taking place at multiple levels: in product development and the choice of components and materials, during the production and use of the product, in the supply chains all the way to the source, including energy generation, and finally in recycling.

Every company involved can thus do its bit, and by acting on as many levels as possible, we can together achieve a big impact.

In short, companies face major challenges in the coming years, both in recruiting and retaining staff and in covering their reskilling and upskilling needs. But what knowledge and skills are needed to prepare the industry for the future?

This white paper provides a general framework concerning the need for reskilling and upskilling.
Flanders Make will later organise a study and company survey in view of setting up an appropriate training offer.

MAJOR LABOUR MARKET SHORTAGES BY 2030

It is no secret that the Flemish labour market is under severe pressure. Due to population ageing, the working population is decreasing and the average age of the active labour force is rising. The Flemish government's Department of Employment and Social Economy states in its recently published report[1] that an evolution of the labour market in Belgium is underway in which we are moving from a situation with a structural oversupply (+100k in 2016) to a situation with a large structural labour shortage (-300k in 2025), with demographics and the growth of the service sector as main causes.

Agoria's 2020 'Be The Change' study[2] also shows that by 2030 about 541,000 vacancies in Belgium will remain unfilled due to the gap between supply and demand of skilled workers. The same study shows that, based on the age pyramid from 15 to 64, we can expect a 0.11% decrease in the active population in Flanders over the same period.

In addition to these shortages, we see a number of impactful changes in the market that will have their full effect by 2030: by then, successful companies will have to operate digitally and sustainably. We share our vision of these transitions and provide a training framework to help Flemish companies move towards a digital, sustainable and competitive industry.

The situation in Flanders is similar to that in the rest of the world. A recent study published by Roland Berger indicates that by 2050 there will be fewer and fewer active people throughout the world due to the ageing population. In other words, the rapid replacement of older workers is a concern in all regions. This puts pressure on the labour market but also on companies that are gradually losing expertise. This expertise must be included in systems so that young people can be supported and companies can continue to produce using current expertise[3].

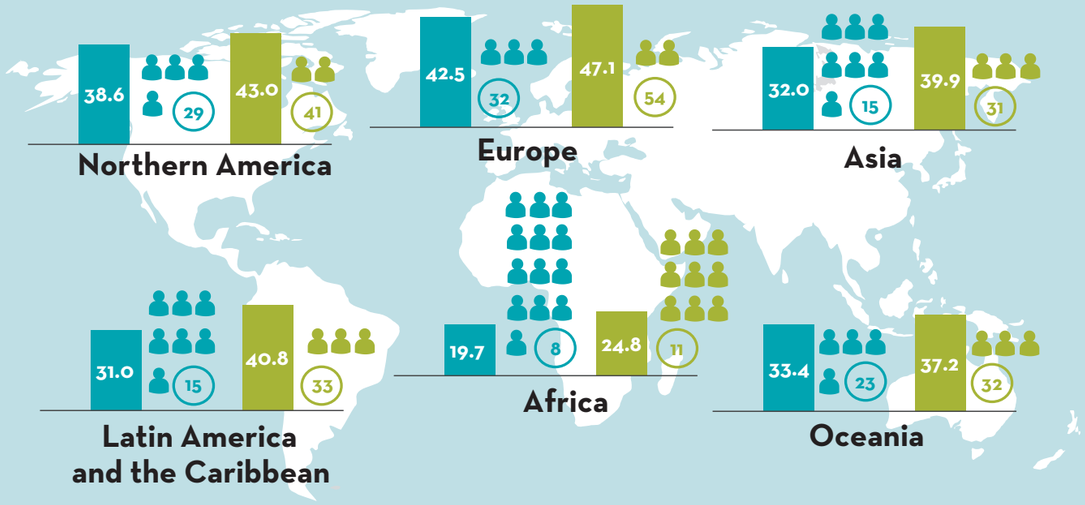
[1] Skills roadmap for Flemish climate transition; Focus on energy-intensive sectors [2020-2035] (Roland Berger)

[2] Be The Change, guidance and levers for a labour market in full change (update 2020 in figures – Agoria)

[3] The Roland Berger Trend Compendium 2050

All regions are aging until 2050, with less people of working age having to support more older people

Median age [years] and old-age dependency ratio by region 2020 vs. 2050 [people 65+ / 100 people 20-64]



Average age and dependency ratio of older people: the ratio between the number of older people at an age when they are typically economically inactive and the number of people that are typically economically active in 2020 and 2050 (Roland Berger)

TOWARDS A DIGITAL TRANSITION AND A MORE SUSTAINABLE INDUSTRY

It should come as no surprise to anyone that the digital transition will require a major change in the future profile of employees. Operators in tomorrow's production environments will play a different role in the organisation. Smart, connected machines, big-data, machine learning and digital twins will be the driving force behind the factory of the future and the products made there.

These smart products and machines contain more and more electronics and software, which will – in turn – lead to additional training needs, not only among the employees of manufacturing companies, but also among managers, who may also have to gain knowledge outside their area of expertise.

Another change in the market that has its impact on the preferred profile of employees is the call for a more sustainable industry. The climate agreement, presented at the 2015 Paris climate conference, is an international treaty to curb global warming and calls for an overhaul of the environmental and economic framework. To this end, the Flemish government has drawn up an action plan with the ambition to reduce greenhouse gas emissions by 35% by 2030.

In concrete terms, this means that companies must learn to make sustainable products and production systems. They will not be able to do this alone, as every company has its place in a broader sustainable framework. Gaining insight into the value chains within which one's company fits is a logical first step, and establishing partnerships with other companies with an eye for increased sustainability is the next necessary step.

But making industry more sustainable requires more than just implementing the climate agreement. Economic, social and government measures are also needed. Sustainability is a broad concept, the following figure indicates four key focus and impact areas to move towards a sustainable industry, taking into account manufacturing challenges:

Industry 4.0, motor for end-to-end digitalisation transformation (Flanders Make)

PAYBACK TIME OF DIGITALISATION AND INCREASED SUSTAINABILITY

FOCUS

A study by McKinsey4 shows that the implementation of Industry 4.0 concepts is both a motor and catalyst for end-to-end digitalisation and sustainability. When calculating the pay-back time of actions, both direct and indirect effects should be included in the ROI (return on investment) calculation. The indirect effects can generate up to twice as much in revenues as the direct effects according to business case studies by McKinsey. This makes the implementation of Industry 4.0 concepts in scalable pilot projects very valuable as part of a digitalisation and sustainability strategy.

