DCD > Verticals

IT vs OT in Manufacturing

Exploring attitudes and areas for collaboration

Introduction

These findings are based on the responses of 60 manufacturing companies to a detailed questionnaire. The objectives of the research are to ascertain the extent to which manufacturing, production and related processes within these companies have been digitised, and how this transformation has been enabled in terms of data infrastructure requirements.

The research looks also at the wider corporate context of production transformation in terms of the degree of collaboration between IT and OT personnel. The survey was conducted between May and July 2017.

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The adoption spectrum

The findings describe the classic skewed profile of an adoption spectrum with a minority of these organisations (≈20%) indicating high levels of adoption of IT and automation within their production processes, expressing clear statements of benefit for doing so and appearing to have a strategic roadmap for the process. At the other end of the spectrum, a higher proportion (≈30%) have made only limited progress towards process digitisation, exhibiting more cautious attitudes towards the benefits of data technologies in the workforce and lower levels of collaboration between IT and OT.

The remainder of the sample (≈50%) lie between these two end clusters in terms of progress towards production process transformation, attitudes towards technology, dependence on data and the extent to which their organisational structure is configured to mesh with production process transformation. Since the adoption process here involves a complex set of technologies and a complex set also of human attitudes, behaviours and relationships, a company's position on the spectrum can be unclear, for example, attitudes may be progressive while deployment practices may be slow. There will be factors outside the scope of this research, for example issues of availability of capital or of ROI perceptions that restrict investment despite attitudes that are positive towards it.

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IT and OT

The corporate context in which process digitisation takes place, is muddled. On one hand the IT side is clear cut – 25% of the sample belong to an 'IT department'. The OT representation does not come from an 'OT department' but from groups of engineers and operations personnel. Higher C-level generalists also play a role but there is little evidence of specialist roles being created to look at the process for digital transformation of production. It seems to be happening from within current working titles and structures, and from within current job responsibilities, for infrastructure/data centers, CRM, networking, strategy and planning.

The two outcomes where a strong majority believe that collaboration between IT and OT is 'always important' are defining and meeting customer requirements, and improving analytics and intelligence. The importance assigned to improving analytics suggests growth in the understanding that data is core to the CRM process.

There appears to be a system of 'formal' collaboration between IT and OT within 19% to 21% of these companies at which most issues are discussed. Satisfaction with collaboration correlates directly to the importance assigned to the issue – satisfaction is highest with the role of collaboration in defining and meeting customer requirements and in improving analytics and intelligence.

The comparative imagery of each department shows, within the limitations of the sample, that OT is more likely than IT to be rated as 'critical to the company' (34.0% to 17.0%) and 'critical to the brand' (29.8% to 19.1%). IT is rated higher than OT for being collaborative in its approach (34.0% to 12.8%) and for being well-established (34.0% to 21.3%). These suggest a reversal of current thinking that IT is the way forward for companies today and that it represents a 'new' approach when compared to the established means of production. More likely, it suggests that OT is viewed as a recent development within IT.

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Mission Critical IT on the Factory Floor

There is agreement that information and analysis is as important as 'product'; that the only way to competitive advantage is through digital technology and that the new era of production is as much about collaboration as it is about technology.

Currently, there are fewer organisations in the sample who have fully automated or digitised the listed manufacturing and production processes (a range of 15% to 29%) than there are who have not started to automate them (29% to 37%). Monitoring the production process for efficiency and performance, and quality control are the most automated or digitised tasks.

The key drivers for the deployment of IT and technology within the production processes of these companies are the more efficient use of resources and materials, improved security, the minimisation of production error and improved cost-efficiency. There is thus a strong cost focus – drivers of customisation, scalability, value-add and sustaining premium pricing are secondary. Strategies already adopted into the production/manufacturing process include sensor systems and upgrades to systems and storage. None of these can yet be seen as radical or second generation transformations.

For 42% of the sample, the collection and analysis of data is highly important to their mission and responsibilities. It is fairly important to another 39%. Security is the attribute most valued in terms of data used in the production process. Ease of curation and consistency with existing data sets are secondary attributes, and latency and ease of analysis are tertiary requirements.

Among companies which have introduced IT into the manufacturing and production process, 52.8% use a pre-existing in-house data center, while 25.2% have built a new data center and 22.2% rely on a private or hybrid cloud. There is no single 'type' of data center used to support the digitisation of manufacturing and production. As most of the data centers used for this purpose pre-dated the digitisation process, this variety is unsurprising.

35.3% make some use of edge processing in the collection and analysis of their production data. Most usually, this uses existing networking equipment although there is some use of containers and micro DCs.

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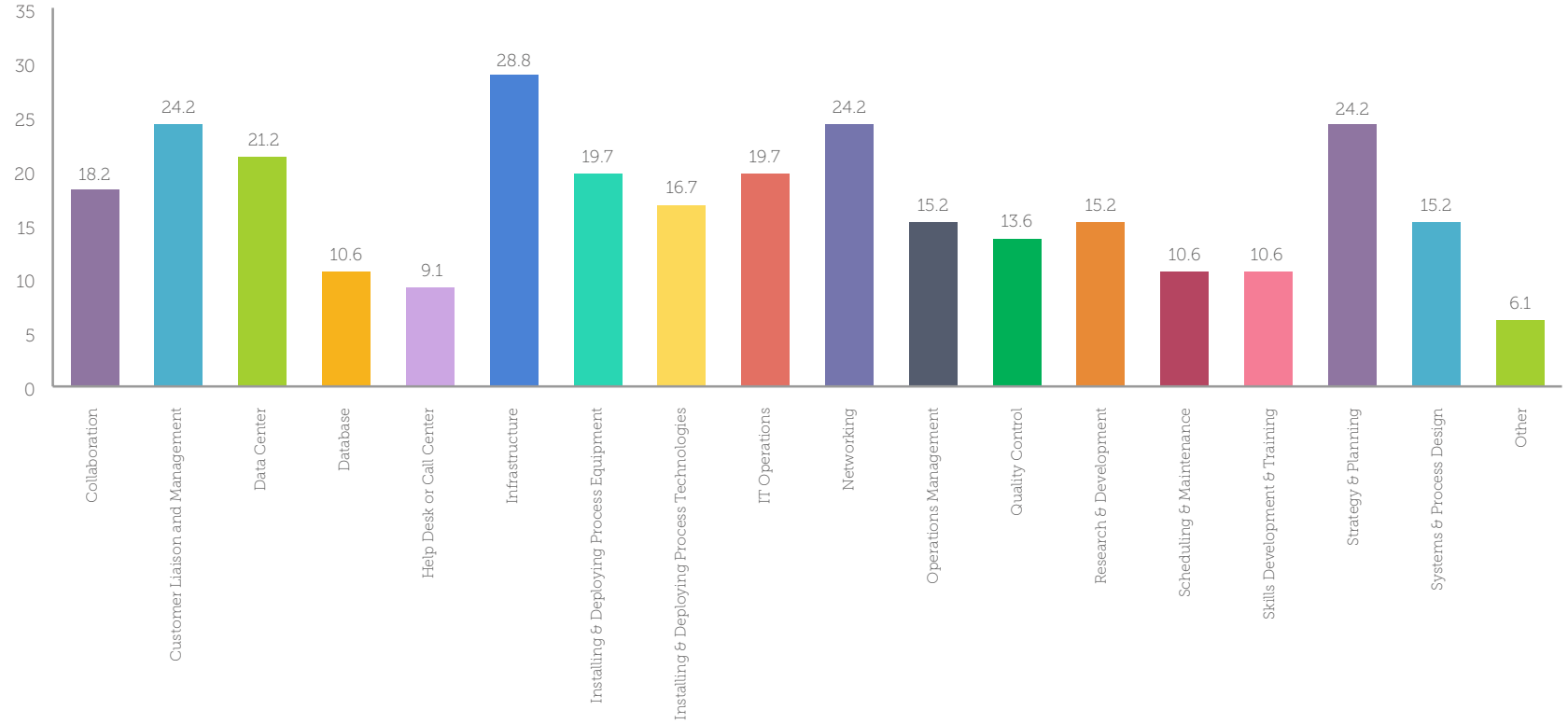
Key job responsibilities?

