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Intelligent Manufacturing:

The Movement of Enterprise Applications to the Cloud

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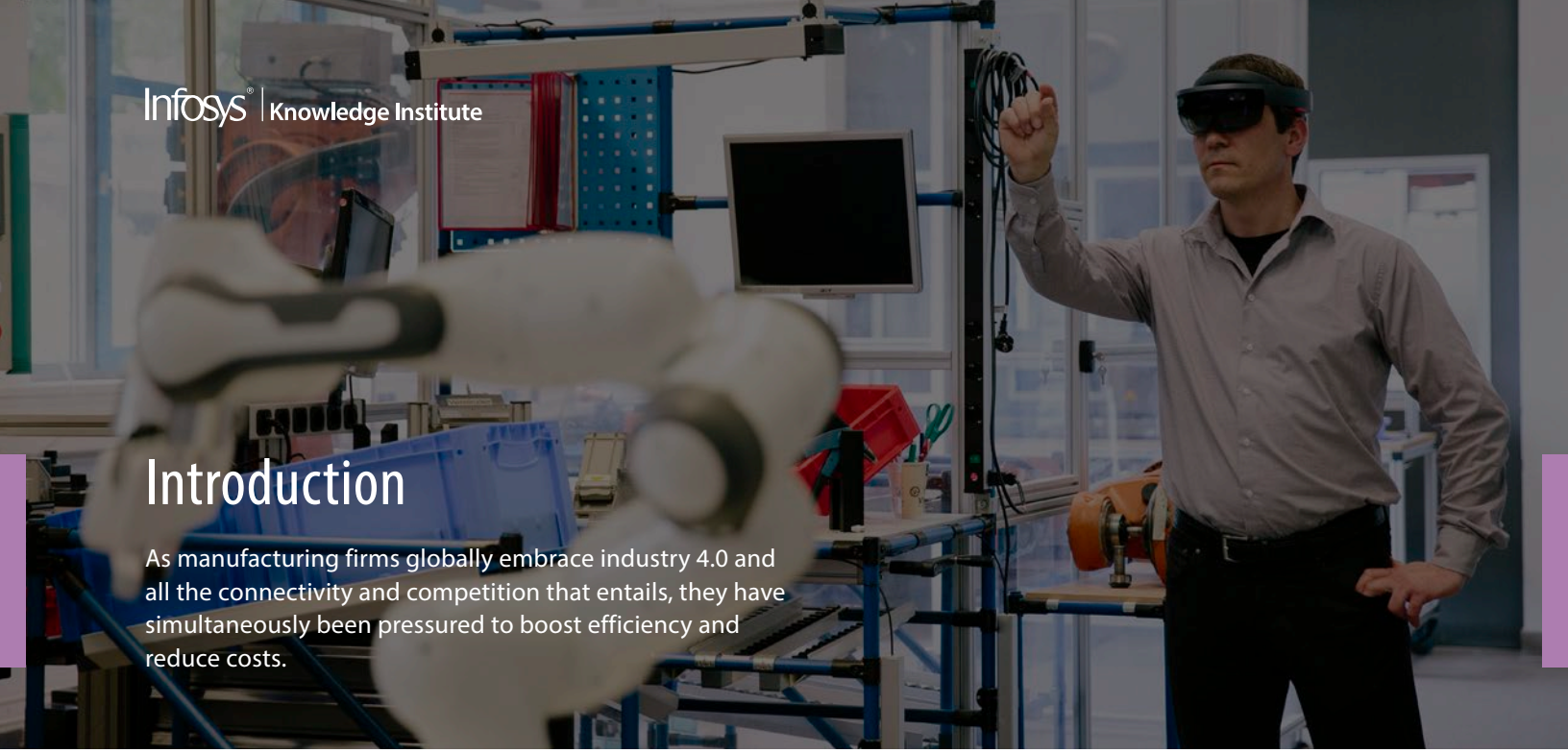


Introduction

As manufacturing firms globally embrace industry 4.0 and all the connectivity and competition that entails, they have simultaneously been pressured to boost efficiency and reduce costs.