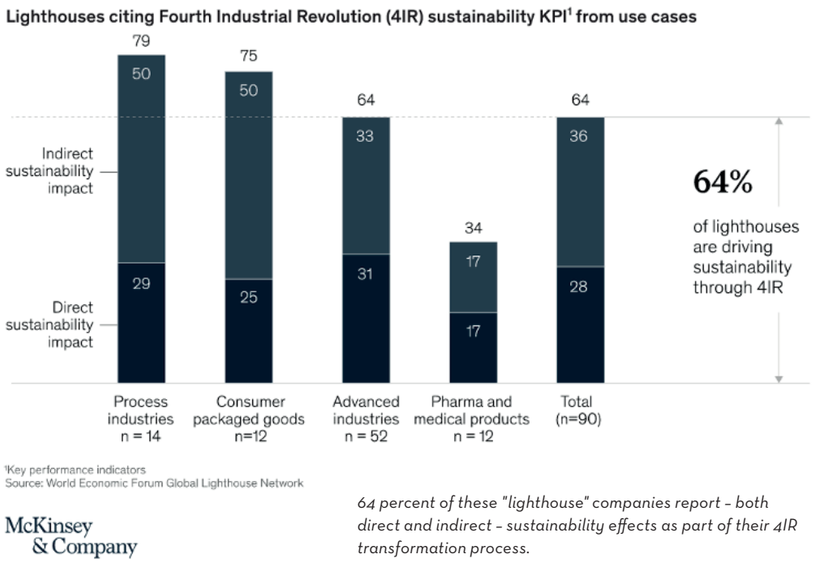
This McKinsey study from 2021 shows that 64 percent of so-called "light house" companies, which are considered to be role models for other companies, report sustainability effects as part of their Fourth Industrial Revolution (4IR) transformation. These effects come from direct use cases, designed with sustainability in mind, as well as indirect use cases, designed for other purposes, and also producing sustainability results.

Of the 14 "light house" companies in the process industry, for example, 29 percent report sustainability gains from direct use cases, such as the deployment of digital twins as advanced models for improving the sustainability of an entire operation. As many as 50 percent report sustainability gains through indirect use cases, including the use of advanced analytical tools to increase the quality of machine output and reduce waste due to downtime.

[4] Lighthouses unlock sustainability through 4IR Technologies (McKinsey) Sept. 2021

[5] Global Light House network (McKinsey)

Fourth Industrial Revolution digital transformations bring opportunities to businesses to drive both sustainability and operational performance.



[1]Key performance indicators
Source: World Economic Forum Global Lighthouse Network

McKinsey & Company

64 percent of these "lighthouse" companies report – both direct and indirect – sustainability effects as part of their 4IR transformation process.

IMPACT OF TRANSITIONS

Overall, we can say that the upcoming transitions will impact many functions within a company and in end-to-end relationships, from supplier to customer. In addition, upgrades will also have an ever-increasing impact on the further life of products. Once they've reached their end-of-life, recycling must lead to reusable components and new raw materials.

Many jobs will change in content: both the demands imposed on employees and the tasks associated with a particular job will be different. Moreover, it will only become more difficult to fill specific jobs due to a lack of trained employees. Training people yourself is therefore a key message and, at the same time, another challenge. The "War for Talent" will continue and intensify. Companies will therefore have to focus even more on recruiting people who are willing to continue learning throughout their careers, and on talent development, through classroom and remote training courses combined with on-the-job training.

In addition, a high degree of standardisation to manage the complexity of (sub-)systems and (sub-)products or the increased customisation of products and digitalisation of production makes work more complex. Companies should therefore focus on strong, complementary and self-managing teams within which knowledge and competences are freely distributed.

These developments in the manufacturing industry require new competences and skills from employees. In the following chapter, we will define and discuss these new competences and skills.

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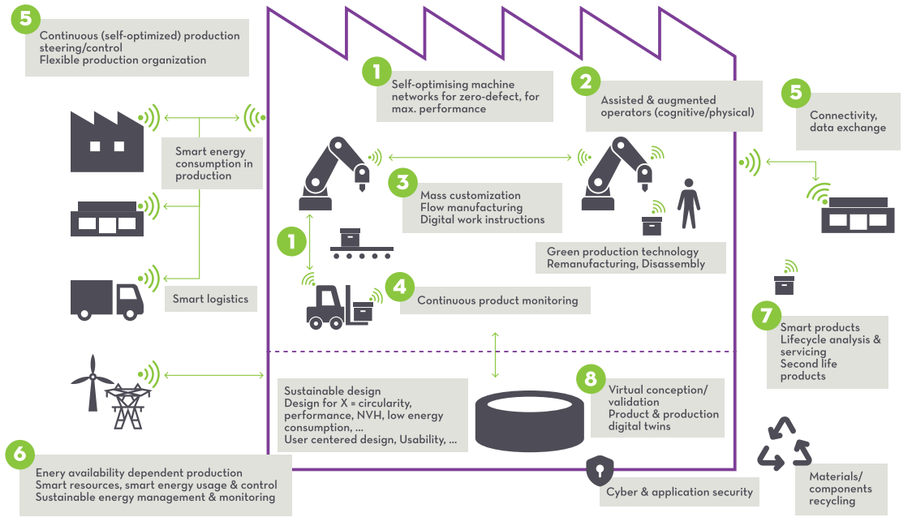
WHAT DEMANDS DOES INDUSTRY 4.0 IMPOSE ON THE MANUFACTURING INDUSTRY OF THE FUTURE?



Based on Roland Berger, 2015

An overview of the requirements imposed by Industry 4.0 on the manufacturing industry of the future (based on Roland Berger's model)

1. **Self-optimising machine networks for zero defects and maximum performance**

Internal and external systems, from connected partners for example, collect real-time data. Based on these data, the production planning is continuously adjusted, resulting in zero defects and a maximum-performance production process.

2. **Assisted and augmented operators (cognitive and physical)**

Operators supported by robots, cobots and augmented reality applications. Not only does this create workable work, it also increases the productivity, quality and flexibility of both processes and employees.