There is no single, dominant area of job responsibility – Infrastructure, Data Center, Customer Liaison, Networking, Strategy and Planning are all mentioned by over 20% of the sample. Again, it is clear that, in most of these companies, the integration of technologies into the production/ manufacturing environment is integrated into existing areas of responsibility.



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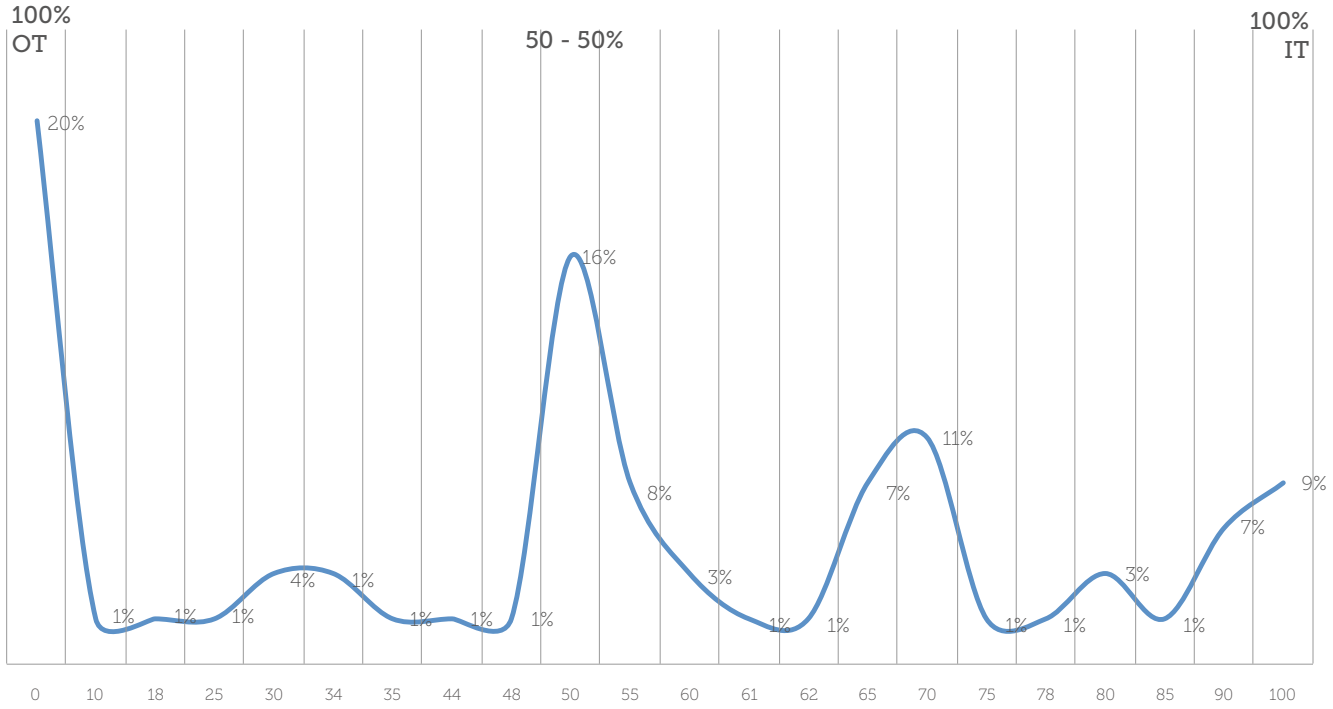
IT and OT

Where do you see yourself on the spectrum below in relation to IT and OT?

The successful integration of IT and OT will depend upon how much the two streams are siloed independently and the extent to which IT and OT personnel perceive this. The sample indicates that there are a cluster of '100% OT' engineers and a smaller number of '100% IT' personnel. This balance reflects the fact within organizations that are not IT specialists, IT personnel will be linked to particular departments or tasks. Half the sample are in the middle two quartiles, indicating a mixed identification.



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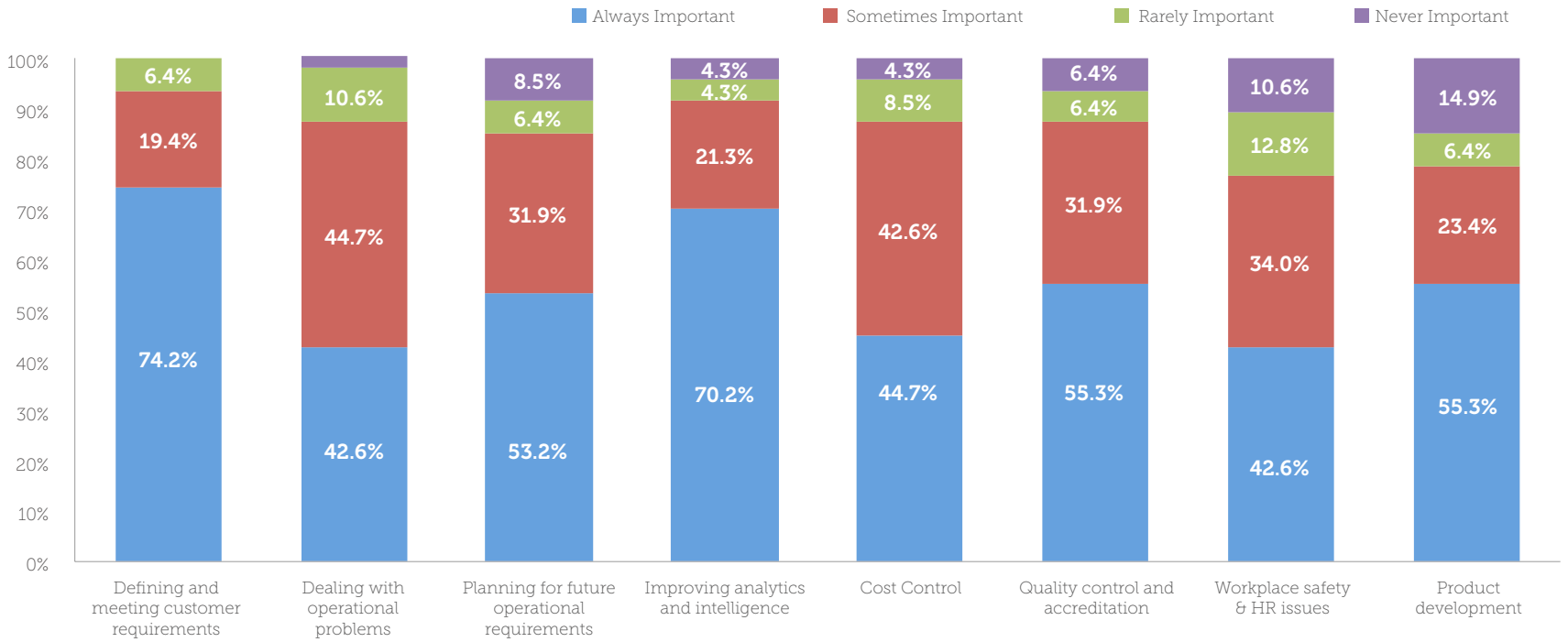
How important to you is the collaboration within your company between IT and OT in delivering the following outcomes?