These corporate giants must cannibalize their existing revenue streams while at the same time opening up in new markets. To do this, they must improve product quality, accelerate time to market and improve engagement with the customer. Consequently, the emphasis is on speed, accuracy and scale.

Digital technologies are helping manufacturers transform into more intelligent, personalized, nimble and customer-relevant organizations. And the cloud plays a vital role in this metamorphosis. By helping reduce the hardware and software assets in an enterprise, the cloud enables faster scaling, cheaper products, improved efficiency and the ability to keep pace with the rapidly changing technology landscape.

As part of the migration, enterprise cloud applications come under the spotlight as firms move away from monolithic packages and massive implementation cycles and toward shorter, agile implementations made possible by the cloud. In turn, this shift is expected to propel digital transformation.

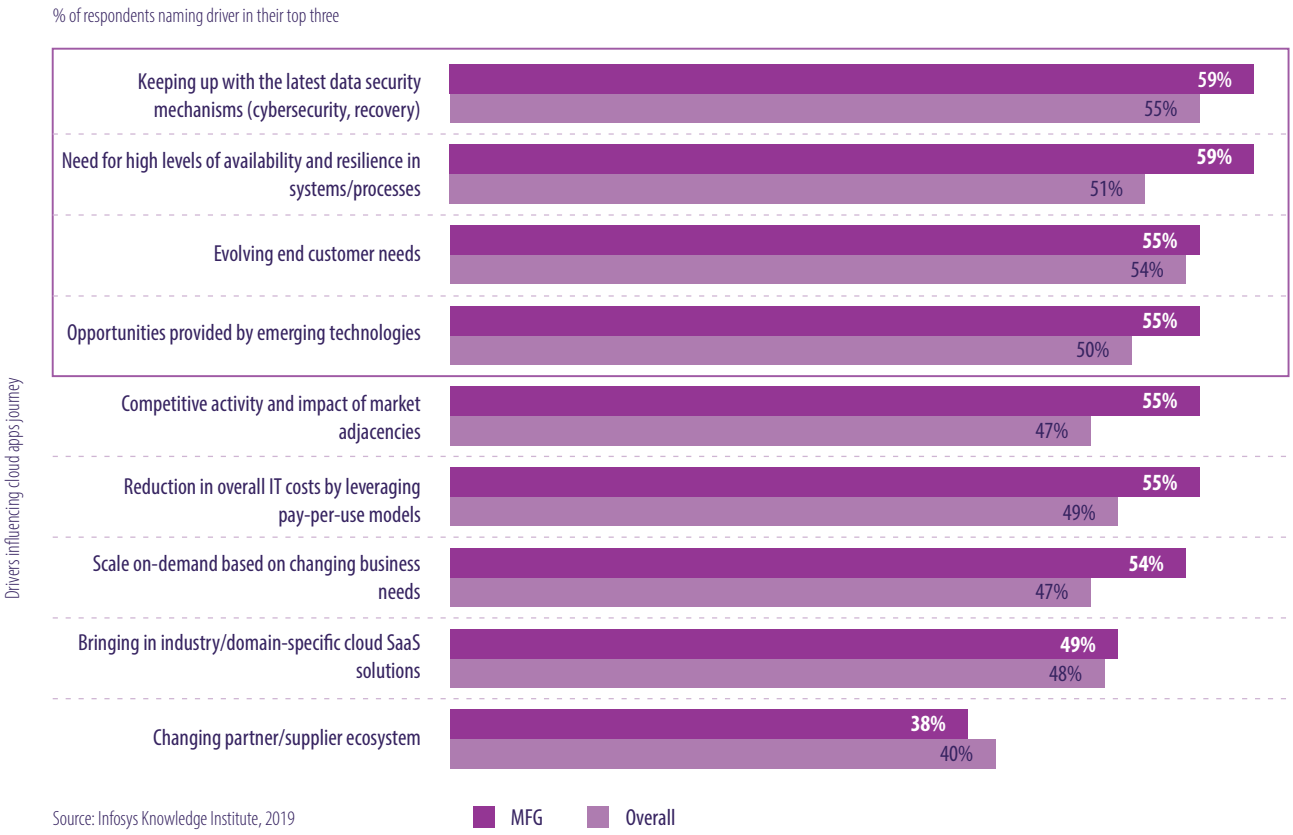
Given the critical role played by enterprise applications in a business, it seemed essential to get a comprehensive idea of their movement to the cloud. Enterprise applications include those that run the business, such as enterprise resource planning, customer relationship management, supply chain management and human resources management.

