

## WP2 - D2.2 Report on EU furniture companies maturity level

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## The survey

**low much do you  
know about  
enabling  
technologies?**

Within WP2 - Industry5.0 Maturity level in EU furniture industry, after studied the topic of Industry 5.0 and the situation of European countries starting from desk research, a survey was developed to collect data directly from companies in the furniture sector in different European countries.

The external expert (the Italian consulting company [PMI Finance and Consulting](#), expert in supporting companies in identifying and financing their innovation strategies) and the project Partners develop a survey that will allow social partners to monitor the general level of knowledge and progress of furniture companies in relation to Industry 5.0 approach, take-up and deployment across Europe.

Results provide key data to understand the level of the Industry5.0 deployment within the EU furniture sector.

The questionnaire has delivered through an online tool so to make it easily accessible to respondents and to facilitate the data collection and their interpretation and comparison.

The questionnaire was developed starting from the contents developed in the desk research foreseen in the project, focusing in particular on the enabling technologies of Industry 5.0, investigating the level of knowledge for the different technologies and the interest in them.

The results were then analyzed by focusing on the correlation between types of companies and origin, to understand at what level each country and each economy is in relation to the new 4.0 technologies.

## The structure

The survey was designed to have a clear and quick response regarding the **knowledge and priority of enabling technologies for Industry 5.0.**

The research started from the technologies identified as enabling by the European Commission and for each one the level of relative knowledge was asked.

Subsequently, we were asked to identify among some technologies those that are most impactful and most important for the business realities of the respondents, thus identifying those to which companies pay greater attention and that they think are interesting to implement for their production processes.

Below are the questions as they appear to respondents.

### Enabling technologies

The enabling technologies of Industry 5.0 are a set of complex systems that combine technologies, such as smart materials, with embedded, bio-inspired sensors. Therefore, each of the following categories can only unfold its potential when combined with others, as a part of systems and technological frameworks.

Can you indicate which of the following enabling technologies you know and what level of knowledge you have?\*

(indicate for each from 0=I don't know; to 5=I know it very well)

#### 8. Individualised human machine interaction: \*

	0 = I don't know	1	2	3	4	5 = I know it very well
Robotics: Collaborative robots ('cobots')	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Augmented, virtual or mixed reality technologies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enhancing physical human capabilities: Exoskeletons, bio-inspired working gear and safety equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Multi-lingual speech and gesture recognition and human intention prediction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tracking technologies for mental and physical strain and stress of employees	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

⋮

9. *Smart materials:* \*

	0=I don't know	1	2	3	4	5=I know it very well
Smart materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. *Digital twins and simulation:* \*

	0=I don't know	1	2	3	4	5=I know it very well
Digital twins of products and processes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Multi-scale dynamic modelling and simulation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Planned maintenance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cyber-physical systems and digital twins of entire systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Virtual simulation and testing of products and processes (e.g. for human-centricity, working and operational safety)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technologies for simulation and measurement of environmental and social impact	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

⋮

11. *Data transmission, storage, and analysis technologies:* \*

	0=I don't know	1	2	3	4	5=I know it very well
Big data management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Traceability (e.g. data origin and fulfilment of specifications)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data processing for learning processes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Edge computing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data and system interoperability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scalable, multi-level cyber security	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Networked sensors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cyber security/safe cloud IT-infrastructure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Artificial intelligence: \*

	0=I don't know	1	2	3	4	5=I know it very well
Generative Artificial Intelligence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decision support systems (AI powered) / Correlation-based AI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technologies for matching the strengths of Artificial Intelligence and the human brain (e.g., combining creativity with analytical skills) / Informed deep learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. Technologies for energy efficiency, renewables, storage and autonomy: \*

	0=I don't know	1	2	3	4	5=I know it very well
Integration of renewable energy sources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low energy data transmission and data analysis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

We are working on a Guide about Industry 5.0.

Which of the following topics would you like to explore?

Your feedback will help us to define the main topics of the Guide, so that it will be really useful for European companies.

#### 14. Choose the 5 topics most relevant to you. \*

Selezionare 5 opzioni.

- Robotics: Collaborative robots ('cobots')
- Augmented, virtual or mixed reality technologies
- Enhancing physical human capabilities: Exoskeletons, bio-inspired working gear and safety equipment
- Multi-lingual speech and gesture recognition and human intention prediction
- Tracking technologies for mental and physical strain and stress of employees
- Smart materials
- Digital twins of products and processes
- Multi-scale dynamic modelling and simulation
- Planned maintenance
- Cyber-physical systems and digital twins of entire systems
- Virtual simulation and testing of products and processes (e.g. for human-centricity, working and operational safety)
- Technologies for simulation and measurement of environmental and social impact
- Big data management
- Traceability (e.g. data origin and fulfilment of specifications)
- Data processing for learning processes
- Edge computing
- Data and system interoperability
- Scalable, multi-level cyber security
- Networked sensors
- Cyber security/safe cloud IT infrastructure
- Generative Artificial Intelligence
- Decision support systems (AI powered) / Correlation-based AI
- Technologies for matching the strengths of Artificial Intelligence and the human brain (e.g., combining creativity with analytical skills) / Informed deep learning
- Integration of renewable energy sources
- Low energy data transmission and data analysis

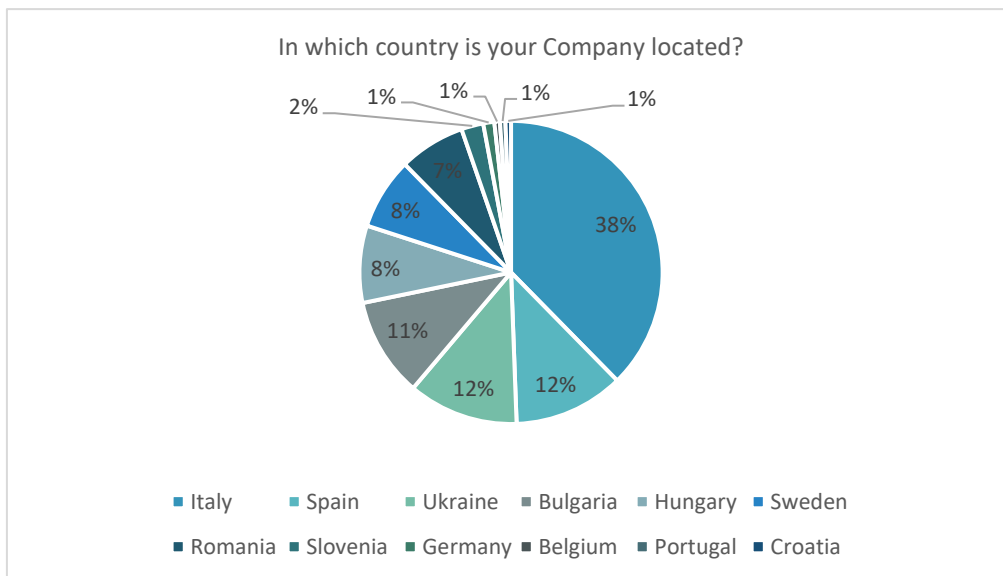


## The respondents

In total **170 companies** in the furniture sector responded to the survey, which was conducted online.

1) These are **located in 12 European countries**, divided as follows:

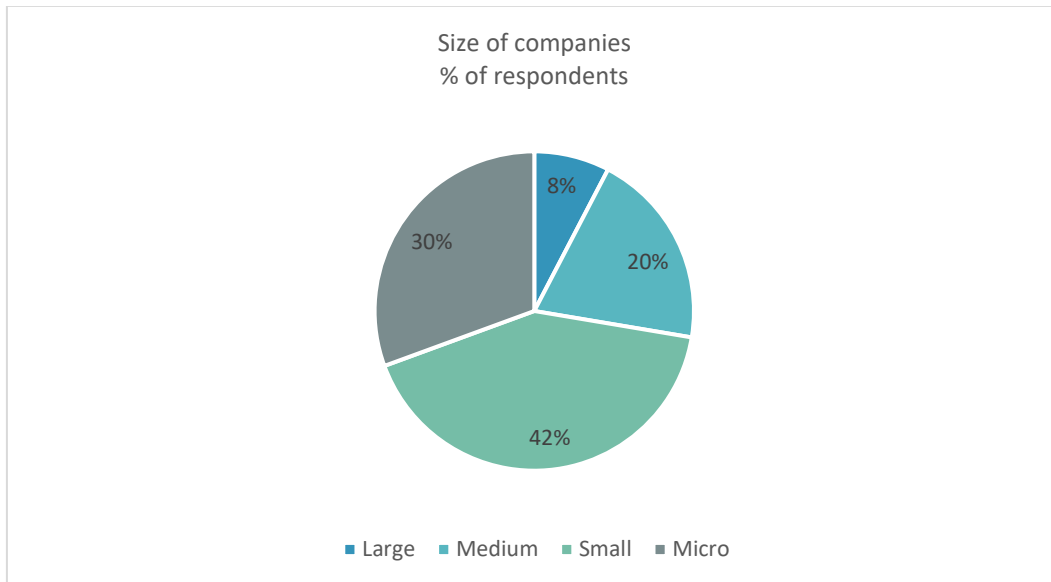
In which country is your Company located?	
Italy	64
Spain	20
Ukraine	20
Bulgaria	18
Hungary	14
Sweden	13
Romania	12
Slovenia	4
Germany	2
Belgium	1
Portugal	1
Croatia	1
<b>TOTAL</b>	<b>170</b>