The two outcomes where a strong majority believe that collaboration between IT and OT is 'always important' are defining and meeting customer requirements, and improving analytics and intelligence. While the priority given to the first of these is predictable for customer-driven organizations, the importance assigned to the second suggests growth in the understanding that data is core to the CRM process.



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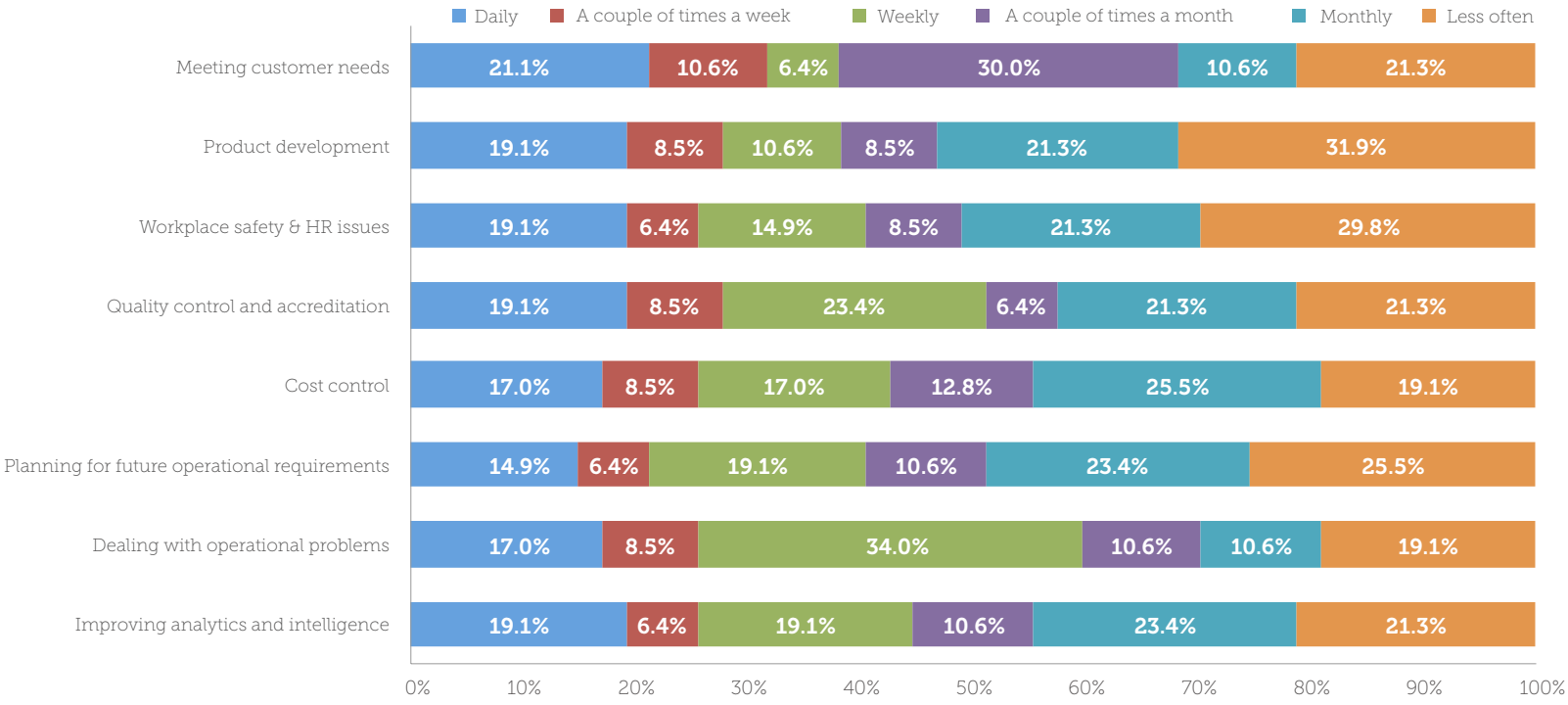
How often are there 'sit-down' meetings between IT and OT to help deliver the following outcomes?

The system of 'formal' collaboration between IT and OT within these companies appears to follow a defined pattern regardless of the criticality of the issue. In 19% to 21% of organisations there are formal daily meetings between IT and OT on a range of issues, with a lower frequency for cost control, future planning and operational problems. Formal collaboration is least frequent for product development or for safety/HR issues.



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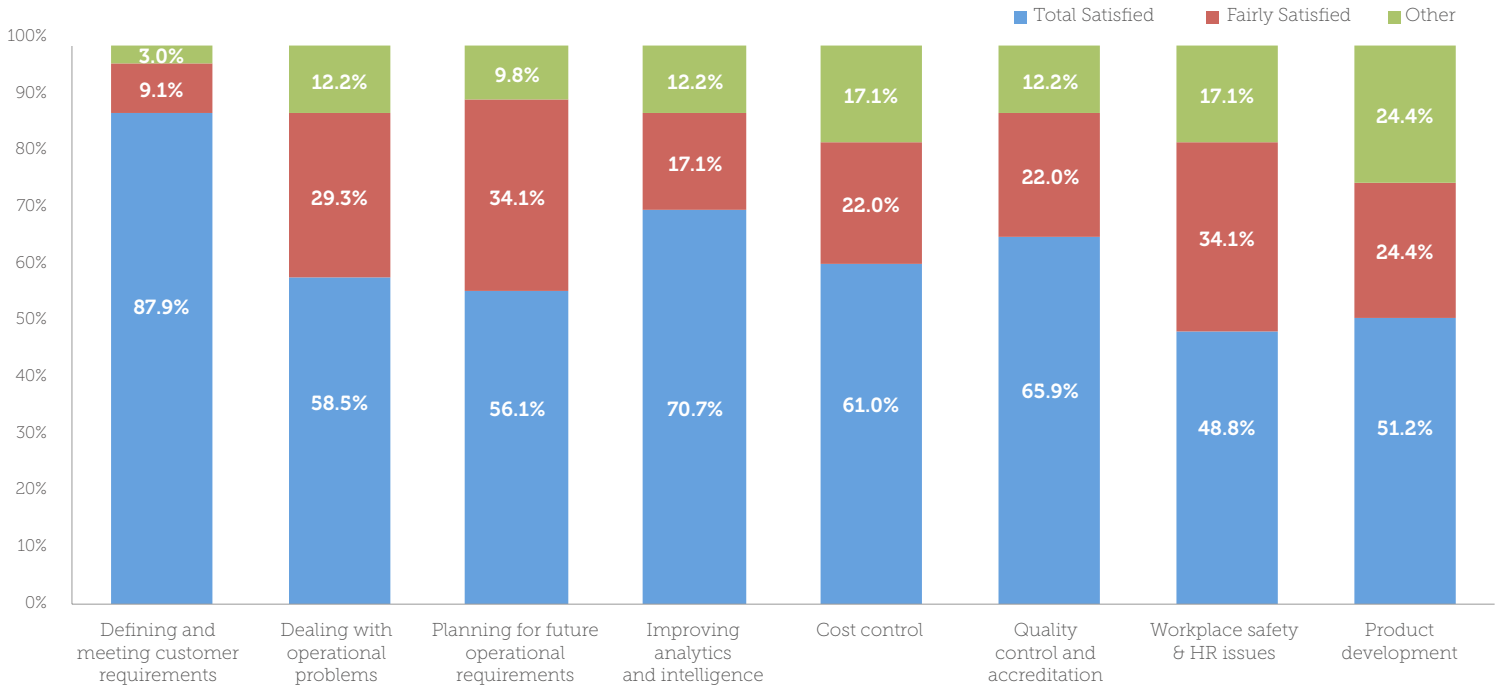
How satisfied are you that collaboration between IT and OT works in delivering the following outcomes?