Infosys launched a study in the first quarter of this calendar year to understand the experience of application cloud transformation across 98 manufacturing firms from the United States, Europe, Australia and New Zealand. To understand the pulse of the market moving forward, the survey was further validated by qualitative interviews with senior executives in September and October. Respondents were senior executives involved in digital and cloud initiatives at firms with revenues exceeding $1 billion.

The cloud: a strategic move for enterprise applications

The top drivers compelling manufacturing firms to transition their applications to the cloud are the need to keep pace with data security trends (59%), high levels of availability and resilience in systems and processes (59%), evolving customer needs (55%), emerging technologies (55%) and competitive activity (55%) (Figure 1). The emphasis on these drivers followed a similar trajectory across industries, with data security also featuring highly in the health care space.

Figure 1. Data security, high levels of availability and resilience in systems and processes, and evolving customer needs are top drivers



Source: Infosys Knowledge Institute, 2019

Traditionally, manufacturers have been slow to embrace the cloud for applications. However, the existing siloed legacy systems are not equipped to provide the overall visibility, flexibility and speed required to meet today's demands. As a first port of call, manufacturers must prioritize which applications can be moved to the cloud, and then undergo a "lift and shift."

Responses to this research show that manufacturers aim to solve multiple issues by choosing the cloud route. By using cloud-based systems, enterprises can prevent suppliers or external stakeholders from accessing their internal networks and protect the enterprise assets more effectively. ABB, a global giant, uses Microsoft Azure to host its workforce management software with the intent to realize greater efficiency, lower costs and enhance security.[1]

Increased reliability (through enhanced disaster recovery and server switching, for instance) is also a compelling factor that drives cloud uptake. Service-level agreements bind cloud providers to deliver near 100% uptimes, ensuring high reliability and availability of cloud applications.