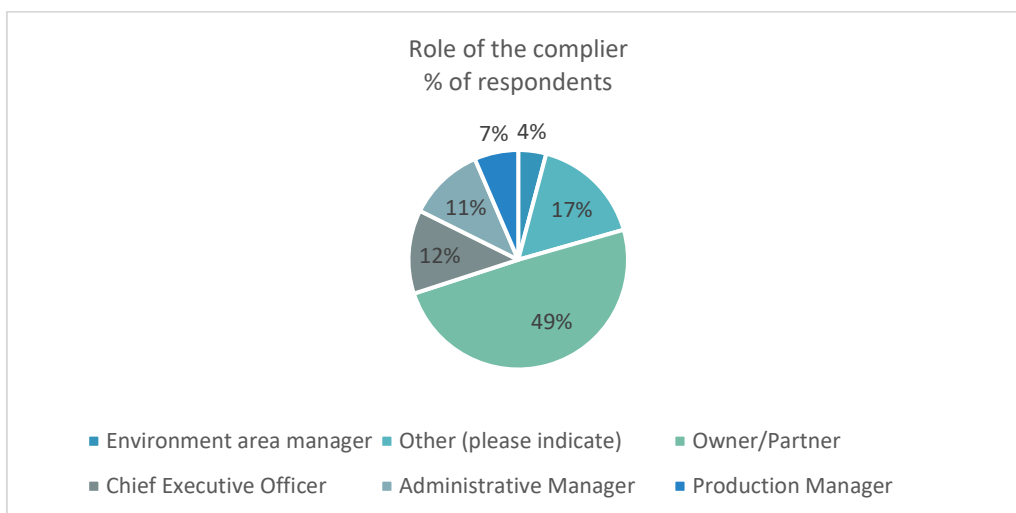
The most represented country is Italy, followed by Spain, Ukraine, Bulgaria and Hungary. These are the most represented countries in this survey, which however

managed to touch, albeit with few representatives, also other countries, thus managing to represent a good number of them.

- 2) As regards the characteristics of the respondents, **most of the answers come from Micro and Small businesses.**



- 3) As for the respondents to the questionnaire, **the Owners/Partners of the companies interviewed answered the questions**, but in some cases other figures relevant to the topic also responded.



For the "Other" responding figures, there are figures such as Business Development Manager, Quality manager, EU project manager, Product manager and others.

This demonstrates how companies are organized in different ways and that the skills relating to technologies for industry 5.0 are a topic that is not yet directly covered by companies, which today delegate the topic to relevant figures but often not specialized and therefore often not fully aware of the topics covered.

## Results

### Knowledge of technologies

The first question asked is about the knowledge of the enabling technologies of Industry 5.0.

“Which of the following enabling technologies do you know and what level of knowledge do you have?”

With this question we want to investigate **the level of knowledge and maturity of the theme of the technologies that underlie Industry 5.0**, to understand to what extent companies are considering these technologies as a future investment for their companies today.

The possible answers were:

- 0=I don't know
- 1
- 2
- 3
- 4
- 5=I know it very well

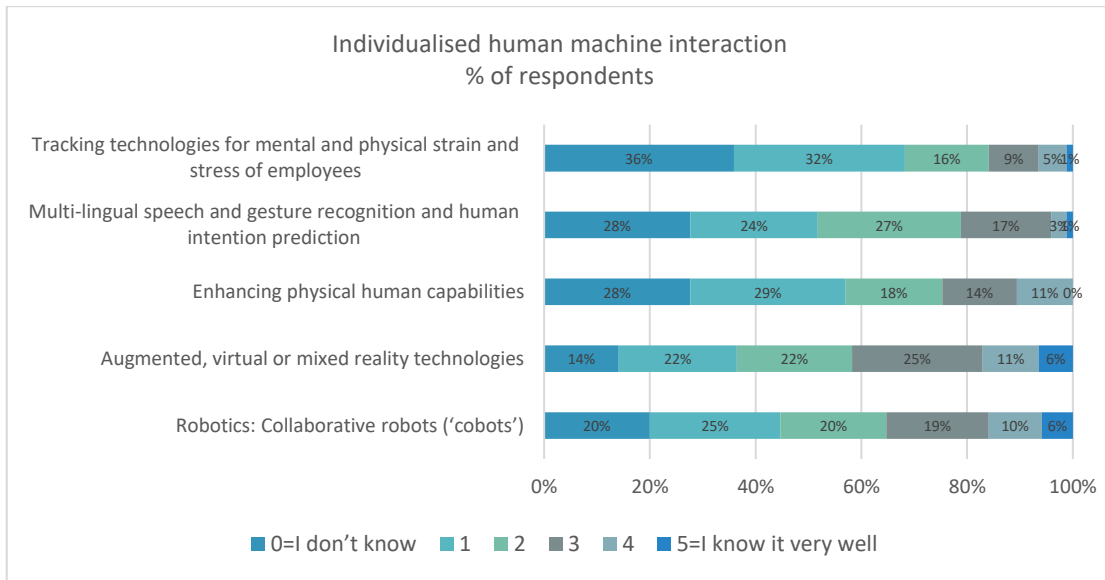
The list of technologies was instead very substantial and relevant, in order to understand the situation more and more and have a broad overview of the situation relating to technologies in business realities.

**These technologies are those proposed by the European Commission "Enabling Technologies for Industry 5.0"**, a document that presents and explains the enabling technologies 5.0.

These are the enabling technologies included in the report and for which the level of knowledge was asked to the companies that participated in the survey:

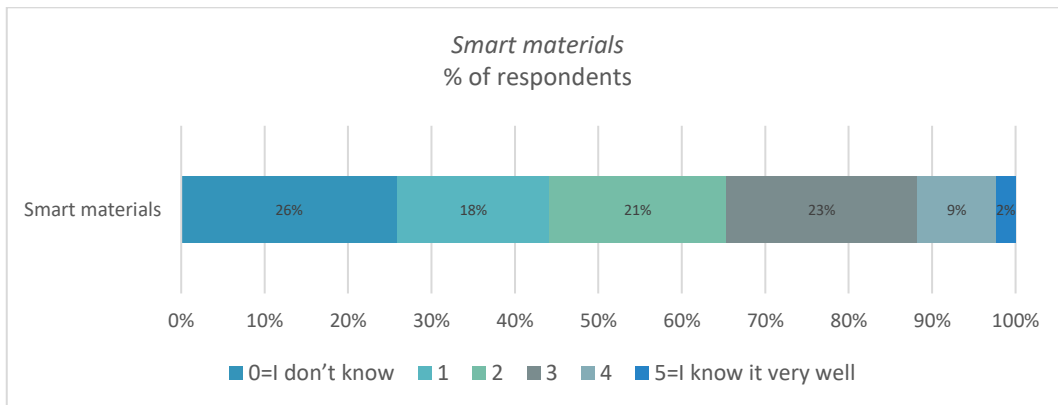
#### **A) Individualised human machine interaction:**

- Robotics: Collaborative robots ('cobots')
- Augmented, virtual or mixed reality technologies
- Enhancing physical human capabilities: Exoskeletons, bio-inspired working gear and safety equipment
- Multi-lingual speech and gesture recognition and human intention prediction
- Tracking technologies for mental and physical strain and stress of employees