There is considerable variation in satisfaction levels with the collaborative process between issues. Satisfaction is very high with the role of collaboration in defining and meeting customer requirements and in improving analytics and intelligence. These were the two issues nominated as the most important so this indicates a focus on them. Satisfaction is lowest with the impact of collaboration on workplace safety and on product development – these are the issues least covered by collaboration which suggests that collaboration as a principle for dealing with any issue is welcomed.



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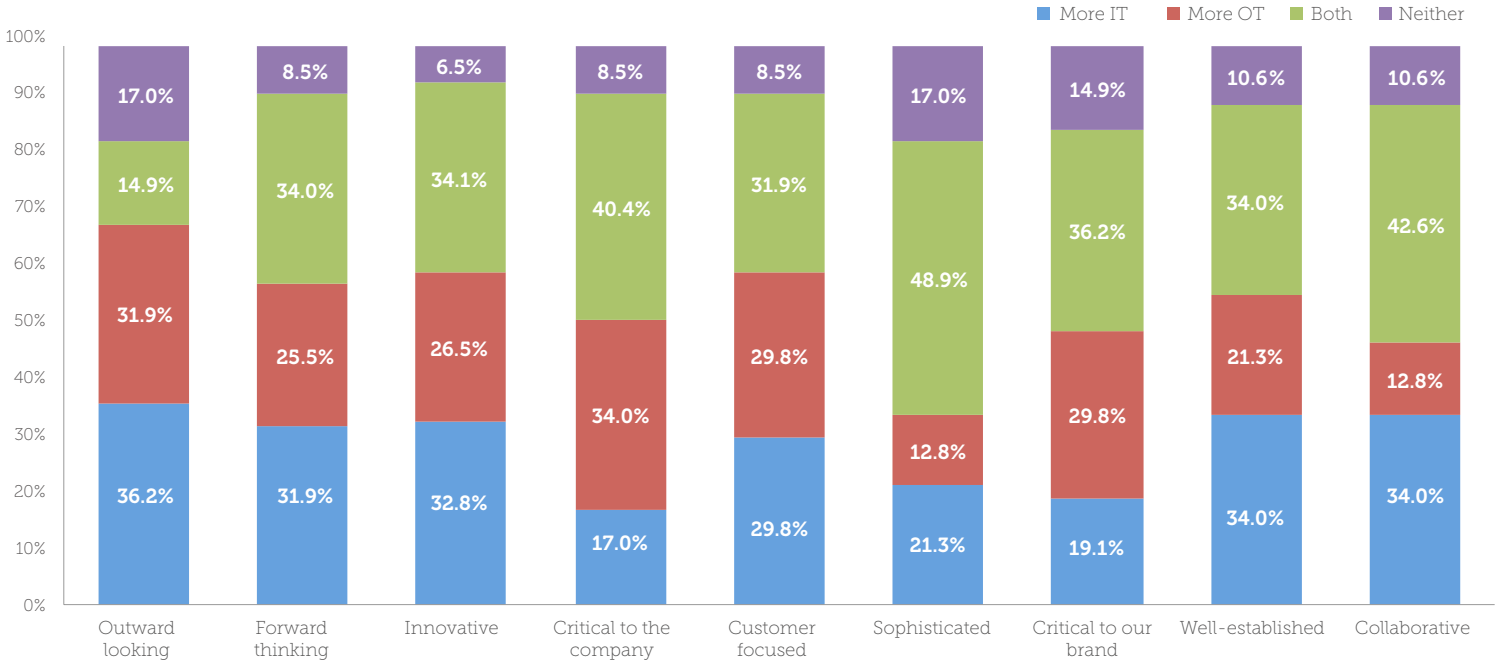
Please think again about IT and OT and indicate which words or phrases you would associate more with each

IT and OT are rated closely on most of these attributes, with the highest proportion on most attributes tending towards rating both IT and OT equally. OT is more likely to be rated as 'critical to the company' (34.0% to 17.0%) and 'critical to the brand' (29.8% to 19.1%). IT is rated higher that OT for being collaborative in its approach (34.0% to 12.8%) and for being well-established (34.0% to 21.3%). The last rating is interesting in the context of Industry 4.0 since it may indicate a belief system that IT is not the new arrival to transform dated process systems. The higher ratings for OT indicate thinking that has not yet grasped that data may become more valuable than process.



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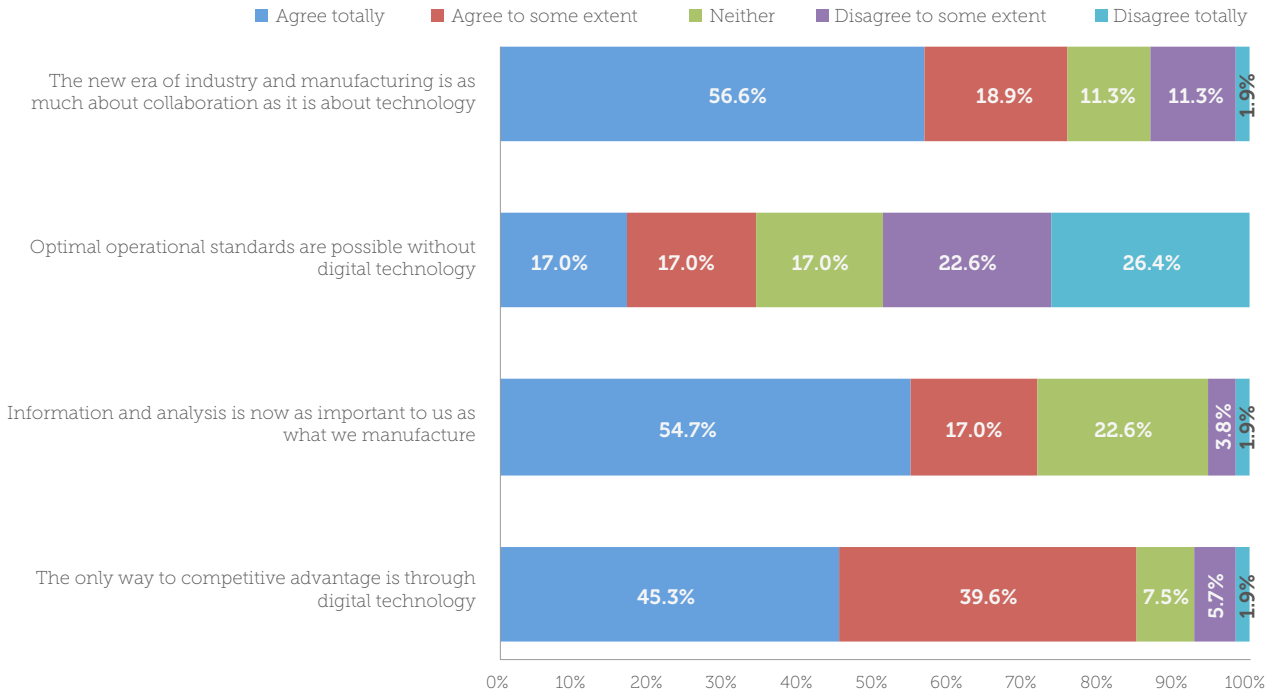
IT on the Factory Floor