3. **Customised mass production, flow production and digital work instructions**

With the shift towards mass customisation, companies need processes that are geared to this, such as flow production. Here, flexible assembly and production systems ensure an uninterrupted "one-piece" flow in which goods, services or materials flow through the process during production, every step adds value and products do not have to wait for the next operation. Digital work instructions support the operators throughout these customised work processes.

4. **Continuous product monitoring**

The continuous monitoring of products provides feedback on their use that can be used to improve their design and production. It also allows to detect the need for maintenance or repair works. Manufacturers may be able to create new business models based on the acquired data.

5. **Continuous (self-optimised) control of production, flexible production organisation**

Production processes must be analysed in real time to enable improvements and efficiency gains. Production processes must be quickly and easily adaptable to changing conditions and requirements.

6. **Production based on energy availability, smart sources, smart energy use and control, sustainable energy management and monitoring**

Smart sources of energy, such as solar and wind power, are an increasingly important part of production environments. These sources are not only cleaner than traditional energy sources, but usually also more reliable and accessible.

Smart energy use includes techniques for saving energy, optimising production processes and using energy-efficient equipment. It also involves minimising waste and production downtimes as well as reducing harmful emissions.

7. **Smart products, lifecycle analyses and maintenance, products with a second life**

Lifecycle analyses assess the environmental impact of products throughout their lifespan, from the mining of raw materials to product disposal, with the aim to reduce their environmental impact.

Maintenance is an important part of any lifecycle analysis, as well-maintained products last longer and don't need to be replaced as quickly. This not only reduces the environmental impact, but also the costs for companies and consumers.

Products with a second life are products designed to be reused or recycled after the end of their useful lifespan. This reduces the need for landfills and the reliance on new raw materials. For example, companies can design products with easily replaceable parts or with a modular design, making them easier to repair or replace.

8. **Virtual conception or validation, product and production, digital twins**

Virtual conception and validation involves testing and validating products, processes and systems through simulation and computer modelling, without actually building physical prototypes. This saves time and costs and enables companies to quickly make changes and solve problems before they are introduced into production.

Digital Twins are digital models of physical systems, products or processes that use real-time data to track the performance and status of the physical product in real-time. This gives companies insight into the performance of their products and enables them to make proactive improvements before problems arise.

Industry 5.0 comes with a few additional requirements, including:

9. **Autonomous production**

The manufacturing industry must be able to implement autonomous production processes, where machines and robots work together to manufacture products without human intervention.

10. **Artificial intelligence**

The implementation of artificial intelligence can solve specific challenges and improve production processes. Implementing artificial intelligence in production processes requires extensive knowledge and experience in both machine learning and industrial automation. In addition, sufficient data need to be available to train and test models as well as solid infrastructure for their implementation and maintenance.

11. **Decentralisation**

Decentralisation in the manufacturing industry includes moving production processes and production centres closer to customers, resulting in shorter delivery times and reduced CO_2 emissions.

FOCUS

The manufacturing industry faces the following technological challenges:

These impactful changes with their corresponding new demands on the industry create a number of challenges for which solutions must be found or which will require more attention in the coming years. In this context, we make a distinction between technological challenges and sustainability challenges.

1. Integration of technologies: the challenge is to integrate different technologies such as robots, sensors, cloud computing and artificial intelligence into production processes.

2. Cyber security: the challenge is to protect production processes and business data from cyber threats and security breaches and develop products that can be safely integrated into an IT/OT environment.

3. Data analytics: the challenge is to analyse the huge amount of data that are generated during production processes and obtained from the operation of products at customers and use these data for developing improvements.

4. Human-machine collaboration: the challenge is to improve the collaboration between humans and machines and ensure that machines can work safely with humans.

5. Sustainability: the challenge is to develop and implement sustainable products and production processes that are energy-efficient and minimise the use of raw materials.

6. Skilled workforce: the challenge is to find trained employees who are skilled in the latest technologies and are able to implement and manage them.

The biggest challenges for the manufacturing industry to manage the sustainability transformation are:

1. Energy efficiency: many production processes in the manufacturing industry are energy-intensive. The challenge is to make these processes more sustainable without compromising on productivity.

2. Waste reduction: the challenge is to reduce the huge amount of waste generated by the manufacturing industry while at the same time improving the production process.

3. Material selection: finding sustainable alternatives to conventional materials is a major challenge, especially if these alternatives are not available or not economically viable.

4. Sustainability of Supply Chain: improving the sustainability of the entire supply chain, including suppliers and distributors, is a key challenge.

5. Financial challenges: sustainability projects require investments that often face resistance due to their high costs. Many companies will be engaged in the coming years to find ways to overcome this financial challenge while achieving their financial goals.

6. Innovation: continuing to innovate and develop new technologies will be a prerequisite to meet the changing needs of the market and customers.

KEY NEEDS FOR SKILLS AND TRAINING

There is no doubt that these new ways of production, distribution and consumption will demand a lot from our manufacturing industry and that there are or will be challenges with respect to the changing labour market and the need for upskilling and reskilling employees.

Based on the new demands imposed on the industry and the challenges we are facing, we have identified the following training needs to make companies ready for the future:

1. Technological skills: employees must be trained in the application of new technologies, such as artificial intelligence, cyber security, augmented and virtual reality, digital twins, data analytics and digital product development and production techniques.

2. Collaboration with machines and robots to improve production efficiency through digital work instructions, AR/VR.

3. Analytical skills: how do your employees handle the huge amounts of data, how can they analyse and use these data to extract actionable information that can be used to improve production processes and products, amongst other things.

4. Sustainability: How do employees work on sustainable product development and production techniques and how do they contribute to a circular economy?

5. Digital skills: how can employees use digital technologies to improve and automate products and production processes.

6. Soft skills: skills in collaboration, communication and problem-solving become more important when working with other team members and machines.

The World Economic Forum reports in its "The Future of Jobs Report" that in future employees will need the following skills in the 4 categories defined below.

These skills will have to be addressed in all talent development efforts and are an explicit part of the training framework that will be discussed further on.

Top 10 skills of 2025

WORLD ECONOMIC FORUM

Type of skill

- Problem-solving
- Self-management
- Working with people
- Technology use and development

Analytical thinking and innovation	Leadership and social influence
Active learning and learning strategies	Technology use, monitoring and control
Complex prolem-solving	Technology design and programming
Critical thining and analysis	Resilience, stress tolerance and flexibility
Creativity, originality and initiative	Reasoning, problem-solving and ideation

Source: Future of Jobs Report 2020, World Economic Forum.