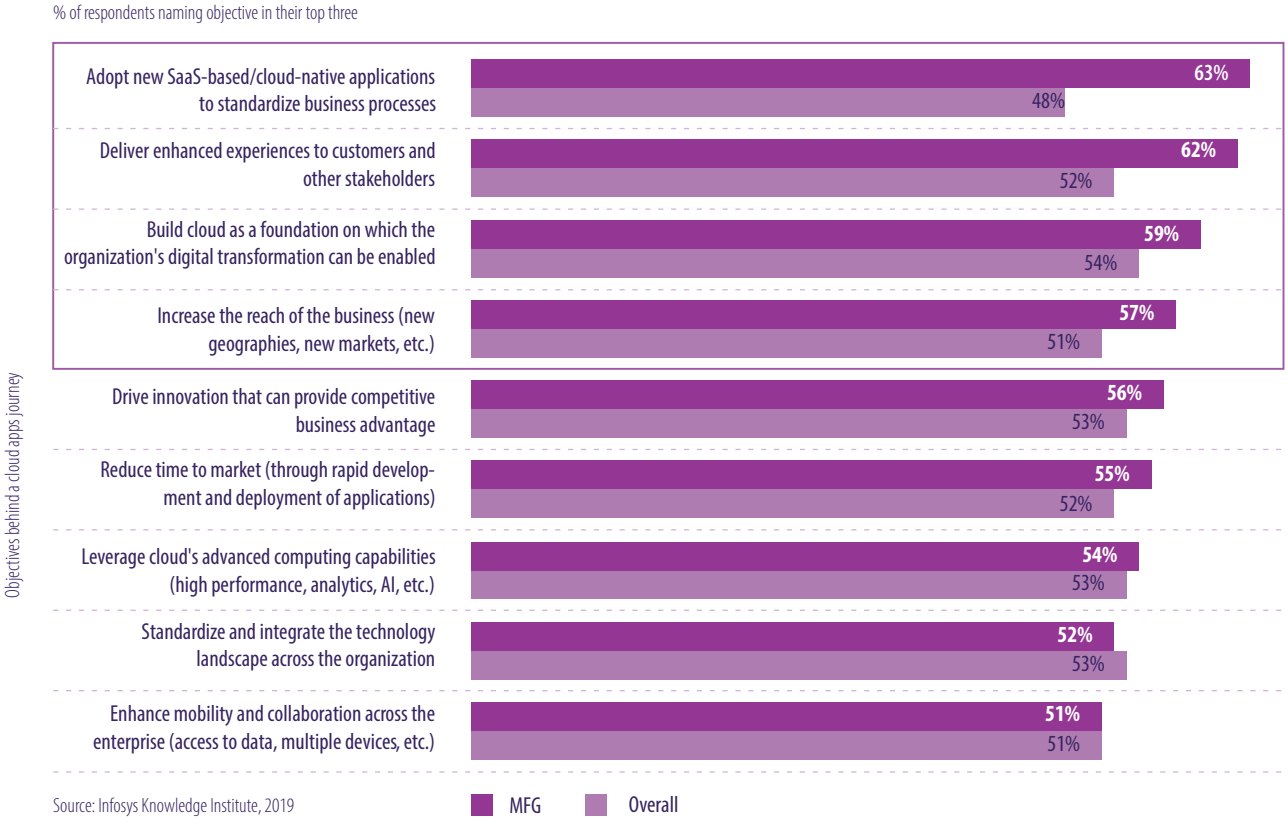
The top three objectives — or pull factors — for moving applications to the cloud were standardizing business processes through software as a service (SaaS) applications (63%), delivering enhanced experiences to stakeholders (62%) and using the cloud as a foundation for digital transformation (59%) (Figure 2).

> *"SLAs bind cloud providers to deliver near 100% uptimes, ensuring high reliability and availability"*

SaaS applications are used more often for business support functions and those functions requiring a high degree of collaboration. One only has to look at the success of Workday, Slack and GitHub to make the argument that SaaS can now serve as the system of record for business processes. Vendors such as Salesforce are also adding hundreds of flavors to their suite of offerings, with everything from artificial intelligence (Salesforce Einstein) to software development (Force.com) provided easily and quickly for business operations. Going the SaaS route also ensures the same version of the software or process across the enterprise, guaranteeing consistency and predictability — a boon for organizations that need to rely on a few superstar employees.

Delivering enhanced experiences to the people within a company is also a reason CIOs are finding leverage for their cloud strategy. As one director at a European manufacturer explained, cloud helps realize better efficiencies, with diverse business unit data tracked under one umbrella. "Centralized paychecks were created and employees efforts logged in a central system," she said. "This helped the accounting team to track as well as capture costs across word orders, and across locations. This ultimately increased productivity, ensuring employees were paid and managed more effectively."

Figure 2. Using SaaS to standardize business processes and delivering enhanced experiences to customers were the main objectives of a cloud apps journey



Source: Infosys Knowledge Institute, 2019

The four types of enterprises

The study evaluated the maturity and direction of the application cloud program across the manufacturing companies surveyed. Maturity was determined by asking the following questions:

- Are the business objectives of manufacturing firms strategic or operational in nature?
- Do business or IT-led reasons drive manufacturing enterprises to the cloud?
- Are enterprises occupied with quick wins today, or are they thinking and planning for the future?
- Have manufacturing enterprises expanded to include the external ecosystem, or are they internally focused?