How far do you agree or disagree with the statements below? Please check one response per row

There is agreement that information and analysis is as important as 'product,' that the only way to a competitive advantage is through digital technology and that the new era is as much about collaboration as about technology. The fourth statement – optimal operational standards are possible without digital technology – divides opinion between companies that have already begun transformation (agree) and those which have not (tending to disagree). But even on the other three statements, strong agreement is not universal –there are pockets of resistance to the idea of digital technology 'on the factory floor.'



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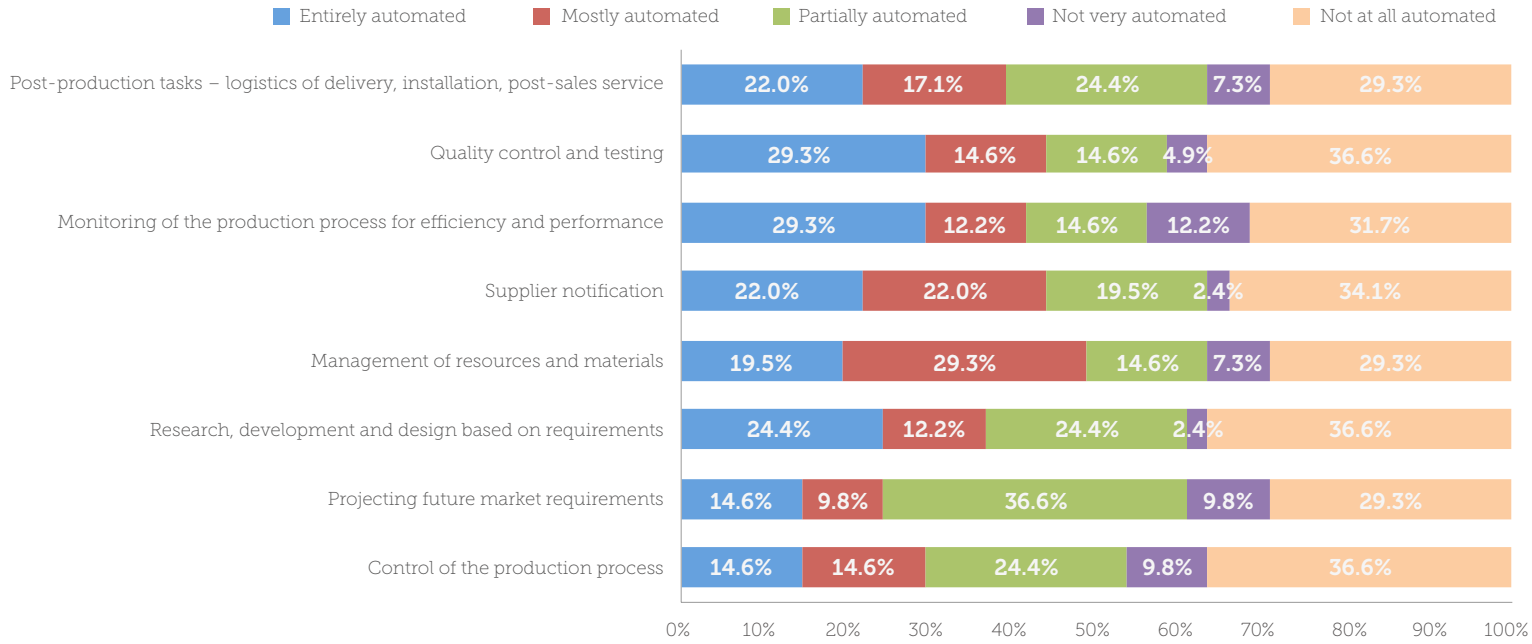
Deployment of IT for manufacturing and production processes

Currently, there are fewer organizations in the sample who have fully automated the listed manufacturing and production processes than there are who have not started to automate them. Monitoring the process for efficiency and performance, and quality control are the most automated tasks, while resource management is the most likely to rely 'mostly' on IT and automation. Projected future market requirements is most likely to rely partially on automation and IT.



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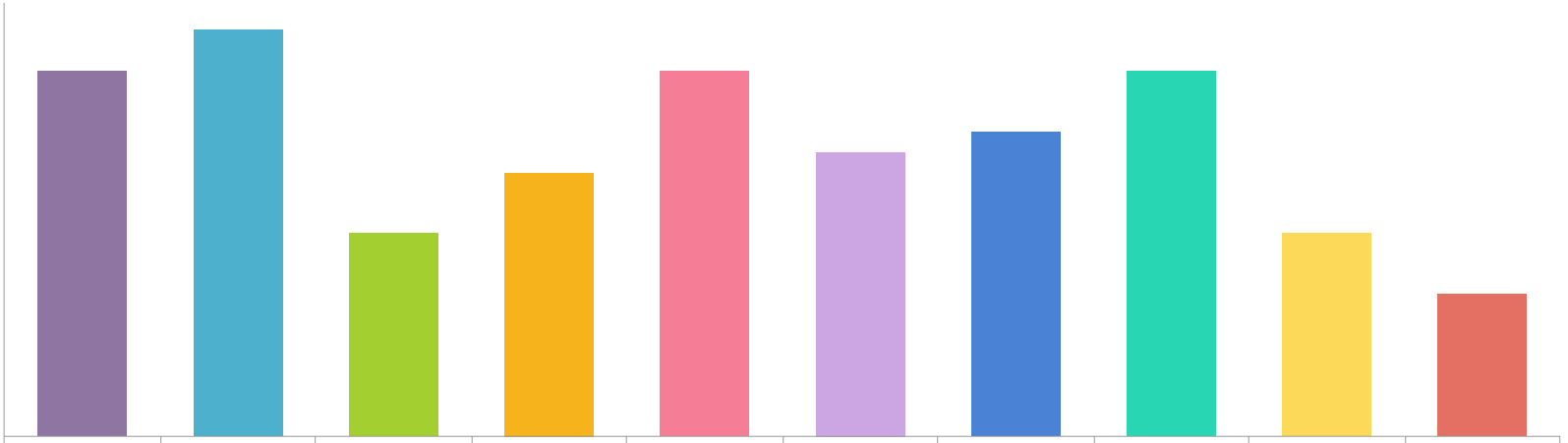
Key Drivers for the deployment of IT and technology in manufacturing and production operations

The key drivers for the deployment of IT and technology within the production processes of these companies are the more efficient use of resources and materials, improved security, the minimization of production error and improved cost-efficiency. There is thus a strong cost focus – drivers of customization, scalability, value-add and sustaining premium pricing are secondary, although data on deployment indicates that only a minority of these companies have deployed a system capable of delivering these 'value' benefits and that deployment appears based on a task-by-task rather than on a fully integrated system basis.