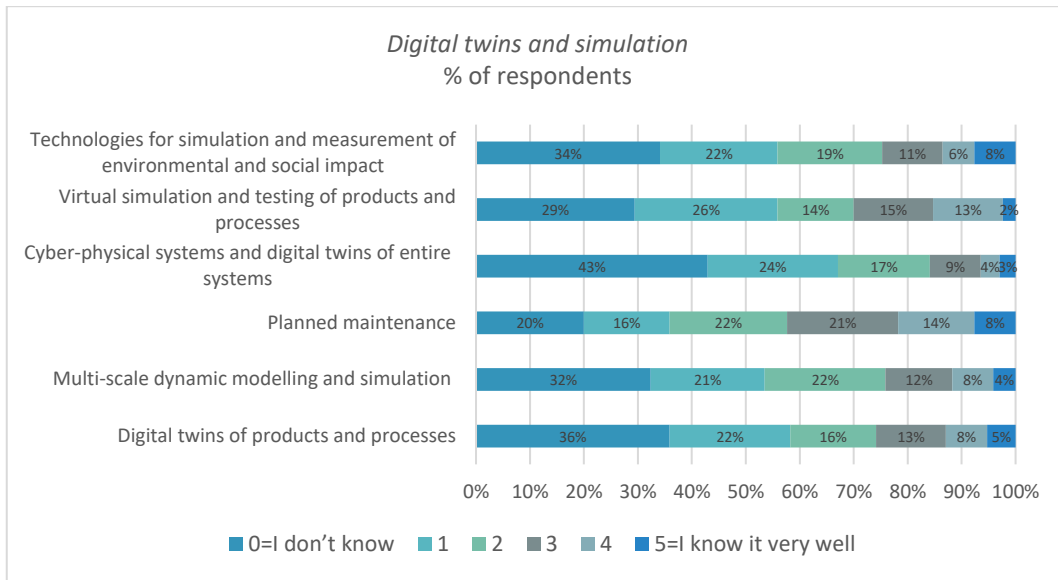
**B) Smart materials:**

- Smart materials



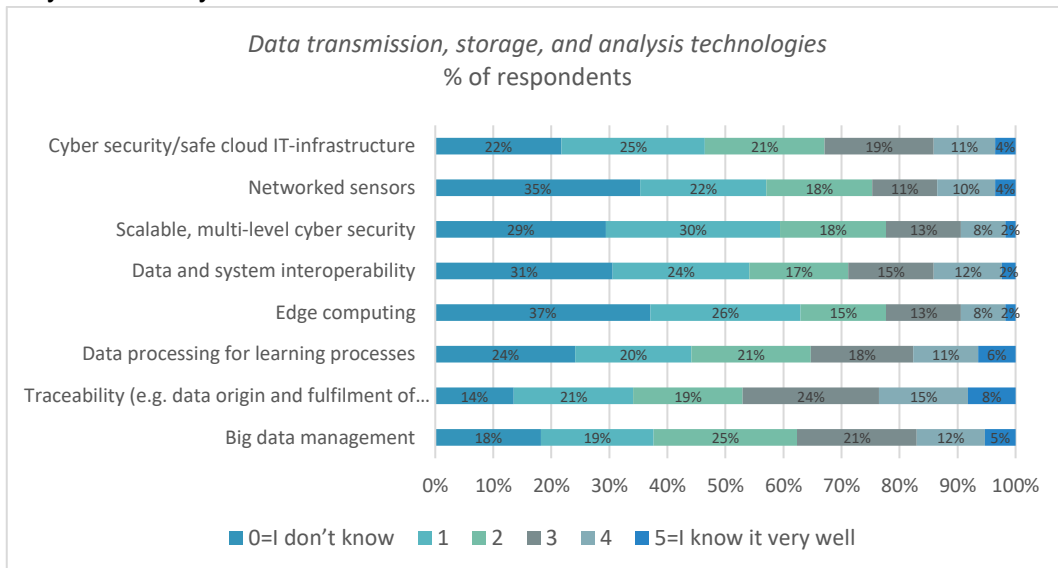
**C) Digital twins and simulation:**

- Digital twins of products and processes
- Multi-scale dynamic modelling and simulation
- Planned maintenance
- Cyber-physical systems and digital twins of entire systems
- Virtual simulation and testing of products and processes (e.g. for human-centricity, working and operational safety)
- Technologies for simulation and measurement of environmental and social impact



**D) Data transmission, storage, and analysis technologies:**

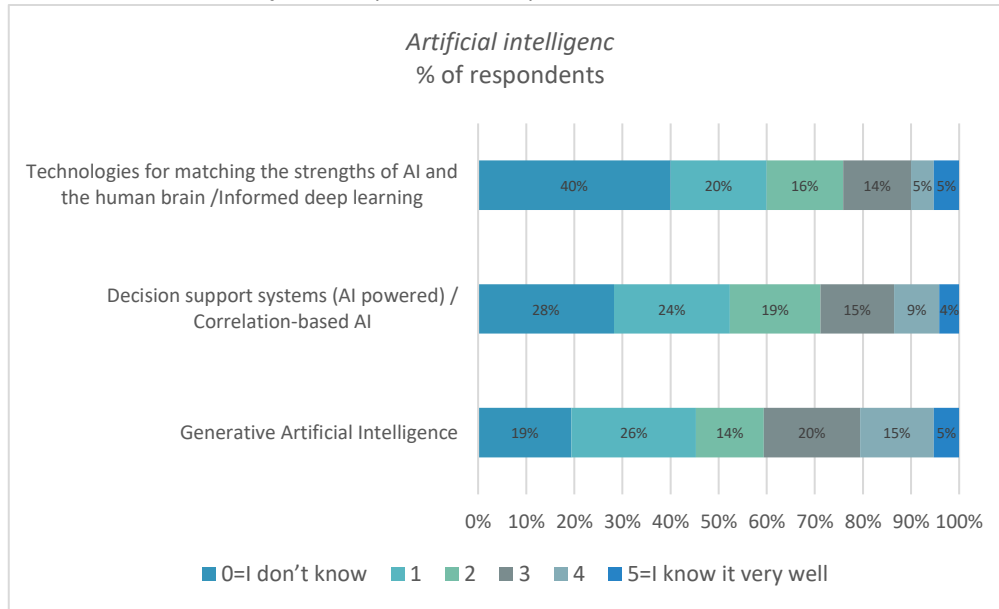
- Big data management
- Traceability (e.g. data origin and fulfilment of specifications)
- Data processing for learning processes
- Edge computing
- Data and system interoperability
- Scalable, multi-level cyber security
- Networked sensors
- Cyber security/safe cloud IT-infrastructure



**E) Artificial intelligence:**

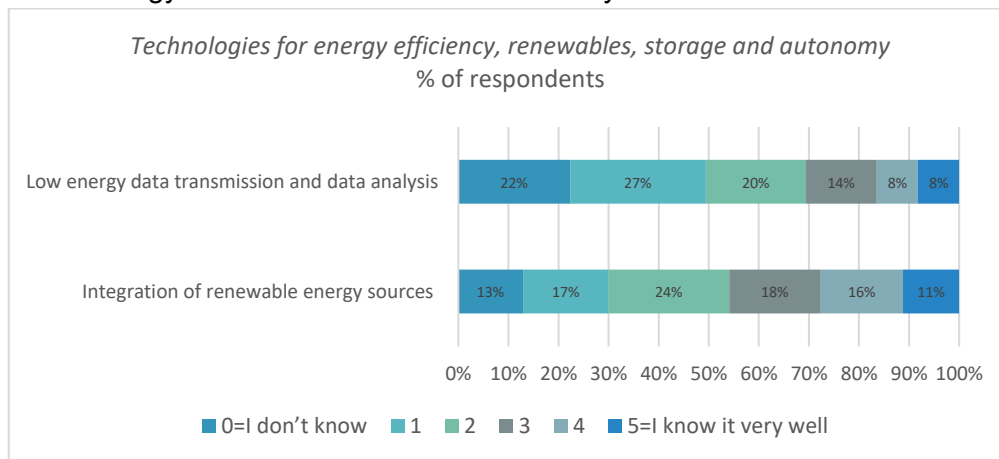
- Generative Artificial Intelligence

• Decision support systems (AI powered) / Correlation-based AI



**F) Technologies for energy efficiency, renewables, storage and autonomy:**

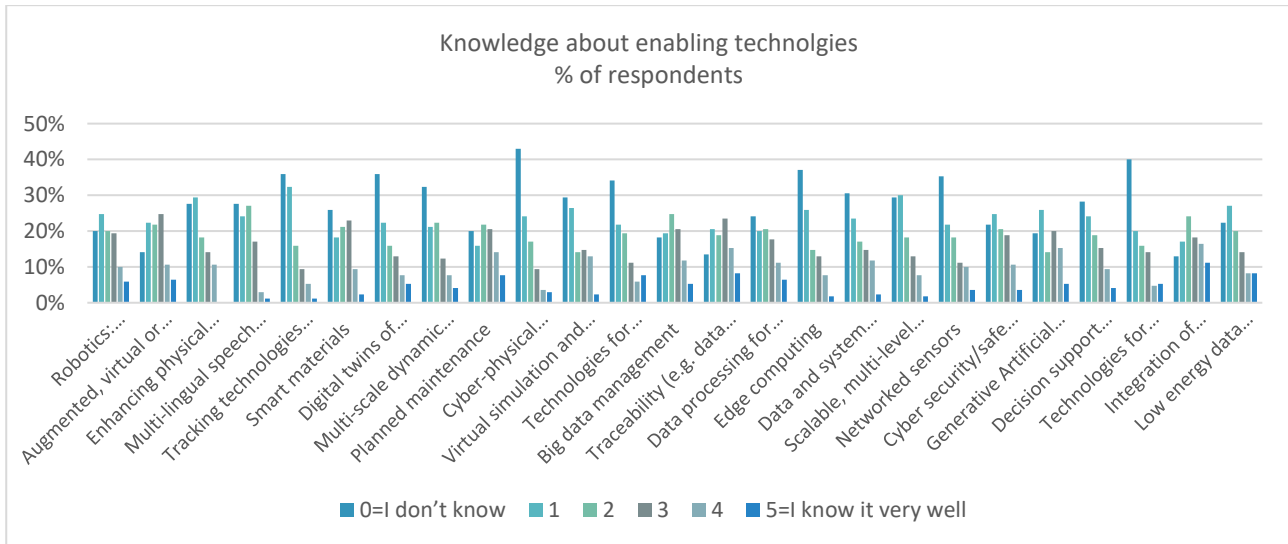
- Technologies for matching the strengths of Artificial Intelligence and the human brain (e.g., combining creativity with analytical skills) / Informed deep learning
- Integration of renewable energy sources
- Low energy data transmission and data analysis



What you can find below is an overview of the answers for each technology that helps us understand the level of general lack of in-depth knowledge regarding the topics covered.