This examination led to four distinct clusters (Figure 3):

Business-focused (49%)

Visionary enterprises looking at long-term business impact. These firms have an eagle eye on enhanced customer and partner experiences, increased innovation and market reach, and keeping up with the changing manufacturing ecosystem.

IT-focused (26%)

Enterprises absorbed in technology-led operational outcomes that are not fundamentally changing their business model in response.

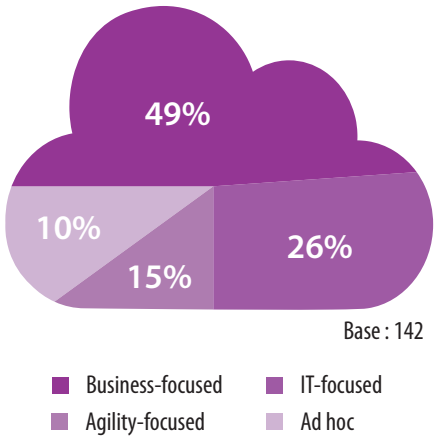
Agility-focused (15%)

Progressive enterprises focused on improving organizational agility. These firms rely heavily on operational transformation to deliver business outcomes.

Ad hoc (10%)

Enterprises lacking a clear vision and plan for IT or business transformation. They respond to triggers in an ad hoc fashion.

Figure 3. External-facing enterprises (business-focused) were twice as prevalent as internal-facing IT-focused firms



Source: Infosys Knowledge Institute, 2019

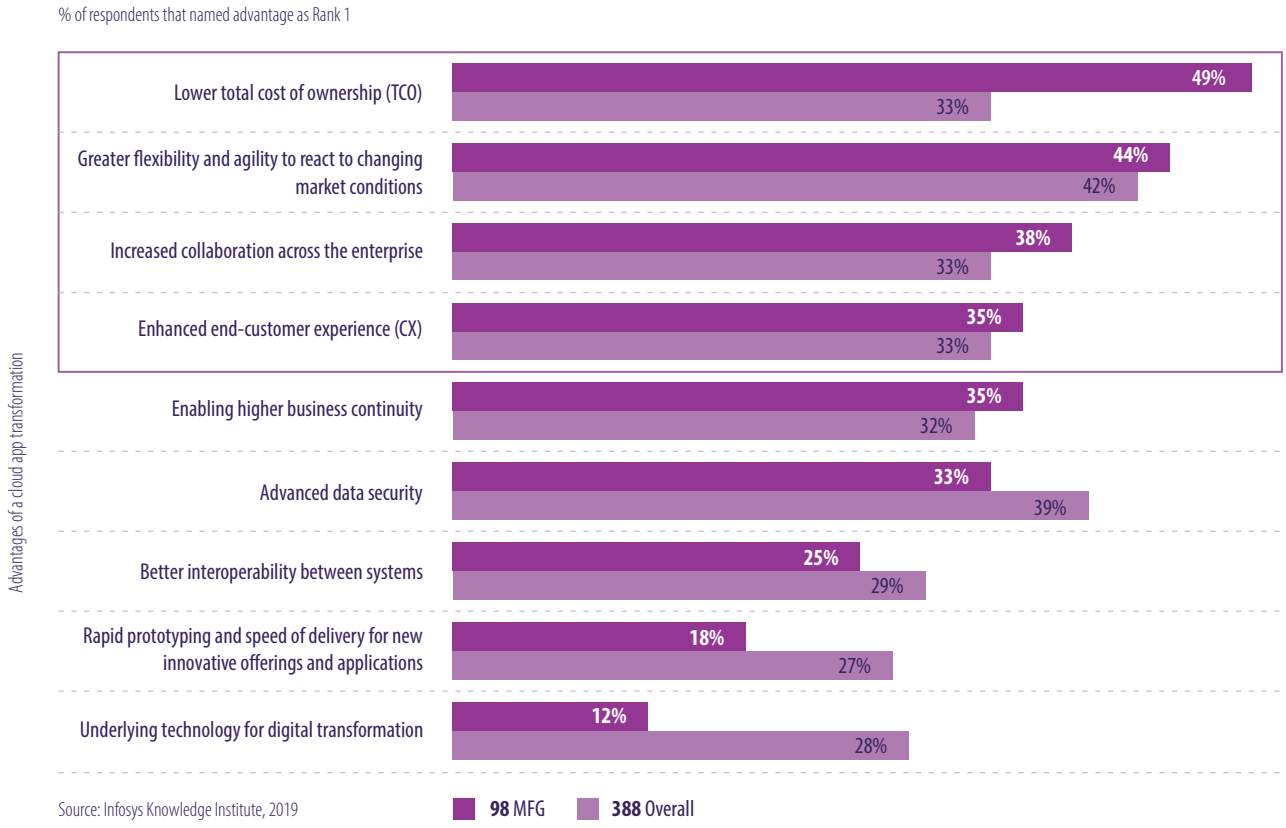
The manufacturing industry has a profile of clusters similar to the median across industries, though there were more IT-focused firms than average. According to a report by The Economist Intelligence Unit,[2] the manufacturing industry trails retail and banking industries in cloud adoption. As a slightly more immature industry in this regard, many manufacturing firms are concentrating on using cloud technology as the foundation upon which to build other technological capabilities. This may account for the higher number of IT-focused firms in the analysis.