	Improved cost-efficiency	More efficient use of resources and materials	Reduced labor costs	Ability to customise to meet individual customer requirements	Minimize production error/improve quality control	Ability to scale output to meet requirement	Ability to add value after the production phase	Improved security	Improved competitive standing/ ability to sustain premium costing	Other drivers
0: Series	48.6	54.1	27	35.1	48.6	37.8	40.5	48.6	27	18.9

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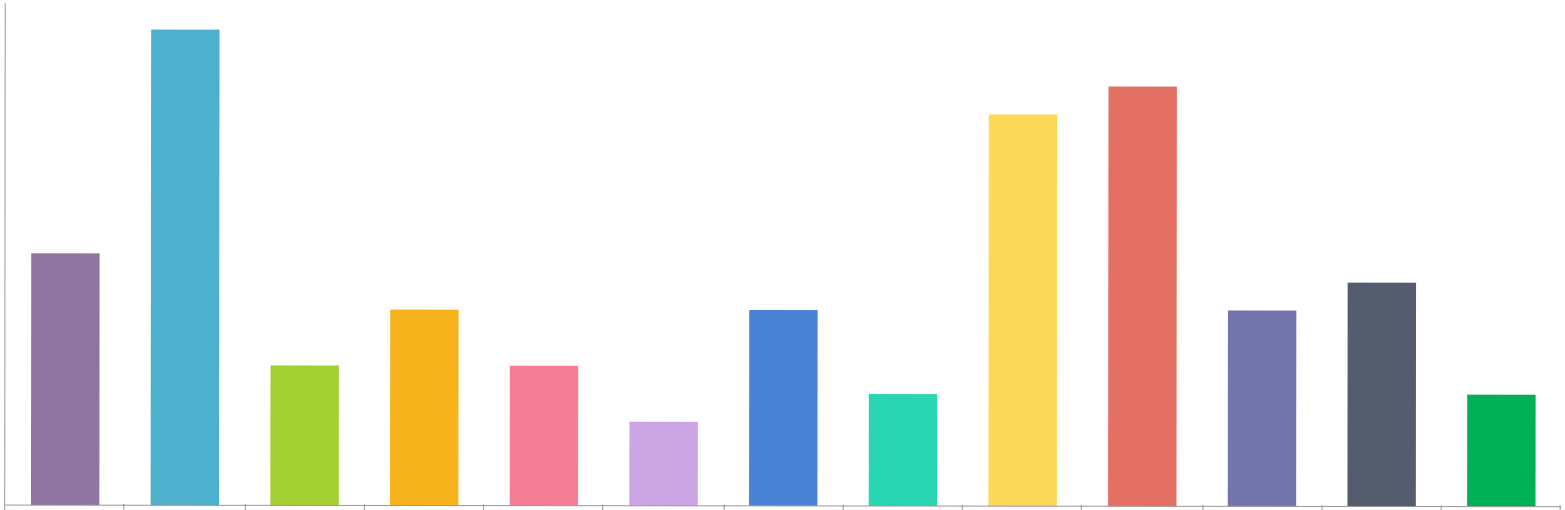
Strategies already incorporated into your production/manufacturing process (including pre- and post-production)

Strategies already adopted into the production/manufacturing process include sensor systems and upgrades to systems and storage. None of these can be seen as radical transformation as they would be a standard requirement of any company running these processes via a data center. Deployment of robotics/co-botics, augmented learning, and strategies for AI and IoT are less common outside the 20% of companies here who have ventured furthest into the digitization of their production processes.



	Process/ control automation	Sensor systems	RPE	Robotics	'Cobotics' (robots working alongside people)	Augmented ('virtual') learning	3D printing	AI/ Machine learning	Storage upgrade	System upgrade	IoT/big data analytics	Direct visualization /reporting	Other strategies
	24.6%	45.9%	13.5%	18.9%	13.5%	8.1%	18.9%	10.8%	37.8%	40.5%	18.9%	21.6%	10.8%

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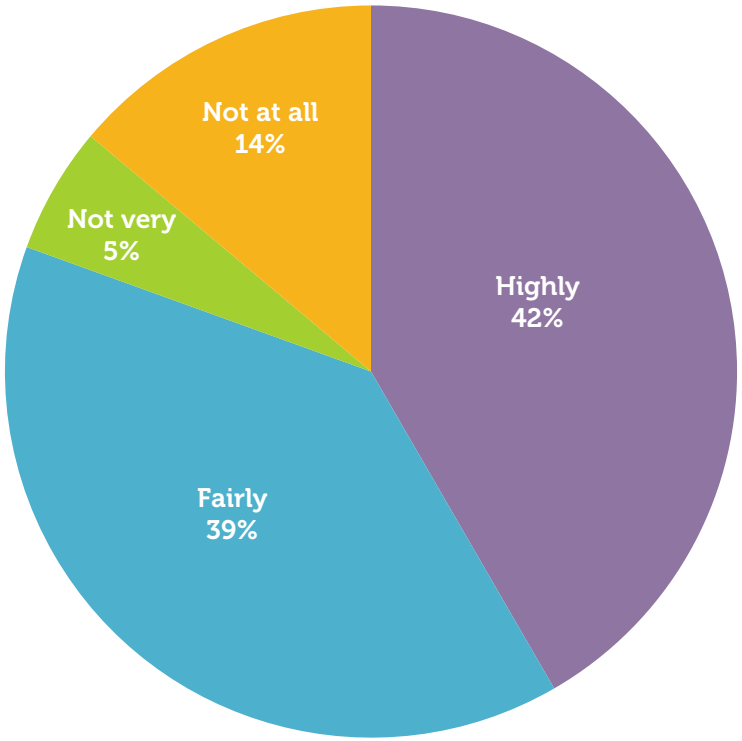
How important is the collection and analysis of data to your mission and responsibilities?

For 42% the collection and analysis of data is highly important to their mission and responsibilities. This is fairly important to another 39%. It is less important to the 20% of organizations which have taken fewest steps towards the transformation of their production processes.



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Ranking of importance assigned to attributes of the data used

Security is the attribute most valued in terms of data used in the production process. Ease of curation and consistency with existing data sets are secondary attributes, and latency and ease of analysis are tertiary requirements. Security is of greater importance to companies already engaged in digitizing their production and relying more heavily therefore on data.