**The answer of little or no knowledge is always present and always very important.**

This data will then be analyzed by understanding which types of companies have determined these results the most.



## The most known technologies

Overall **the top 5 technologies best known** by the responding companies are:

- 1) Integration of renewable energy sources
- 2) Traceability (e.g. data origin and fulfilment of specifications)
- 3) Planned maintenance
- 4) Generative Artificial Intelligence
- 5) Data processing for learning processes

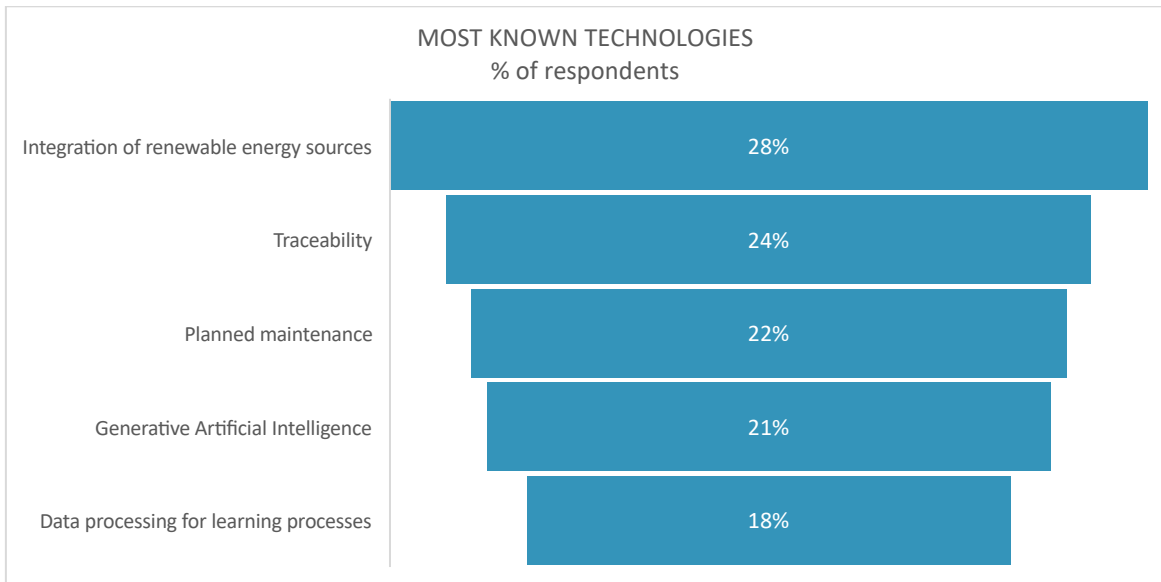
These are the first technologies for response 4-5 (excellent knowledge) in relation to the level of knowledge.

It should be emphasized, however, **that the level of general knowledge of 4.0 technologies is not high, indeed, it is still necessary to work to increase knowledge.**

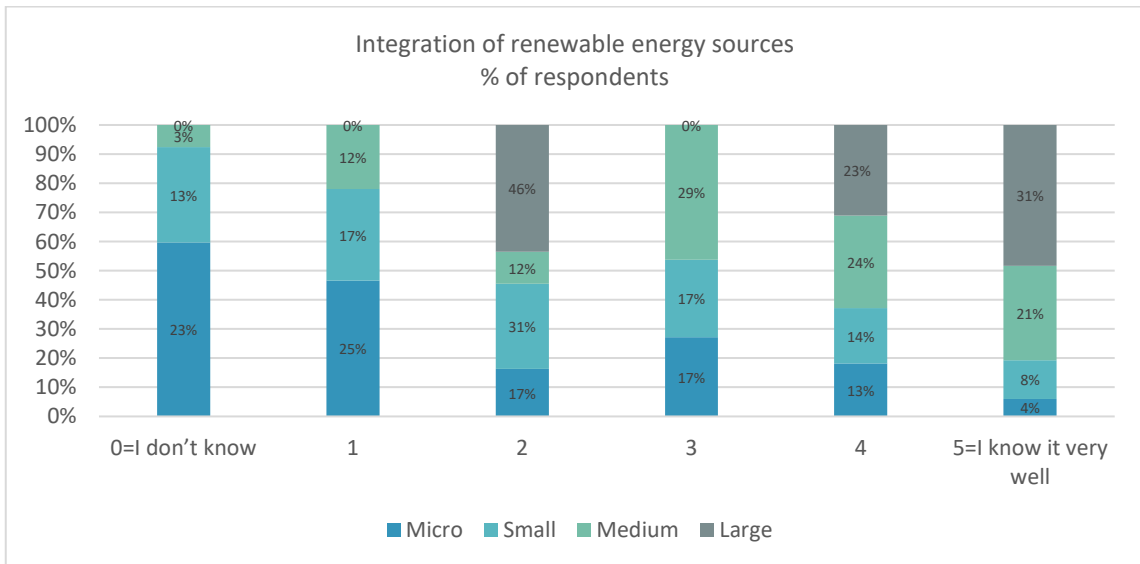
Taking into consideration the size of the companies and comparing it with the responses received, it is possible to understand that medium-large companies are the ones that today lead the implementation of technologies in the company, being the ones that today seem to know the topic the most.

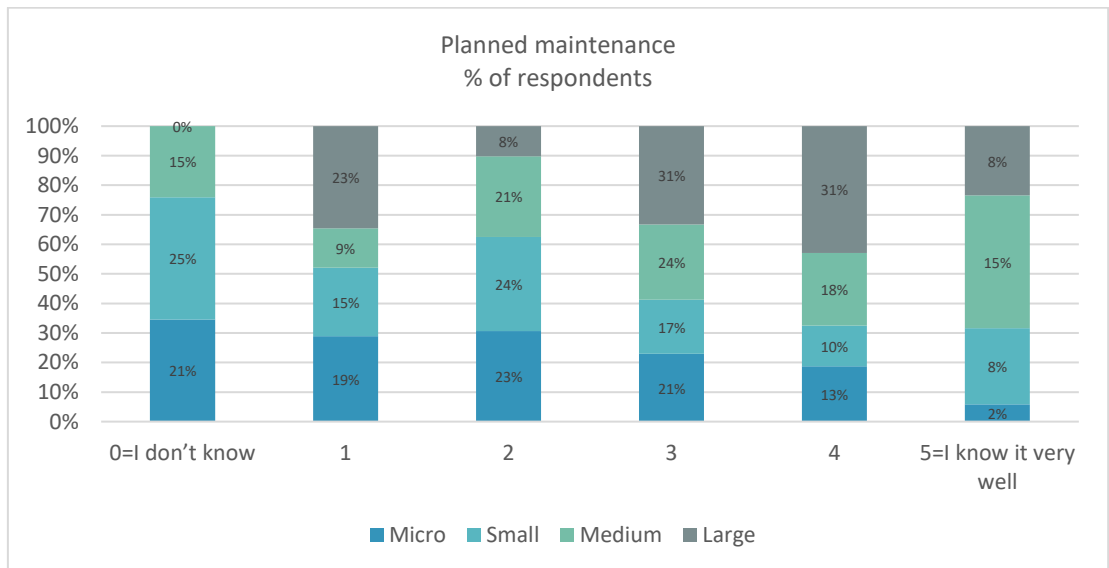
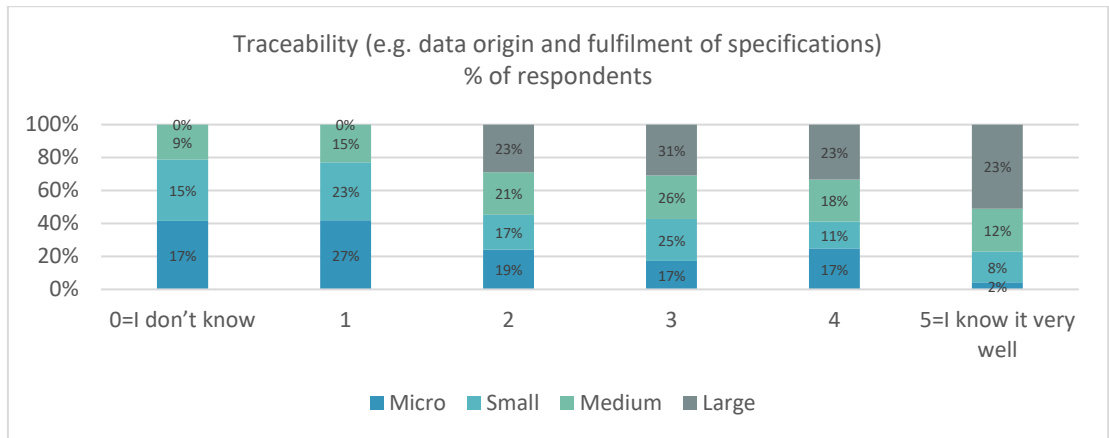
Below we report for the most known and the least known technologies, a detail of the responses by size of the respondents.