Read our master report — Behind the Scenes of an Intelligent Enterprise: Moving Enterprise Applications to the Cloud — for more insight into each cluster.

Enterprise clusters expect both strategic and operational benefits

The survey asked respondents about the advantages they expected cloud applications to deliver, and the answers differed significantly from the actual drivers pushing firms to transform. Whereas the top three drivers were increased data security, system resilience and evolving customer needs, the top three expected wins were a lower total cost of ownership (49%), greater flexibility to respond to market conditions (44%) and increased collaboration across the enterprise (38%) (Figure 4).

Figure 4. Manufacturers expect lower TCO, greater agility to react to a changing market and increased collaboration from their cloud apps program



Source: Infosys Knowledge Institute, 2019

Tied closely to operational benefits is the need to lower costs. Having applications in the cloud allows a reduction in the number of assets to manage and provides better insights into diverse aspects such as inventory, production and health of machines. The cloud also optimizes usage (you pay only for what you use) and increases labor productivity through automation (since more virtual machines can be spun up with fewer people on the ground).

> *"The cloud optimizes usage and increases labor productivity through automation"*

" With Watson's IoT and AI coupled services, we were able to predict the condition of the equipment and machine. This also enabled customers to maintain their machines in their premises and shout out if they notice any red flags," said the manufacturing line head at a US-based manufacturing firm.

Digital manufacturing and intelligent supply chains are the latest trends in the manufacturing industry. Cloud applications provide the necessary flexibility to respond in real time to market signals, even as IoT and 5G become common place in business processes.