Overall Rank	Item	Score
1	Security	148
2	Ease of curation/identifying what is important	113
3	Consistency with existing data sets	112
4	Latency/Real Time	84
5	Ease of processing/analytics	83

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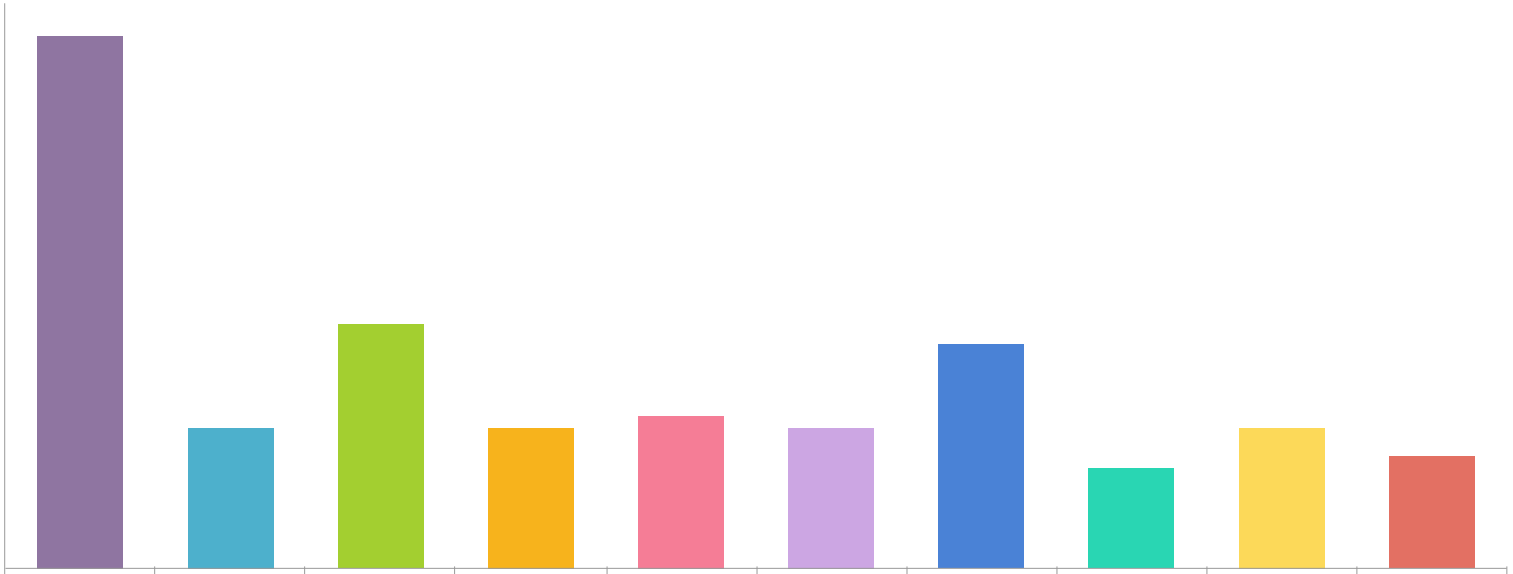
Means used for hosting, processing and storing the data required to drive design, manufacturing/production and delivery processes

Among companies which have introduced IT into the manufacturing and production process, 52.8% use a pre-existing in-house data center, while 25.2% have built a new data center and 22.2% rely on a private or hybrid cloud.



	Your own data center operated before deploying the process IT system	An external data center or hosting service that used before deploying the process	A data center that built specifically to house the IT required for the processes	An external data center or hosting service specifically to house the IT required	Edge computing units to process information in real time at or close to the point	In-house virtual machines	A private or hybrid cloud	Public cloud	None of the above	Other
0: Series	52.8	13.9	24.2	13.9	15.1	13.9	22.2	9.9	13.9	11.1

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Data center(s) used to operate production or manufacturing facility/facilities

There is no single 'type' of data center used to support the digitization of manufacturing and production. As most of the data centers used for this purpose pre-dated the digitization process, this variety is unsurprising.

Metric	Smallest	Largest	Model
Total technical space in square metres	10	500	Smaller than 100
Total power capacity (kW, IT)	25	1000	Smaller than 50
Year of commission	1999 (oldest)	2016 (youngest)	
Average kW/rack (IT)	2	6	5
Tier Level (design)	II (lowest)	IV (highest)	III
Tier Level (operation)	II (lowest)	IV (highest)	III

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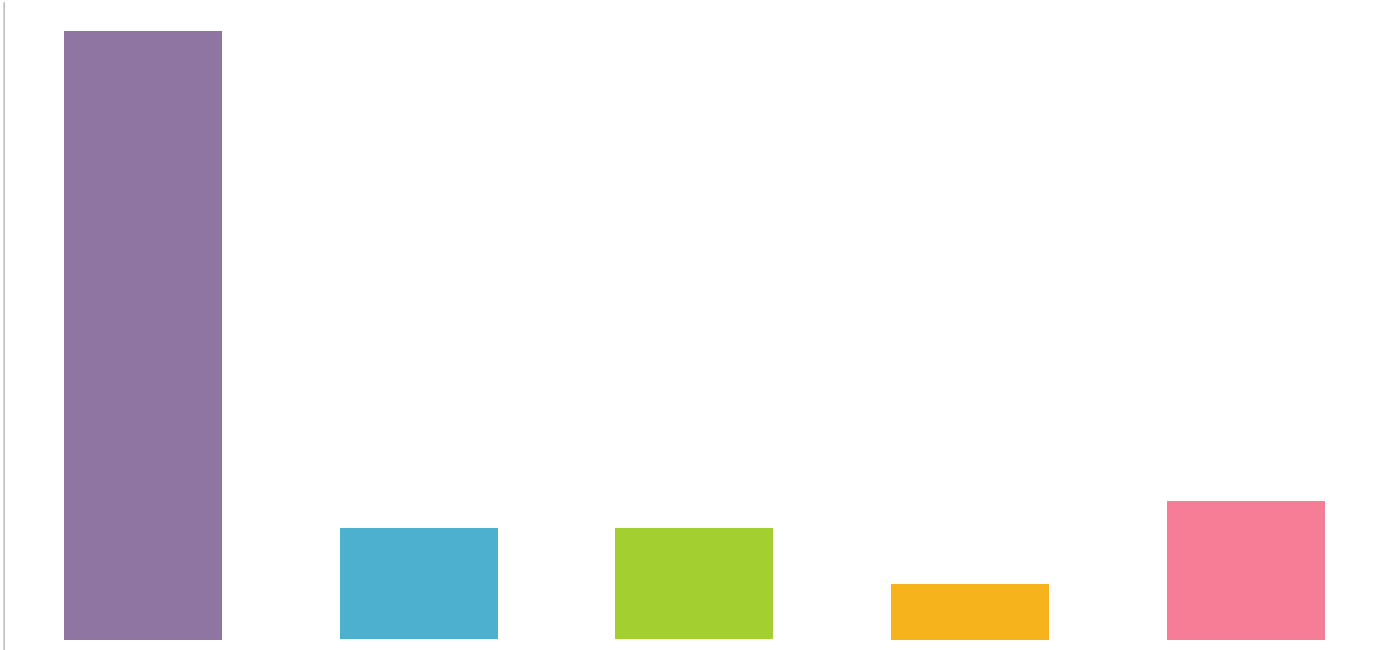
Deployment of edge computing units

35.3% make some use of edge processing in the collection and analysis of their production data. Most usually, this uses existing networking equipment although there is some use of containers and micro DCs.