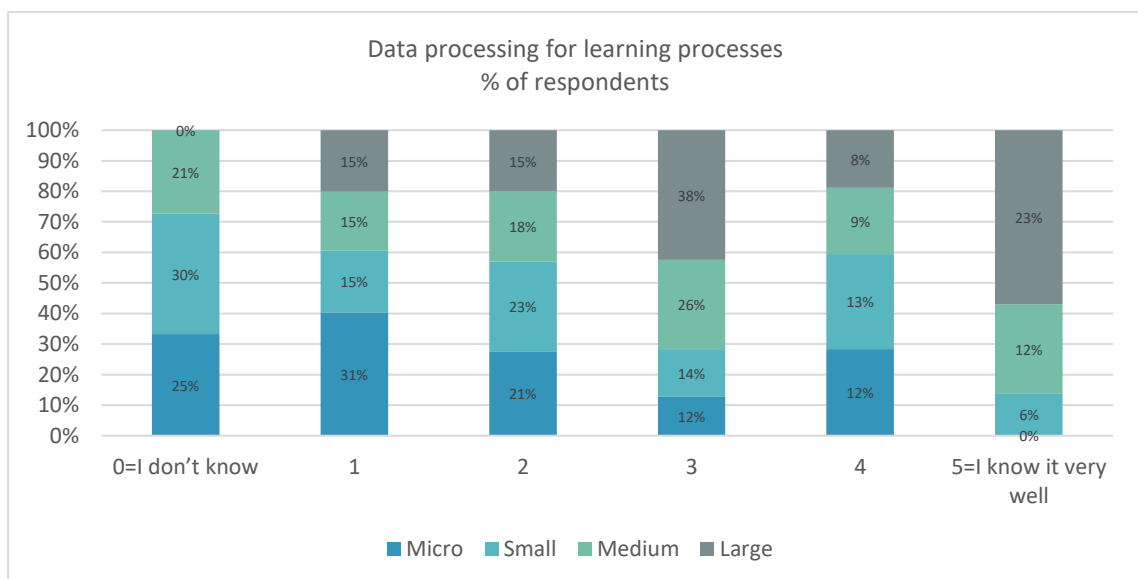
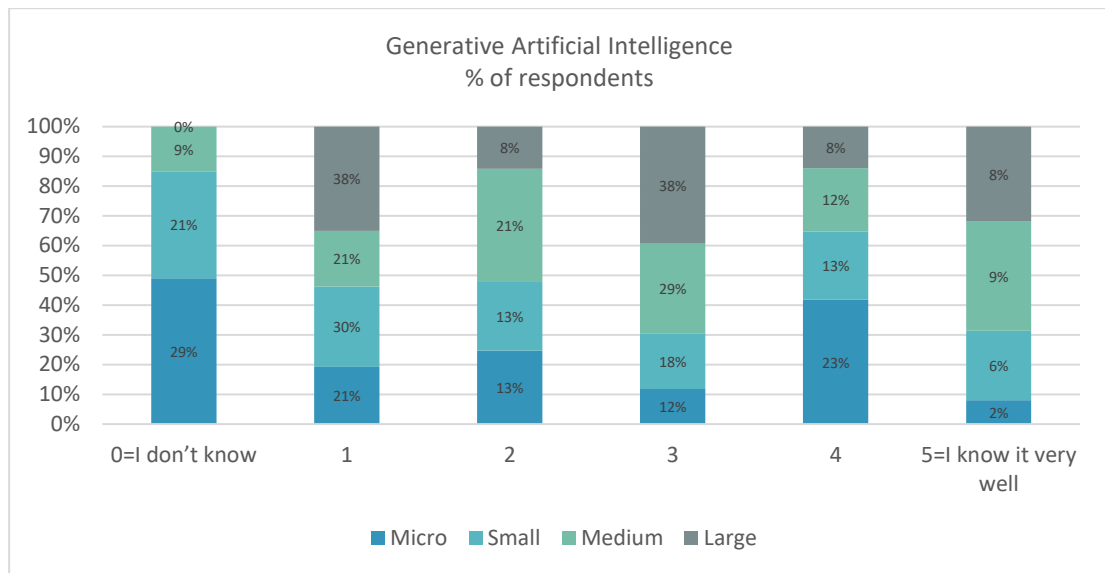




Here most popular technologies divided by respondent size and level of knowledge. This division is important to understand which types of companies are more attentive to the knowledge of technologies and which consequently can be those that drive the sector towards a better implementation of technological innovations.







As we can see from the graphs, it is mainly large companies that currently have a more in-depth knowledge of these technologies.

This is true for approximately all the technologies proposed, in addition to the 5 best known that we have reported here.

The results then underline how the majority of respondents admit to not knowing or knowing little about the technologies proposed in the questionnaire in general.

The response percentages for the values 0-1 (i.e. no or little knowledge) are much higher than the values that indicate a good knowledge of the technologies.

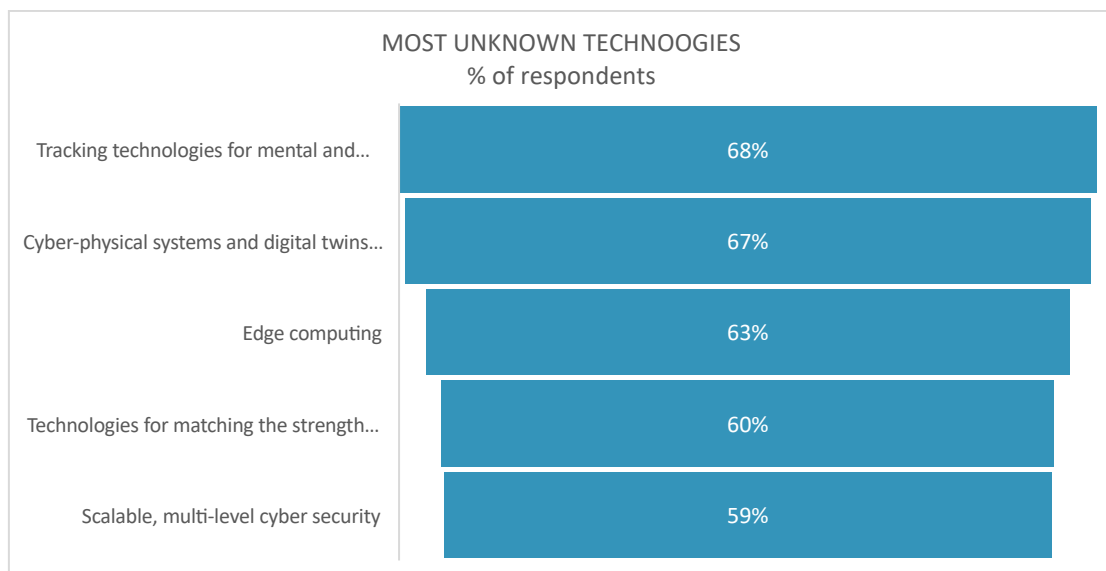
On average, 50% of respondents declare to know little about the enabling technologies of Industry 5.0, with peaks of up to 70% for some specific technologies.

## The most unknown technologies

As for the **lesser-known 5 technologies** in general, that is, those for which companies have answered options 0 (I don't know) or 1 option. These are therefore those indicated as lesser-known, with almost non-existent knowledge and for which the definition of these technologies is often not known and consequently not even the possible field of application.