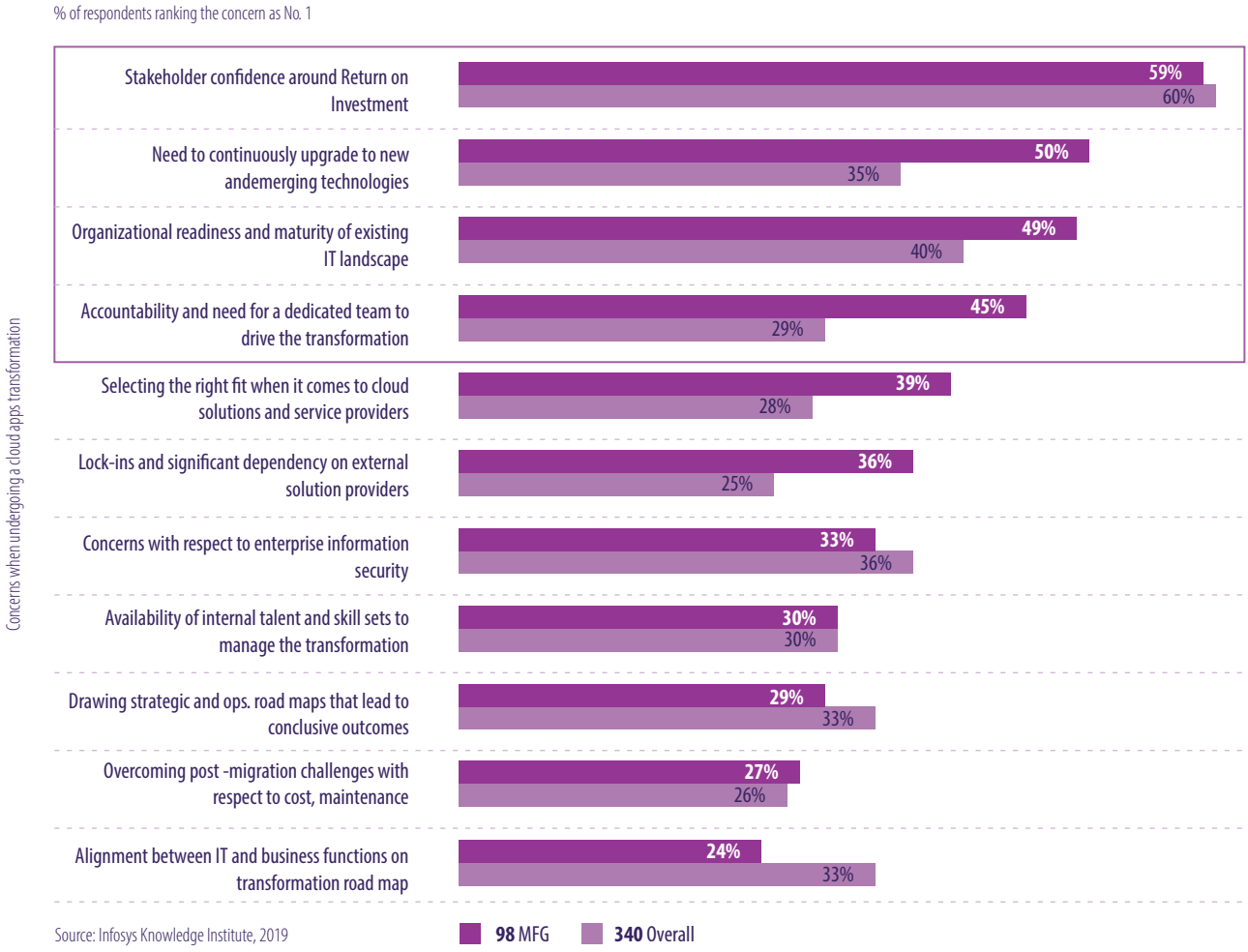
Manufacturing firms are expanding, capitalizing on strategic acquisitions. They are also entering new markets. In such situations, the presence of diverse and siloed legacy systems can pose a severe challenge. Switching applications to the cloud enables a more integrated approach, empowering enterprises to respond more effectively and enabling greater business continuity.

The U.S. (57%) and Australia/New Zealand (50%) showed high trust in cloud technology enabling lower TCO. European respondents, on the other hand, anticipated greater flexibility to respond to market conditions (53%) and increased enterprise collaboration (50%).

Cloud concerns persist, characterizing large-scale programs

The top three apprehensions for manufacturers in undertaking a cloud apps journey were building stakeholder confidence around return on investment (59%), continuously upgrading to new technologies (50%) and the maturity of the IT landscape to handle the transition to the cloud (49%) (Figure 5).