Top 10 of most important skills in the manufacturing industry (Future of Jobs Report 2020 World Economic Forum)

Based on the template of the "Skills Roadmap" for the Flemish climate transition, which was developed for the Flemish government[6] and focuses on energy-intensive industries, Flanders Make has created an adapted version for the manufacturing and processing industry, taking into account future trends, the needs of the industrial sectors for realising their digital and sustainability transition as well as the required productivity increase.

The key upskilling needs up to 2035 have been identified; we see that topics involving sustainability, greening and digitalisation play a crucial role. Overall, the overview below includes competences in three categories: sustainable and circular competences, people-oriented competences and digital skills. This analysis has been conducted for the broad manufacturing industry. The specific activities of individual companies will determine which competences are relevant to them.

The main building blocks for workplace competences consist of:

Technical knowledge (Knowing)
Theoretical knowledge/information about a technical subject matter

Technical skills (Doing)
Skills related to specific technical applications

Soft skills (Being able to)
Skills related to people, social and communication skills as well as personality characteristics

Infrastructure
Finally, it is also important to have the necessary infrastructure in place so that technical knowledge can be immediately tested and put into practice during training sessions.

This generic framework serves as a starting point for individual companies. Based on an overview of the available competences and the needs for the future, companies can determine their own specific training needs, which can be addressed by themselves or through third parties.

[6] Skills Roadmap for Flanders' climate transition; Focus on energy-intensive sectors [2020-2035] (Roland Berger)

	KNOW Technical knowledge	DO Technical skills
Sustainable, green smart, connected products	• Industry 4.0 technologies (=> products) • Mechatronics, Thermodynamics, Design science (Digital twins, NVH, robustness, reliability, functional safety ...), software • Data science (generation, analysis, dashboarding) • Making AI algorithms robust and reliable for industry • Usability science, User centered design	• Design for X (product fam lies, green, sustainability, lifecyle, upgrading, UX design, ...) • Sensor systems for smartness of products • Design, development and exploitation of products & digital twins & data streams • AI for industry (manufacturing environments) • Digital twin design, usage and exploitation • Creating actionable insights for products • Software developments
Circular products	• Design for circularity • Applied material science	• Life cycle assessments • Life extension technologies • Remote repair and service technologies
Sustainable - green, smart connected production systems	• Industry 4.0 technologies (=> production) • Flexible assembly technologies (c/robots, AR, VR, ...) • Flow manufacturing (ERP/MES, lean, QRM...) • Advanced logistics • Usability science, User centered design	• Flow manufacturing developments and exploitation • Design, development and exploitation of production & digital twins • Integration of new production technologies • Sensor systems for smartness of production systems • Creating actionable insights for production
Circular production	• Applied recycling science • Sorting technologies • Disassemby technologies	• Remanufacturing • Zero waste production • Applying sorting technologies • Waste recycling production
People – Technology Man - Machine interactions	• Workable work concepts (needs and challenges of emotional, organizational, cognitive and physical mechanisms for operators) • Man-machine interaction science • Assessment of man-machine maturity	• Social/People/technology impact analysis • HMI design & developments • Generating digital work instructions • Developing workable work environments
Sustainable - green business models and ecosystems	• Economics, business and financial modelling • Sustainable/green/circular economy business models • Key elements for dynamics of an ecosystem/network • Sustainable business models for ecosystems • Value chains, TCO business models	• Commercial skills for sustainable business • Life-time extension (repair, revamping) (TCO) business models • Innovative ecosystem setup, orchestration and maintenance for value chains • Success factors for sustainable business modelling
Digital setup	• Industrial IOT technologies including 5G • Cyber & application security technologies • Data related science • Meta data generation methodologies	• Setting up, maintaining and securing IT/ OT/IOT infrastructure • Setting up data storage environments (edge, device, cloud) • Setting up, maintaining and securing data processing algorithms • Meta data creation and maintenance
Digital use	• Functionalities of sensors, digital technologies • Functionalities of support programs • Product Domain Knowledge • Production Domain Knowledge	• Basic digital ability • Use of predictive maintenance • Using smart sensing & control technologies • Using industry 4.0 technologies (AR, VR, Cobots, ...) • Creating digital work instructions • Transforming domain knowledge into digital twins
Digital innovation	• Programming • Data science (e.g. AI) • Architectural product & production platform knowledge • Product & Production Digital Twins	• Decision making based on data analysis • Architectural product family developments • Architectural production developments • Creation, updating and maintenance of product & production Digital Twins

CAN
Soft skills

Self management
- Resonsibility
- Critical & ethical thinking
- Decision making skills
- Systems thinking
- Creative and innovative thinking
- Entrepreneurship
- Willingness to learn

Planning & organization
- Scenario thinking
- Flexible planning & organization
- Organisation development for flexible and agile production
- Agile project work

Communication & cooperation
- Leadership
- Organisational design
- Transformation management
- Coaching and training
- Multidisciplinary cooperation
- Participative techniques

Networking, team developments
- Stakeholder management
- Team dynamics, safe teaming, building trust
- Intercultural skills
- Language in the workplace

Needs in terms of skills and training programmes to enable the transition in the manufacturing and processing industry, based on Roland Berger's Skills Roadmap (Flanders Make).

Enabling upskilling/reskilling infrastructure - Industrial Representative Training Center infrastructure

IMPACT

Agoria's "BeTheChange" study[7] includes the analysis conducted by the sector federation of the different types of employees for the ICT and technology sector in Flanders. It is important here to state that different profiles need training tailored to their specific profile.