The technologies least known by all the responding companies are:

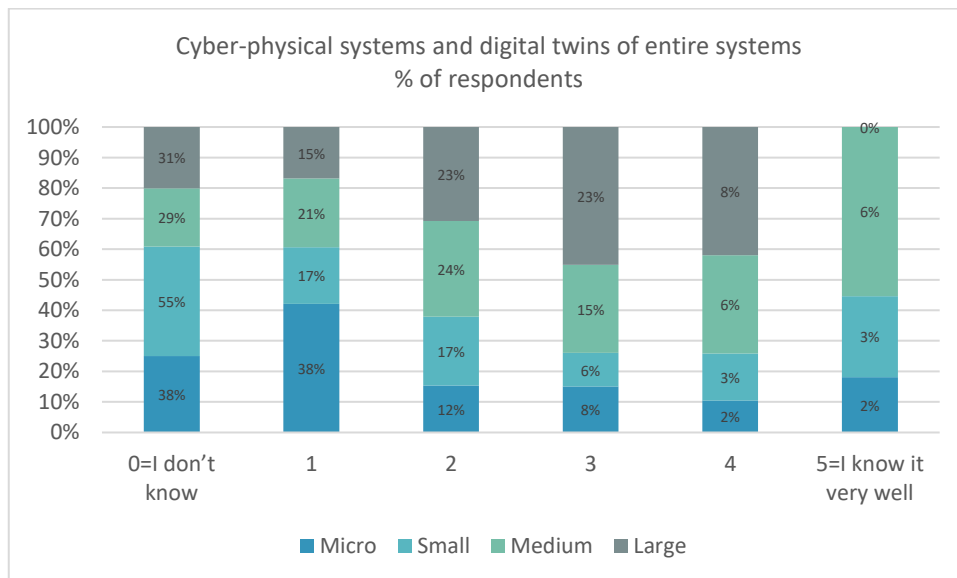
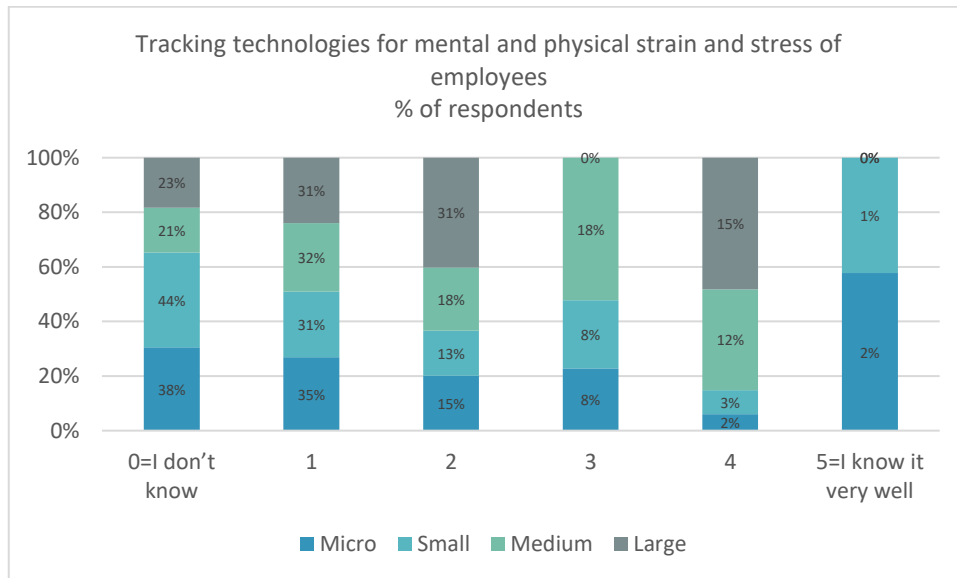
- 1) Tracking technologies for mental and physical strain and stress of employees
- 2) Cyber-physical systems and digital twins of entire systems
- 3) Edge computing
- 4) Technologies for matching the strengths of Artificial Intelligence and the human brain (e.g., combining creativity with analytical skills) / Informed deep learning
- 5) Scalable, multi-level cyber security

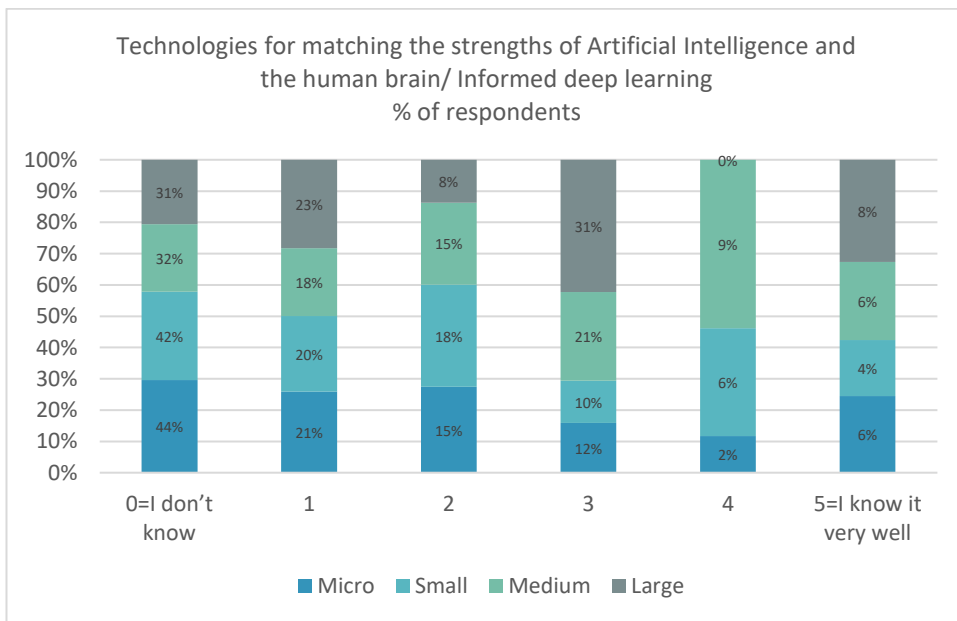
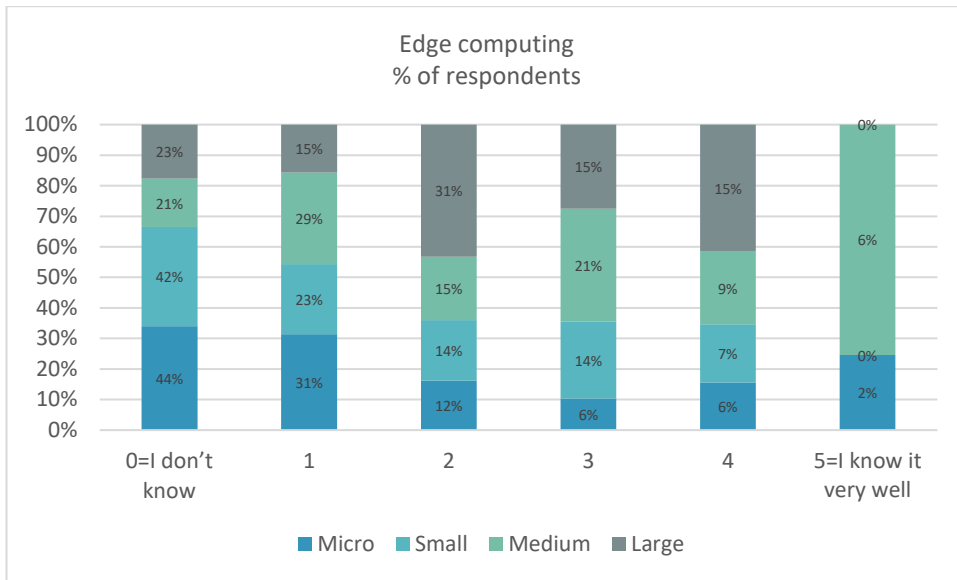


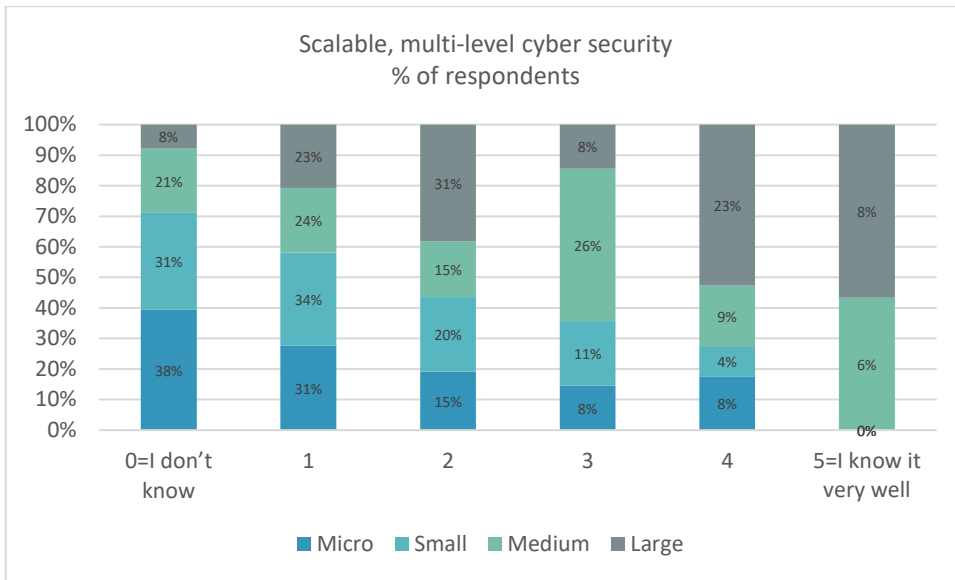
As for the most well-known technologies, an analysis was also made for the lesser-known ones, dividing the answers by company size of the respondents. It can thus be noted **that small companies are the ones that struggle the most to know the most technical and not immediate technologies in use.**

However, this is also accompanied by the presence of large and medium-sized companies that do not know some types of technologies, a symptom that for the Furniture sector, some technologies are currently outside the field of knowledge and application in production processes.

