

Smart Manufacturing and Industry Skillsets



*Supporting Manufacturing SMEs in all aspects
of Digital Transformation and Industry 4.0: A
New and Innovative Industry Cluster.*

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1. Introduction to the Importance of Manufacturing

Smart manufacturing is the process of using digital technologies to create novel solutions, data business processes, culture, and customer experiences to meet the ever-demanding and changing economic landscape. This reimagining of business in the digital age and on the manufacturing production line is the art of

smart manufacturing. The art of digitalisation can help your firm with the (1) reduction of time to market, (2) improvement of manufacturing/production processes, (3) reduction of non-quality

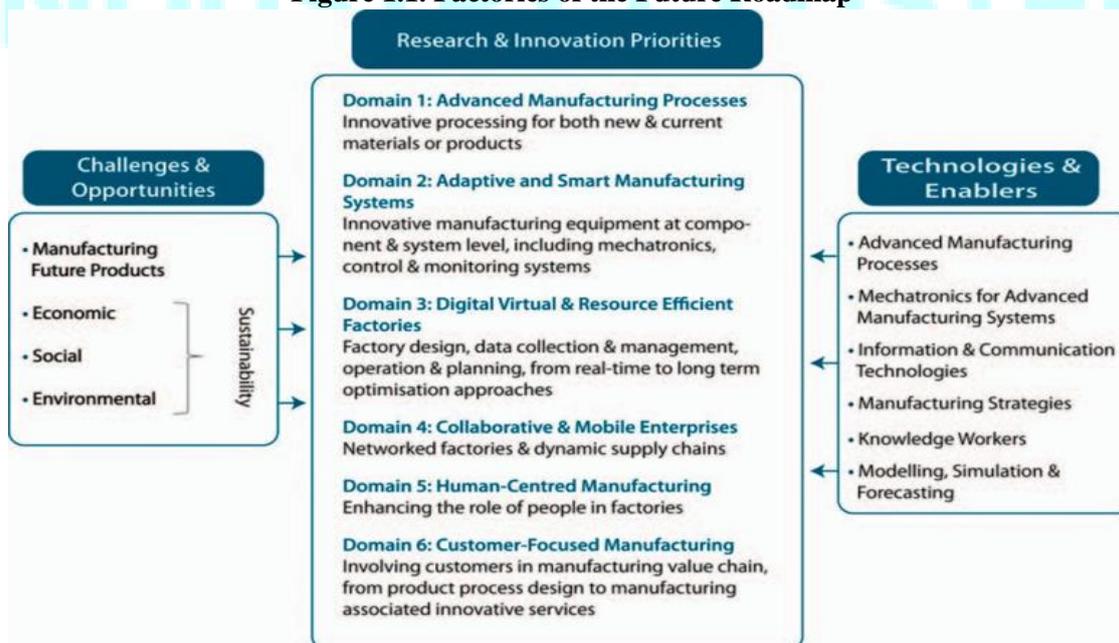


supply chains, (4) reduction of stress and increase in attractiveness, (5) development of partnerships in the supply chain and (6) increase knowledge of the supply chain to identify new partners capable of providing rapid and agile skills development. Around one in ten (9.8 %) of all enterprises in the EU-27's non-financial business economy were classified as manufacturing in 2009, a total of 2 million enterprises. *The manufacturing sector employed 31 million persons in 2009, generated EUR 5 812 billion of turnover and EUR 1,400 billion of value-added. The sectors' turnover grew from 2009 to 2010 by EUR 600 billion, up to EUR 6,400 billion* (EU Commission, Factories of the Future Report). Furthermore, SMEs are the backbone of the manufacturing industry in Europe. Micro, small, and medium enterprises provide around 45% of the value added by manufacturing while they provide around 59% of manufacturing employment. Manufacturing is critical for emerging markets: new markets driven by advances

in science and innovation will revolutionise Europe’s capability to expand manufacturing across traditional and new industries. Manufacturing is an indispensable element of the innovation chain: manufacturing enables technological innovations to be applied in goods and services, which are marketable in the marketplace and is key to making new products affordable and accessible to multiply their societal and economic benefits and achieve the desired impacts. Manufacturing is an RD&I-intensive activity. Manufacturing SMEs have considerable megatrends to consider with regards impact and drive structural changes:

- ❖ Changing demographics (growing world population, ageing societies, increasing urbanisation)
- ❖ Globalisation and future markets (BRIC and beyond) & Scarcity of resources (energy, water, other commodities)
- ❖ The challenge of climate change (increasing CO2, global warming, ecosystem at risk)
- ❖ Dynamic technology and innovation (ICT and virtualisation, technology diffusion, the age of life science, ubiquitous connectivity, sensing and digitalisation)
- ❖ Global knowledge society (know-how base, gender gap, war for talent, multiplication of data and information) & Mass customisation (personalised customisation) and
- ❖ Sharing global responsibility (shift to global cooperation, growing power of NGOs, increasing philanthropy).

Figure 1.1. Factories of the Future Roadmap

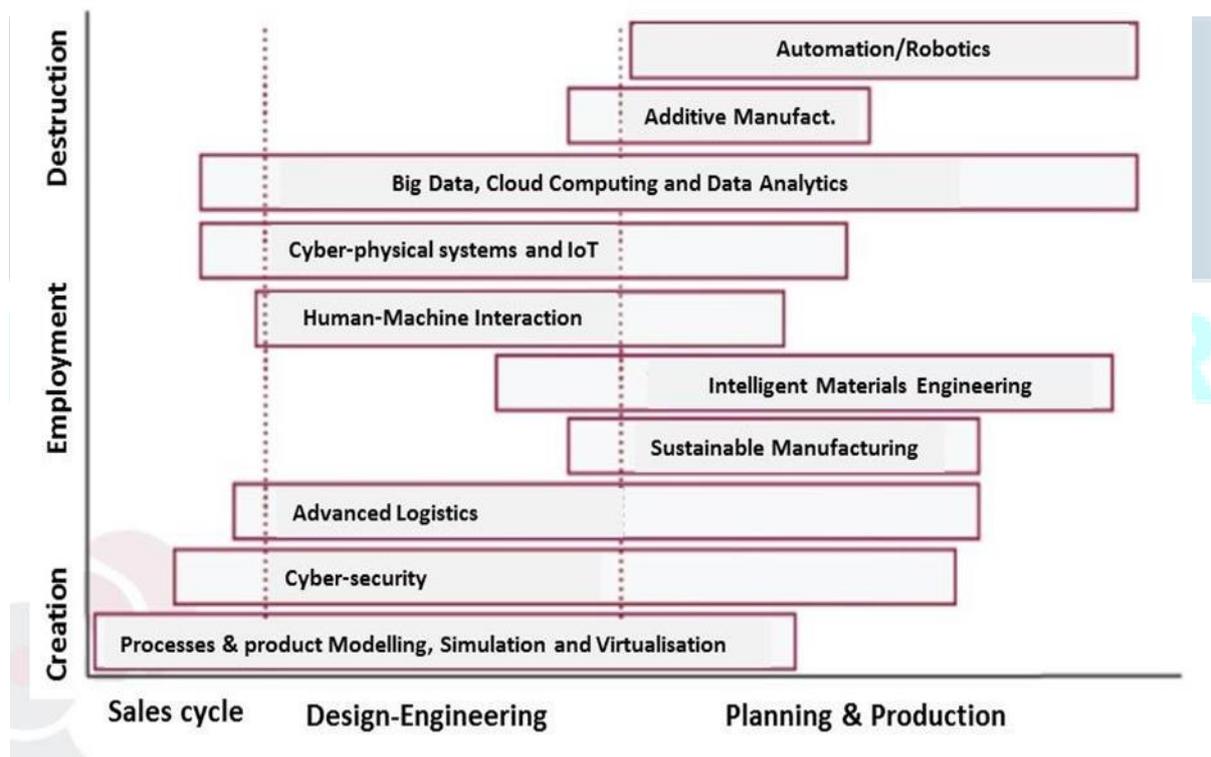


Source: EU Commission (The Factories of the Future Roadmap framework)