This methodology can be applied to different classifications within companies and to different numbers of employees within a given job profile. These figures for the different job profiles are shown in the following table:

Flanders	2021		Total 2021	Est. 2030		Total est. 2030
	ICT	Technology industry		ICT	Technology industry	
ICT workers	51.916	2.893	54.809	60.982	4.237	65.219
Mechatronic technicians	1.098	68.744	69.842	1.110	70.422	71.531
Management	11.609	7.077	18.686	12.534	7.139	19.673
Production-people	5.822	38.593	44.414	6.052	34.208	40.259
Sales		5.325	5.325		5.631	5.631
Scientists & engineers	3.252	9.727	12.979	3.590	10.708	14.298
Staff	12.794	26.337	39.131	11.374	23.048	34.423
Others	3.807	4.660	8.467	3.706	4.578	8.284
Total	90.298	163.356	253.653	99.348	159.971	259.318

Analysis of the different types of employees for the ICT and technology sector in Flanders, with in green the job types focussed on by Flanders Make

The transition to a sustainable manufacturing industry (including ICT) has an impact on almost 254,000 employees (2021), a figure that is expected to grow to almost 260,000 by 2030. The shift in roles has already been incorporated, as is the fact that the same number of people will have to produce a larger quantity than before. These figures do not include indirect employment, i.e. jobs created in other sectors as a result of employment in the manufacturing industry. The number of indirect jobs is at least as high as the expected 260,000 direct jobs. The manufacturing industry is and will therefore remain a major driver of wealth creation in the region, with – as a result – a major economic and social impact.

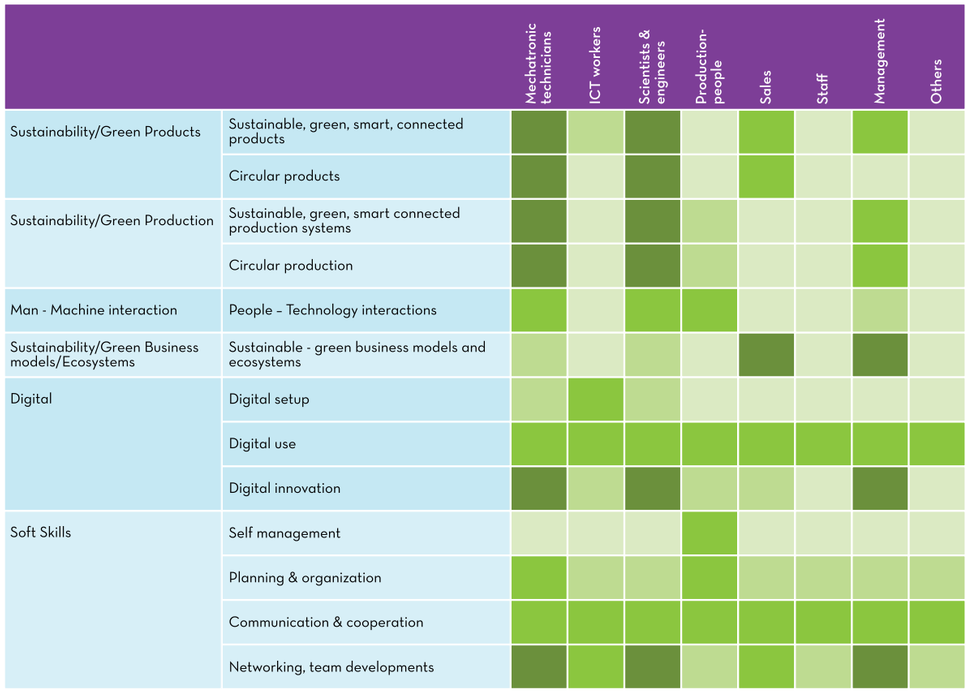
Based on the number of employees per job type for the technology industry and ICT sector only, Flanders Make has estimated the necessary training for and the corresponding impact on the different job types, starting from the skills roadmap. The importance of the topic is indicated by the colour code, split into 4 categories: Must have, Good to have, Nice to have, Nice to have if you have spare time. The matrix allows us to make estimates on the number of training days that are needed to support the sector in its transition journey by multiplying the number of employees by the percentage.

[7] "Be The Change", guidance and levers for a labour market in full change (update in figures 2020 - Agoria)

[8] Based on figures from "Be The Change", guidance and levers for a labour market in full change (update in figures 2020 - Agoria)

In doing so, we see – for a number of skills – comparatively high training needs in the job groups Mechatronics Technicians, Scientific Engineers and Management. Of course, other job groups are also contributing to this transition. As a result, more and more people will need suitable training.

The breakdown into categories of employees is linked to the database of employees that is used in the sector. Obviously, these job profiles will still be subject to changes in the future.



Estimate of training needs and corresponding impact for job types in the technology industry and ICT sector

These 4 levels provide an estimate of the size of the impact on the job and the corresponding need for training:

» **Must have:** dominant impact, training necessary, about 2 days per year

» **Good to have:** high impact, training strongly recommended, about 5 hours per year

» **Nice to have:** limited impact, training recommended, about 1.5 hours per year

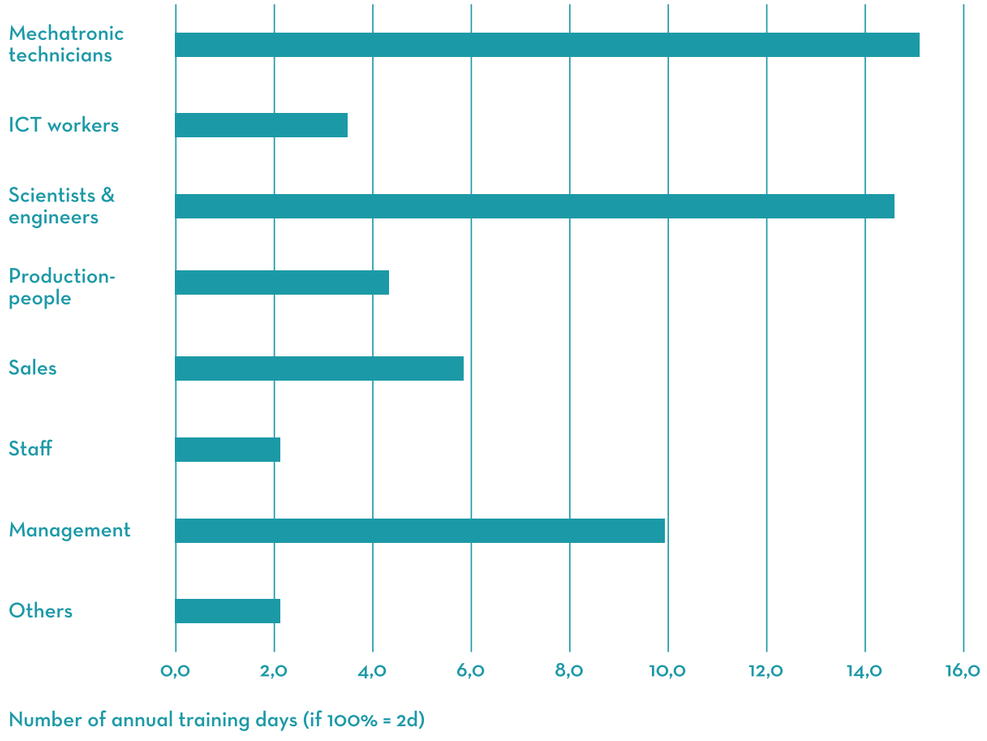
» **Nice to have if you have spare time:** low impact, training not a priority, about half an hour per year

Every company needs a customised training plan, taking into account its current and future situation, the products it makes, the evolution in their functionalities and the use of different technologies.