	We don't/does not apply	In 20 foot containers	In 40 foot containers	In micro or pod DCs	Within existing operational control and networking equipment
0: Series	64.7	11.8	11.8	5.9	14.7

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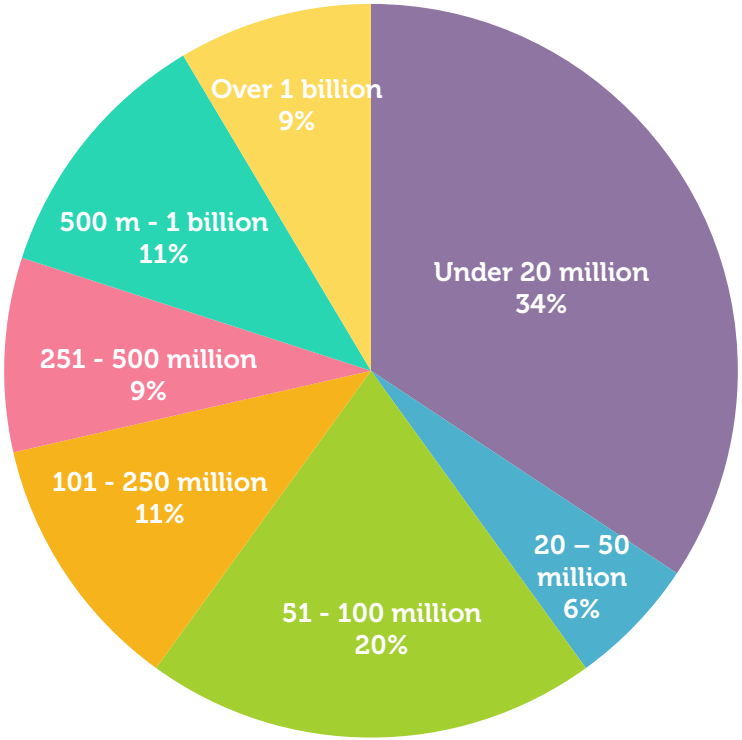
Corporate Profiles

Company's turnover in the last year in US dollars

The sample includes a range of companies of different sizes, from national and regional manufacturers (the largest group here) to global brands.



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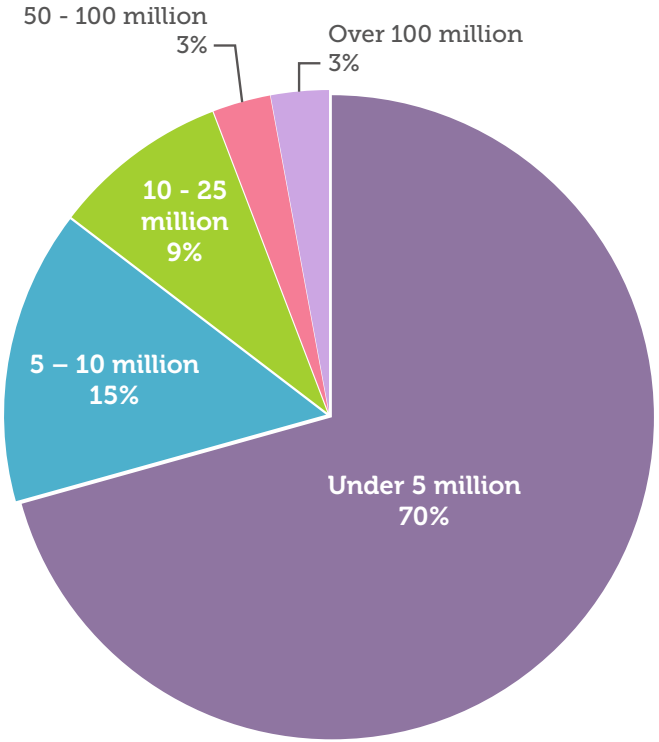
Company's annual IT budget in US dollars

The sample includes a range of companies with different levels of IT budget, from under USD 5 million (the largest group here) to a minority with a spend over USD 100 million.



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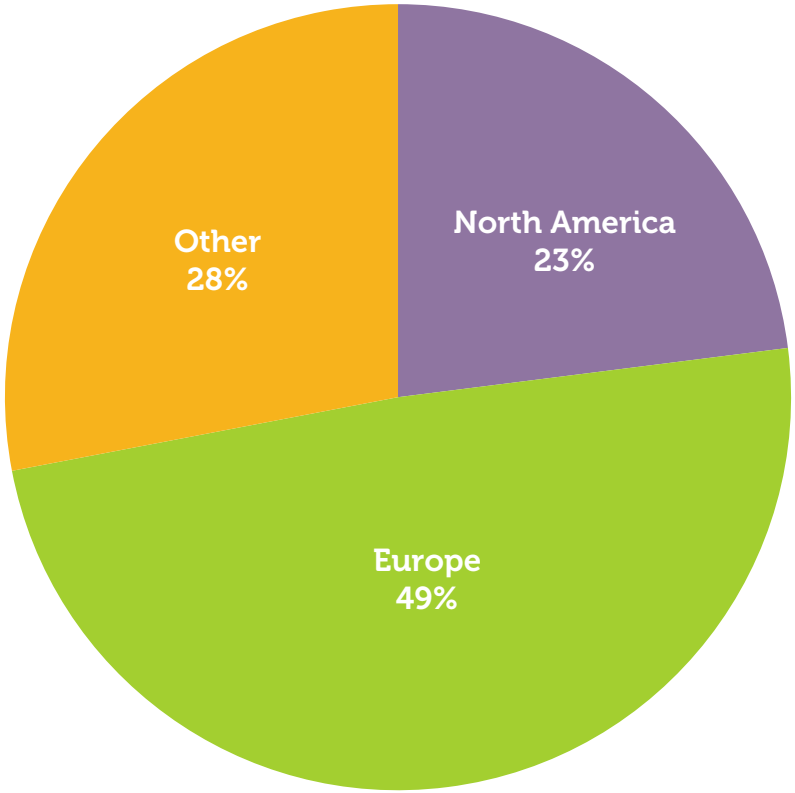
Where do you usually work from?

Almost half the sample are based in Europe.



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Profile of Respondents

Job Title

	Total %
CEO /Other C Level	15.8%
Director/Manager of Engineering	15.8%
Head of Information Technology/ CTO/CIO	CEO/Other C Level 12.3%
Operations Director/Manager	7.0%
IT Engineering	7.0%
Project Engineer/ Manager	7.0%
Innovation Director /Manager	5.2%
Data Center Manager	5.2%
Infrastructure Manager	5.2%
Operations Manager	3.5%
Management Consulting	3.5%
System Administrator	3.5%
Other	12.3%

A number of different disciplines were interviewed as part of this research. With the intention of separating the sample into IT and OT streams, it is clear that the latter seems to fit under engineering. While responsibility is taken at C Level for the production process, there is little mention of specialists and strategists working on this. Possibly this is provided by external consultants.

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Products that company manufactures for which respondent has responsibility?

	Percentage
Electronics	19.2%
IT equipment / hardware	15.4%
Transport / vehicles	9.9%
General industrial	8.2%
Mining / minerals processing	7.2%
Corrections equipment	3.6%
Copper products	3.6%
Tooling	3.6%
Gear and motor assembly	3.6%
Batteries	3.6%
Medical equipment	3.6%
Space craft	3.6%
Storage	3.6%
Instrumentation	3.6%
Engines	3.6%
Other products	3.6%

The respondents interviewed are responsible for a range of manufactured products including electronics, IT equipment, transport and a range of diversified (metal-based) products.

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