These are the results by company size:







As for lesser-known technologies, however, only a niche of companies, even small ones, claim to know them well. In most cases, however, even large and medium-sized companies struggle to have an in-depth vision of these technologies.

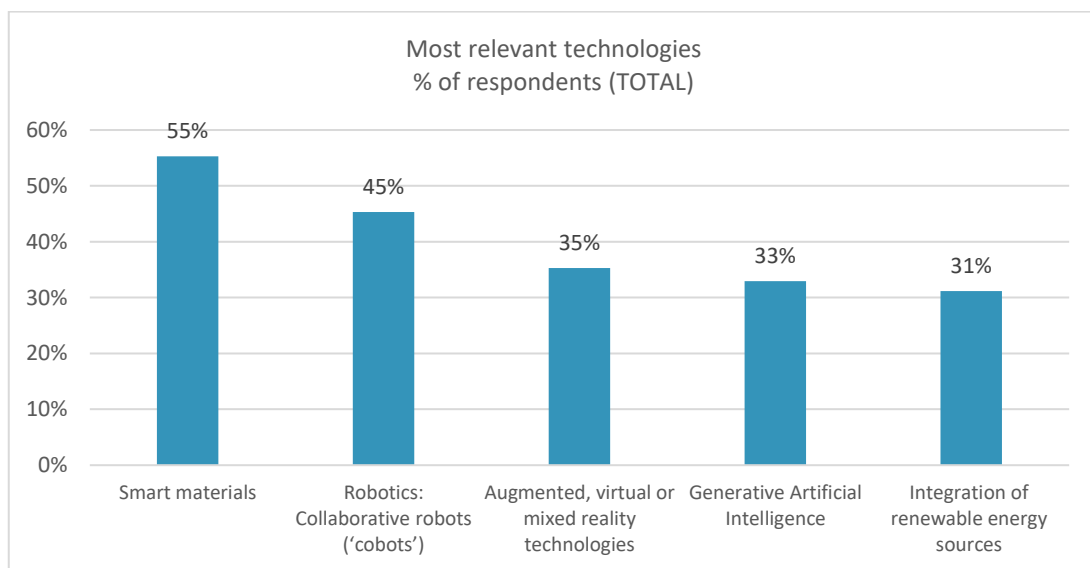
What emerges overall is therefore a lack of generalized knowledge regarding enabling technologies and this could lead to poor use and poor investment in the near future within companies that thus risk being left behind in the competitive challenge.

## The relevant technologies

The survey then investigated which of the proposed technologies were considered most relevant by companies.

With relevant we mean those that are considered most important for production processes, those considered most impactful for business models in the furniture sector.

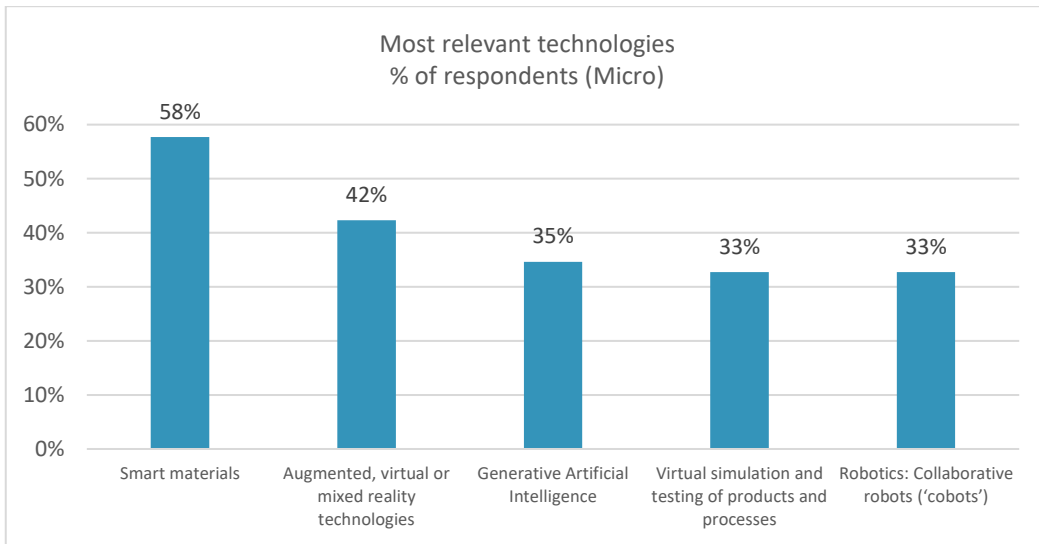
Regarding the technologies that companies consider interesting and useful for their production processes and to increase the competitiveness of their companies, below are the **5 technologies considered most relevant**.



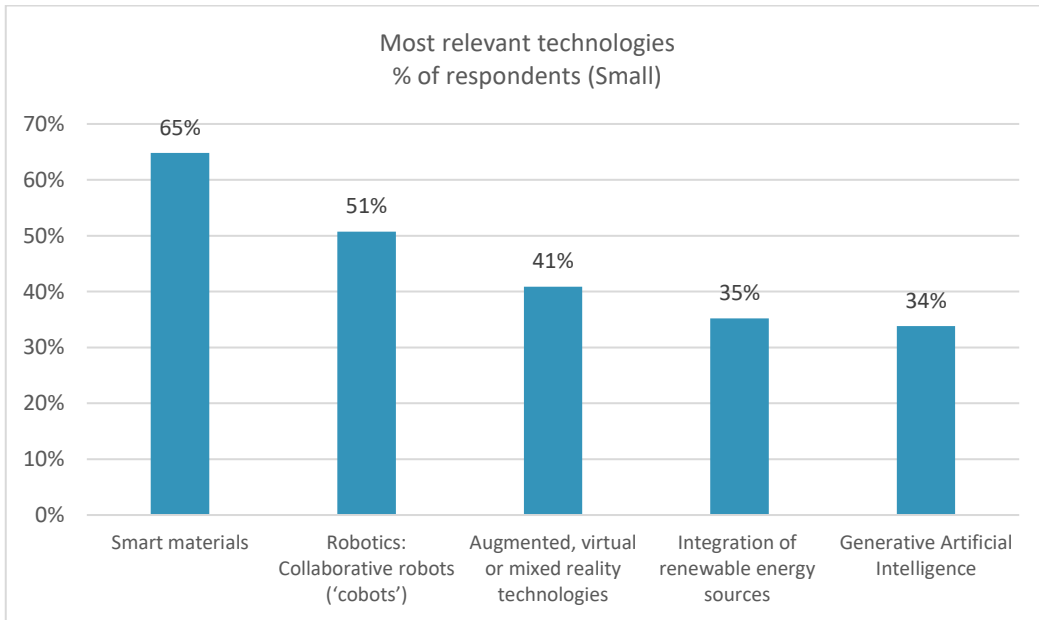
It is then possible to delve deeper into the choices of technologies considered most relevant by analyzing the responses by company size.