For example, a mechanical product evolving into a mechatronic product will demand additional competences from the employees who design it and from those who validate it, as well as from the users of the updated product.

The production environment of such a product will also change along with it and include new technologies, such as augmented reality, digital work instructions, digital twins, artificially intelligent chatbots, etc. All those involved in that changing environment will also need new competences to be able to do their jobs well.

Taking into account the importance of the topics in percentages per job category, one can also determine the average number of training days for an average person. This is merely indicative as it will depend on the person's initial knowledge and your company's area of work.



Training required in days for and corresponding impact on the different job types based on the Skills Roadmap.

Required reskilling and upskilling actions	# of employees
Upskilling for sustainable, green, smart and connected products	100.000
Upskilling for sustainable, green, smart and connected production systems	100.000
Upskilling for basic digital capability	
Digital innovation	113.000
Digital use	84.000
Upgrading soft skills	
Networking, collaboration, team development	130.000
Communication, cooperation	84.000

Impact in number of employees for the different job types

ITEMS REQUIRING ATTENTION IN THE TRANSITION PROCESS

SHIFT WITHIN JOB PROFILES

Thanks to reskilling and with the support of technology, employees with lower skill levels will be able to perform new tasks at a higher level and with more added value. Specifically, they will be given tools that allow them to play a greater supporting role in the digitalised production process.

Middle management will play a more important role in improving the current production process and products, whereas currently this is often reserved to innovation experts within the production environment. The latter will thus have more time to initiate innovations within the production environment as well as product innovations. A valuable task that will contribute to the company's competitive position and long-term viability.

FUNCTION TYPE	Operator Making products Performing in lead plants	Product(ion) Engineer Improving products Maintaining lead plants	R&D specialist Creating new products Upgrading lead plants
SKILL LEVEL	LOW	MID	HIGH
LEARNING NEED	• Upskilling • Reskilling • Deployment	• Upskilling • Reskilling	• Training on new challenges
ENABLING TOOLS	Assisted technology for ease of operations & product quality	Technology for productivity & product quality asset optimisation	Participation in innovation ecosystem for product & production innovation & new business models
RESULT OF LEARNING	Can handle (some of) the tasks of a **Product(ion) Engineer**	Can handle (some of) the tasks of a **R&D specialist**	More time for innovation

TASK SHIFT TASK SHIFT

Shift in roles due to upskilling and reskilling.

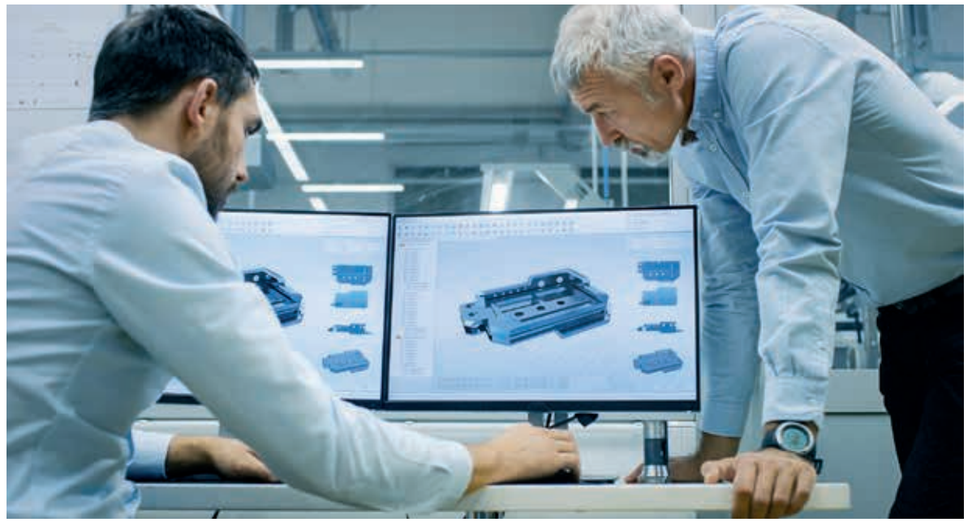
INVESTING EFFICIENTLY AND ENSURING RETURN ON INVESTMENTS IN RESKILLING AND UPSKILLING

In a technological transition process, employees not only need to develop their technological skills, they also need to know and be convinced of the bigger, social purpose of the organisation. They should be involved right from the start of the preparations and receive support to increase their technological knowledge and develop skills that will help them to embrace technological improvements as a team.

By analogy with the Industry 4.0 Maturity index study[9], companies need to cover several areas of training to be able to grow into a learning, agile organisation. The areas of training can be categorised into four structural areas of social purposes and awareness:

1. social awareness,
2. digitalisation and technology,
3. culture, and
4. organisational structure.