2. Manufacturing Skillsets

The fact that machines can perform routine, dangerous or filthy tasks is a great advantage, as it allows workers to make better use of their skills. However, to take full advantage of this technological advantage, companies must now focus on new skills and training. The introduction of Smart Manufacturing deliverables and Industry 4.0 will lead to the disappearance of some jobs, but also to the emergence and transformation of many others (see Figure 1.2 below).

Figure 1.2. Smart Manufacturing Skillsets



When these technologies are implemented, most job positions at all functional levels will be affected, some of them are expected to disappear and others are expected to undergo important changes, or even merging with other job positions. Therefore, the digital transformation will

require a thorough assessment of the transformation and recycling capacity of each of these job positions.

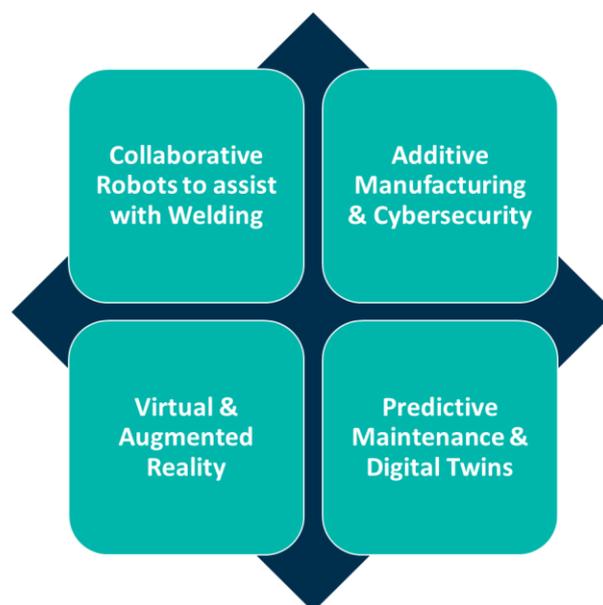
In Ireland, traditional skills will still be needed in the future; however, experts recognise that

Industry 4.0 practices can help improve the efficiency of routine activities across the industry. In general, the existing workforce will be soon required to be skilled in the use of advanced software (3D modelling and



advanced algorithms for predictive maintenance). In Ireland, consulted experts consider that the implementation of new technologies such as collaborative robotics, augmented reality, automated visual inspection systems, cybersecurity and additive manufacturing is already an urgent issue. As for managers and supervisors, they will be soon required to be skilled in the use of new technologies, and most especially in the following ones:

Figure 1.3. Upskilling Areas in Manufacturing



Manufacturers need to change the way they produce to remain competitive, as the era of smart manufacturing will change and improve what is produced. In this new era of manufacturing, the Internet of Things and cloud connections will become a key factor for the sector. Machines will be more autonomous and will interact and communicate with each other in real-time.

Table 1.1: Skills Transformation

	Job positions under threat	Job positions to undergo adaptation	Job positions to be created
Sales	Accounting assistant	Customer service assistant	Data analyst
	Budget assistant	Sales assistant	Virtual reality creator
	Account manager	Sales manager	Database legal expert
	Budget manager	Technical sales manager	
		Post-sales manager	
		Customer service manager	
		Production flow manager	
Engineering	Structure building technician	Drafts person (CAD)	Robotics expert
	Sales support engineer	Design manager	3D simulation expert
		Engineering manager	Artificial Intelligence expert
		Design architect	R&D Innovation Manager
		Graphic Designer	
	Planning technician		
Manufacturing	Foreman	Production assistant	New materials expert
	Tool maker	Maintenance assistant	Cyber security expert
		Planning assistant	Additive manufacturing expert
		Welder	Smart logistics expert
		Electrician	Visual Factory Expert
		Pipe-fitter	
		Carpenter	
		Service technician	
		Chief engineer	
		Project manager	
		Structure engineer	
		Logistics manager	
		Occupational Risks manager	
	Maintenance and repair manager		