Results for Micro companies:

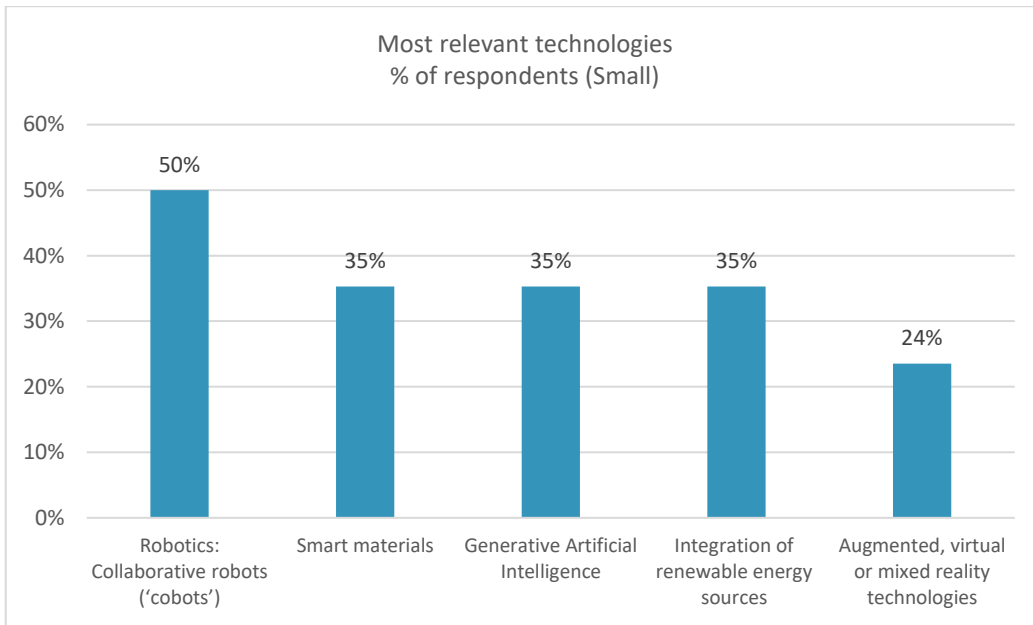




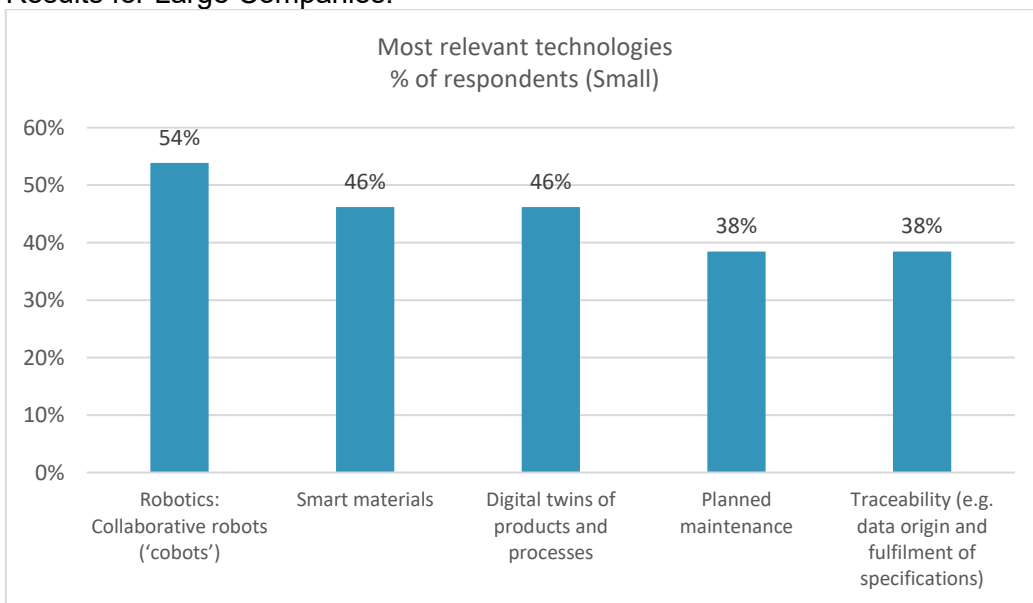
### Results for Small Businesses:



### Results for Medium-sized Companies:



### Results for Large Companies:



As we can see, the technologies that are the subject of the answers to this question are largely similar for every company size.

This is a sign that the sector is fairly in agreement on the technologies that can be useful to implement to progress in business development.

However, the answers also seem to be dictated by the "scarce" knowledge of these technologies, rather than by an in-depth analysis of their potential.

In fact, the technologies that are considered less relevant are different and are mostly those of which there is little knowledge.

That means that companies intend to invest or are thinking of doing so in the future, in those technologies that they know and that they have deemed useful for their companies.

This choice is rational, but it once again outlines the risk of stopping at what is already known, without fully grasping the possibilities that technological development can offer today.

## Conclusion

The furniture sector demonstrates that it has the **basic knowledge for some types of technologies** that are already having an impact on production processes and that by nature and type of products have already been implemented and are therefore better known than others.

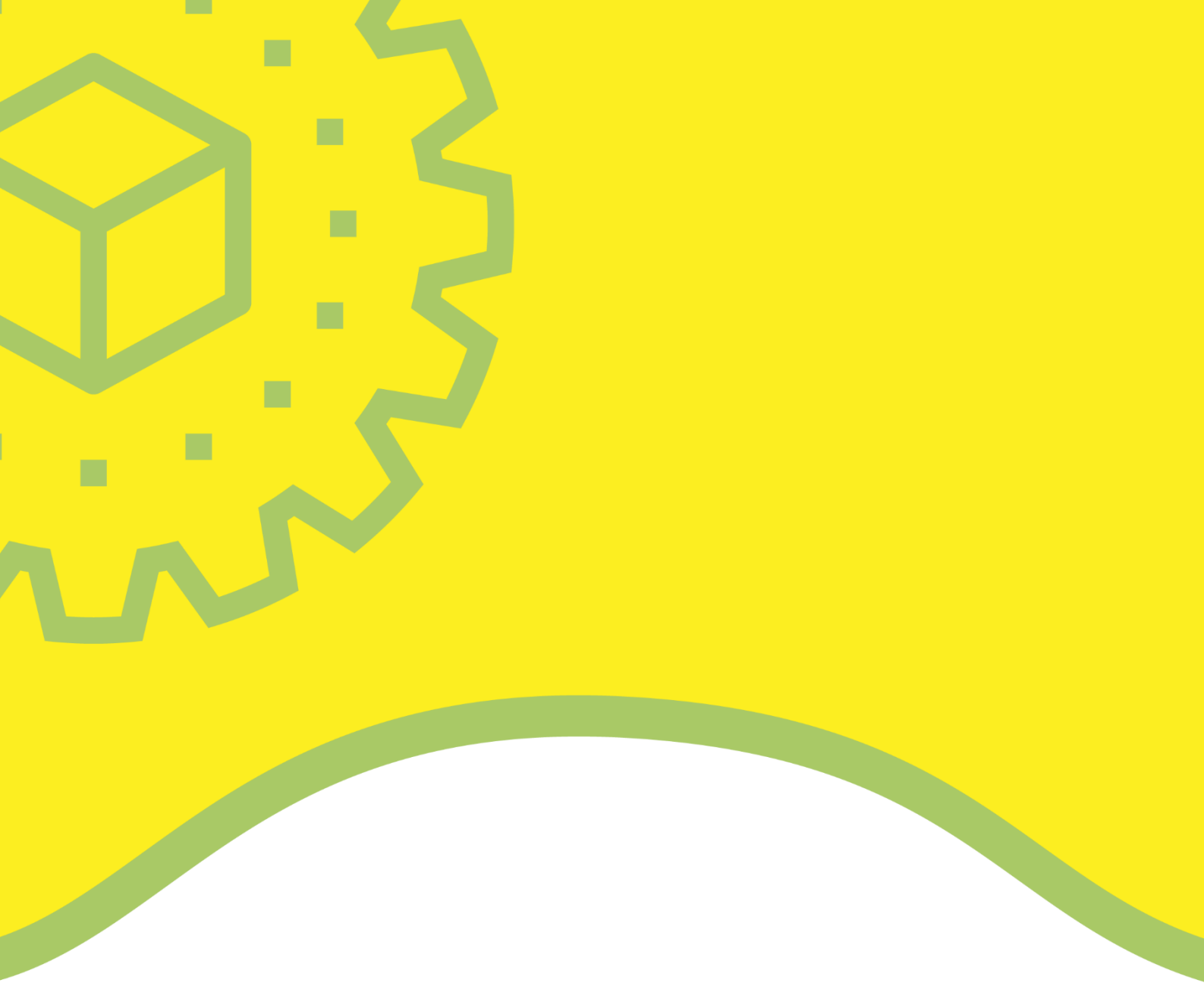
However, there are many technologies that today should be explored in depth due to the impact they can have on the life of companies that are not taken into consideration.

This is dictated by the lack of knowledge of these technologies and the lack of in-depth analysis of their potential and possible uses.

The survey outlined **a sector that is poorly informed regarding some types of technologies** and more competent on others. Overall, however, a strong lack of knowledge of these enabling technologies emerges, both for large and small companies.

It is precisely the **sector that needs a step forward in training** regarding the new technologies enabling the smart industry, in order to imagine new uses and new applications within a sector that is slowly approaching the technological revolution that has been underway in recent years.

The survey was certainly a good opportunity to understand what the most important gaps in the knowledge of these technologies are and to imagine solutions and proposals that can help companies understand the potential and tools that technology makes available today, in order to give a new innovative boost to the furniture sector.



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