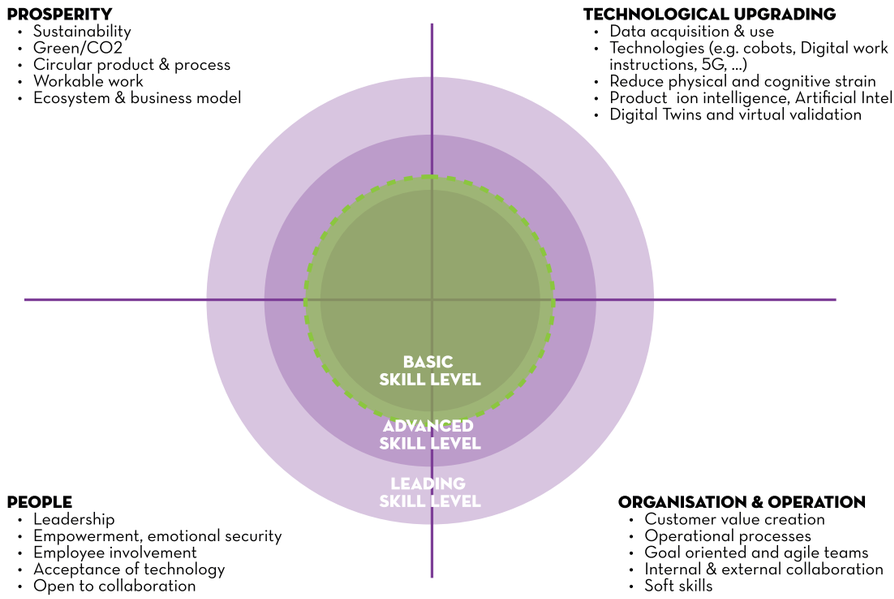
[9] https://en.acatech.de/publication/industrie-4-0-maturity-index-update-2020/



The figure below explains these areas of training in more detail.

The training courses within the four training areas are complementary and are best extended to the same extent and at the same time, as is the case with team/company C in the figure on the following page.

Not everyone needs to receive the same training with the same level of depth, but the team as a whole should accrue the necessary knowledge. This will strengthen the effectiveness of the overall training efforts and ensure a return on a company's investments in reskilling and upskilling.



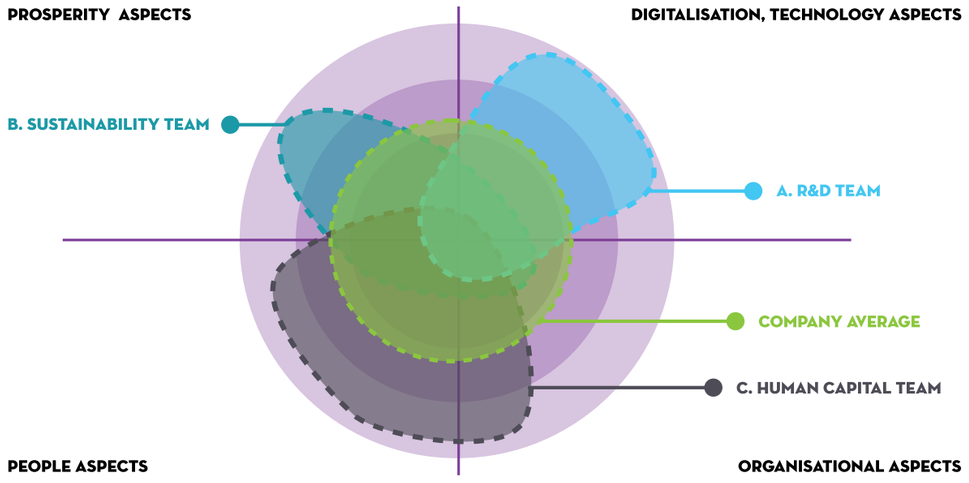
To be successful, companies must focus on developing an equal level of skills for 4 key domains.

If some of these domains are not covered or covered inadequately, the return on investment will be lower. When paying too little attention to the human side of introducing technology solutions, for instance, these solutions will be used inadequately or not be used at all. So, it doesn't make much sense to invest heavily in technology if people do not know enough about sustainability and are not convinced of its importance. Focusing more heavily on only one specific domain will create an imbalance in the four domains of the model and also lower the overall efficiency and effectiveness of the training efforts.

Company/Team A implements the sustainability agenda mainly through technological developments but it is not certain that people will accept the technology and use it to the maximum extent possible. They also fail to raise awareness about the overall concept. As a result, the organisation will continue to operate as before.

Company/Team B mainly focuses on general background knowledge of the sustainability concepts and adapts its organisation to a flexible and agile environment. It implements the necessary supporting processes, but due to the imbalance between technology introductions and the corresponding human aspects, they do not succeed in tackling the overall challenge together.

Company/Team C tackles everything in a structured way and works simultaneously on all aspects so that people can see their own contribution and that of the organisation from a value-added perspective and in relation to the bigger challenges. The organisation adapts gradually. The expected ROI progressively increases along with the increase of the training level of the people in the company within the 4 areas of training.



Example for a fictional Research and Development team, Sustainability team, Human capital team and corporate average

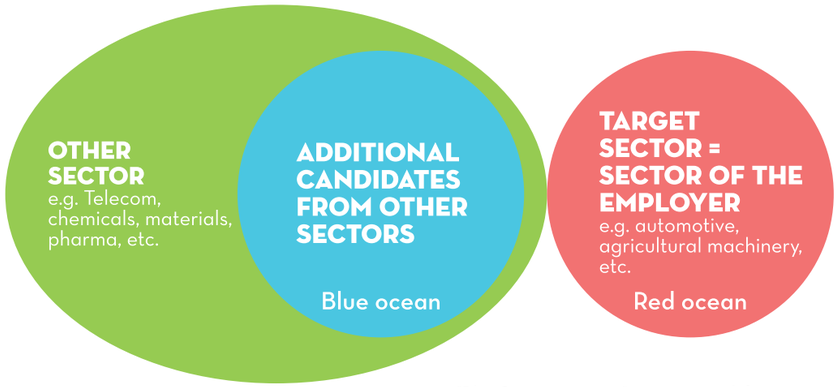
"BLUE OCEAN" RECRUITING: A NEW WAY OF RECRUITING

Attitude and the potential to familiarise oneself with the company's business will become crucial in the future. During the recruitment process, it is important to focus on the growth potential of new people rather than first and foremost assessing their already acquired (hard) skills and sector expertise. This greatly widens the talent pool of potential candidates as specific sector experience no longer has to be a hard requirement. Besides, this also creates an opportunity to recruit people with new ideas, which fits in perfectly with the multi-dimensional approach that is needed to shape the transition to a more sustainable industry.

Recruiting with focus on growth potential and complexity thinking is called "Blue Ocean recruiting"[10], after the Blue Ocean Strategy market approach. "Red Ocean" recruiting, on the other hand, refers to a recruitment approach that focuses on employees who are highly specialised and have many years of experience and training. In this context, competition is fierce, colouring the ocean red.