Source: IN4.0 Project (2020)

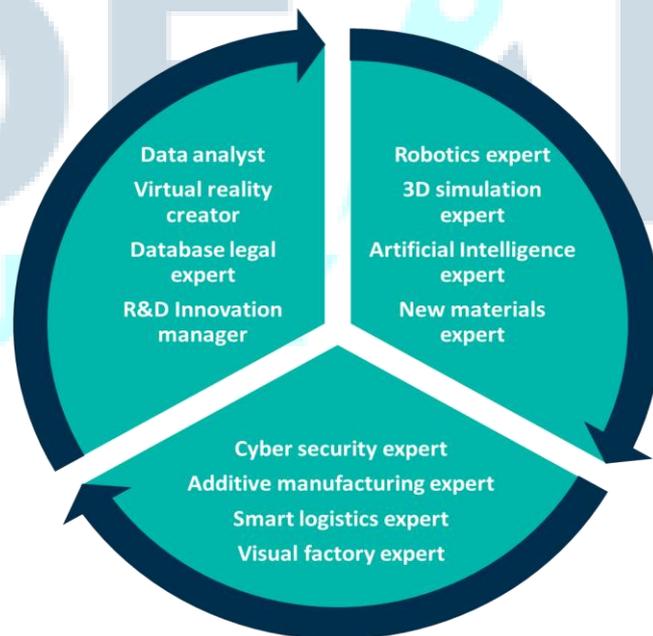
Advanced technologies will manage Big Data and will facilitate this enhanced integration, not just between machines, but between every segment of a manufacturing enterprise from designers and engineers to technicians/operators and office staff. The Future of Jobs Survey

(2018) suggests that the drivers of change are the following four specific technological achievements:

- ❖ High-speed mobile internet
- ❖ Artificial intelligence
- ❖ Widespread adoption of big data analytics
- ❖ Cloud technologies are set to dominate the 2018-2022 period.

Sales and management positions are key jobs within any organisation, and their occupiers will be forced to understand IN4.0 technologies, as, in the future, technologies will be part of the product and service development process. According to the EU Interreg Atlantic Area IN4.0 Project report, the top priority job positions to be created are:

Figure 1.4. Future of Manufacturing Work



Manufacturing is the immediate priority in terms of innovation and workers training and adaptation to the industry 4.0 model, which comprises the following 4 top positions:

- 1) New materials expert
- 2) Cybersecurity expert
- 3) Additive manufacturing expert
- 4) Smart logistics expert

3. So, What is Next?

As the term Industry 4.0 was first coined by the German government in 2011, it has steadily gathered pace and interest from companies across all industries. Data analytics is at the heart of 'Industry 4.0 and Smart Manufacturing'. In all supply chains, companies are always looking for ways to make it more efficient and digitalisation can be the mechanism to advance the growth and business

model of the firms whilst improving their current value chain.

Smart manufacturing is

all about connection and it can connect all areas of your business to improve efficiency.

Enhance your digital productivity and awareness by taking our digital assessment:

<https://www.ideam.ie/assessment/> to identify where your company is on the digital curve:



- ❖ Step 1 Computerisation
- ❖ Step 2 Connectivity
- ❖ Step 3 Visibility
- ❖ Step 4 Transparency
- ❖ Step 5 Adaptability and
- ❖ Step 6 Predictive Capacity

Smart manufacturing can enable you to use real-time data to satisfy customer demands, see weaknesses that exist in equipment with data from thousands of sensors and data points, ensure timely replacement of parts and avoid production downtime. This is just some of what can be accomplished.