Companies that want to stay ahead of the competition should choose not to focus mainly on these specialised profiles, but should also look for people with growth potential, the right attitude, experience in other sectors and general competences. The result of such a Blue Ocean approach is also a multidisciplinary team that has more creativity and clout due to the influx of all kinds of ideas from employees with different backgrounds.

One should also involve or look for enough people in management who can flexibly deal with the increasing complexity of thinking and acting. To operate successfully in ecosystems, one must be able to identify connections and assess their impact, including the effects that go beyond the boundaries of the company. This is necessary to determine one's own place in the ecosystem and in value chains, in line with the goals of the company and its stakeholders. There is increasing pressure from society to move towards a broader definition of prosperity that transcends the purely economic aspect.



"Blue Ocean recruiting": recruiting with focus on growth potential and complexity thinking

[10] By analogy with "The Blue Ocean Strategy", which is a business strategy. The strategy was published in 2005 in the book with the same title, written by W. Chan Kim and Renée Mauborgne of The Blue Ocean Strategy Institute at INSEAD. The core of the strategy is to create new markets, so-called Blue Oceans.

FOCUS

WORKABLE WORK

Workable work is achieved when the focus on productivity and efficiency is accompanied by attention to people and their involvement and competences. Paying due attention to the (psycho) social aspects of work is another prerequisite for creating the right culture. Think, for instance, of creating acceptance of technology and dealing with the additional stress associated with its introduction, or offering engaging work, with a balanced level of autonomy and job content.

By combining the strengths of man and machine, the industry in Flanders is arming itself for the future. Investing in safe, high-quality, workable work is in this respect a win-win for both employers and employees. For employees, work becomes more exciting and easier to perform thanks to new supporting technologies. In turn, organisations can count on motivated, competent and productive employees.

SCAN CODE

Learn more about Workable Work

SUMMARY AND GENERAL RECOMMENDATIONS

The Agoria study "Be The Change" came to the conclusion that the transition to a sustainable manufacturing industry (including ICT) will impact nearly 127,000 employees by 2030.

Flanders	Est. 2030		Total
	ICT	Technology industry	
Mechatronic technicians	1.110	70.422	71.531
Production-people	6.052	34.208	40.259
Scientists & engineers	3.590	10.708	14.298
Total	10.752	115.338	126.088

Estimates of industrial needs in terms of members of staff required per job type by 2030

Based on the template of the "Skills Roadmap" for the Flemish climate transition, which was developed for the Flemish government and focuses on energy-intensive industries, Flanders Make created an adapted version to reflect the upskilling and reskilling needs for the manufacturing industry by 2035, This includes the estimated number of employees involved in this training need.

Required reskilling and upskilling actions	# of employees
Upskilling for sustainable, green, smart and connected products	100.000
Upskilling for sustainable, green, smart and connected production systems	100.000
Upskilling for basic digital capability	
Digital innovation	113.000
Digital use	84.000
Upgrading soft skills	
Networking, collaboration, team development	130.000
Communication, cooperation	84.000

Summary of necessary reskilling and upskilling actions in rounded numbers

KEY FOCUS POINTS TO JOINTLY ACHIEVE A SUSTAINABLE, COMPETITIVE INDUSTRY IN FLANDERS

1. Identify and fill the training needs for each company, department, team and individual employee
2. Provide for structural training and define target groups, taking into account their impact on business objectives
3. Deploy multidisciplinary teams combining the necessary competences
4. Organise training courses tailored to the company in addition to general training courses
5. Recruit with a focus on growth potential and complexity thinking.

Not listed in the report, but valuable additional focus points to achieve this goal:

6. Build Ecosystems with companies that support a sustainable, competitive industry in Flanders. More information on Ecosystems can be found on the Flanders Make blog: www.flandersmake.be/blog
7. Actively involve all stakeholders in continuously changing conditions, stimulate their enthusiasm and support them to grow in this together
8. Create organisations where people know that they matter and want to be proud ambassadors of a successful, sustainable business
9. Contribute to a positive image of the manufacturing industry by showing the important valuable impact of companies on society
10. Invest in STEM profiles, a/o through close contact with schools, internships and company visits, to increase the intake in technical education programmes
11. Facilitate maximum mobility of employees between different regions and set up local entities.

THE ROLE OF FLANDERS MAKE

Through research, Flanders Make accumulates knowledge with which it supports companies in their digital and sustainability transition. We want to maximise the valorisation of this knowledge. That is why we also want to play our part in providing tailor-made training to one or more companies, complementary to the existing players. This white paper outlines a general framework that will be used by Flanders Make as a basis for defining and setting up a suitable training offer in the future.

We are keen to use our knowledge to contribute to the upskilling and reskilling of employees in the manufacturing industry and in other industries with manufacturing challenges. We are thinking primarily of training scientists and engineers, technicians specialised in mechatronics and managers and experts in manufacturing.

FOCUS

ABOUT FLANDERS MAKE

TOWARDS A DIGITALLY TRANSFORMED, SUSTAINABLE AND COMPETITIVE INDUSTRY

Flanders Make is a fast-growing research centre that performs research to support companies from various sectors in their sustainable innovation processes. From our establishments in Lommel, Leuven, Kortrijk and Sint-Truiden and labs within the 5 Flemish universities, we stimulate open innovation through excellent research.

Because of our unique position as a bridge between industry and research, our teams combine application and system proficiency with technological and scientific knowledge. Research conducted by academic partners and Flanders Make vzw, nearly 200 company members and the government are part of Flanders Make's circular innovation ecosystem.

Our strategy based on industrial needs and long-term trends ensures a close link with the industry and its challenges. With our programmed research, we create impact in companies.

Sustainability, climate and workability have a high priority in our research. We want to help companies in developing sustainable, green, smart and connected products and production systems, with a special focus on people and their interaction with machines.

Co-creation centre for machine development
Gaston Geenslaan 8
3001 Heverlee

Co-creation centre for the vehicle industry
Oude Diestersebaan 133
3920 Lommel

Co-creation centre for Industry 4.0 production
Graaf Karel De Goedelaan 5
8500 Kortrijk

EUKA
Drone Innovation Intrest Group
Droneport Campus
Lichtenberglaan 1090/102
3800 Sint-Truiden

info@flandersmake.be
+ 32 11 790 590
www.flandersmake.be

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