Figure 5. Top concerns revolve around stakeholder confidence, the need to continuously upgrade to new technologies and organizational readiness



Source: Infosys Knowledge Institute, 2019

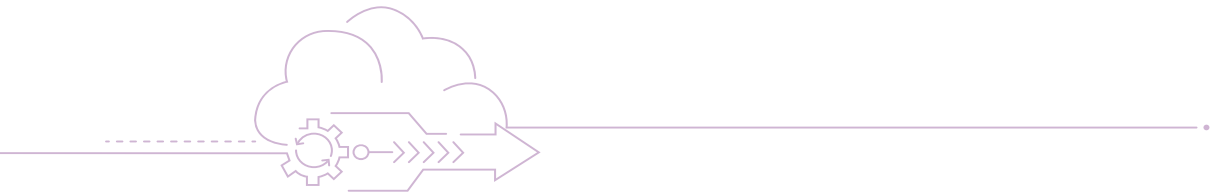
Cloud transformation programs mandate high investments and consequently garner significant visibility, especially among senior leaders. Large scale programs such as these require management support to succeed, and so delivering adequate ROI is critical within business units to ensure ongoing technological transformation.

The manufacturing industry uses a host of operational technology (OT) and IT as firms embrace industry 4.0. An important development is the growing OT-IT convergence, made possible by technologies such as cloud, APIs and the "internet of things." As the enterprise becomes increasingly connected, intelligence is extended to the shop floor, allowing the business to

aim for new levels of efficiency. Concern over upgrading to these new technologies is likely to stem from the fear of inadequate understanding of the latest trends, managing the mountains of data flowing in from the connected enterprise and ultimately losing control of the upgrades. This concern can spiral into a severe issue in the case of business-critical applications.

As manufacturing enterprises gear up to scale and modernize their applications portfolio, there is a genuine concern about the organizational readiness and the maturity of the existing IT landscape. Most of the time, cloud apps transformation is not a case of simply lifting and shifting applications from legacy systems to the cloud. Legacy applications were developed with a methodology that does not dovetail with today's modern footprint. Typically, the older systems are monolithic, rigid and not scalable. Therefore, shifting them to the cloud in their present state is likely to mean forgoing many of the benefits that cloud promises.

Further analysis from this research found that respondents from Australia and New Zealand (75%) and Europe (70%) expressed the most concern over building stakeholder confidence. Respondents from the U.S. were not as worried (50%). However, concerns over continuously upgrading to new technologies (56%) and organizational readiness for cloud adoption (52%) were significant for these U.S. respondents.

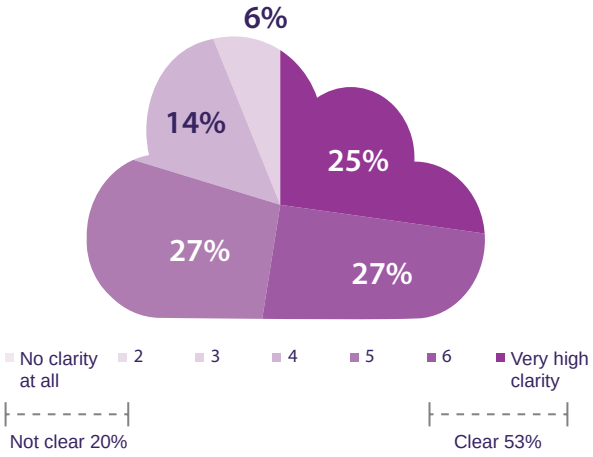


The importance of a clear strategy and road map

Game changing initiatives such as moving applications to the cloud cannot succeed without the support of multiple stakeholders across the organization. To buy in, stakeholders must have clarity on the initiatives and what to expect from them. For this to happen, knowledge must be shared widely from the top to the bottom of the enterprise. According to a recent digital transformation index by Dell Technologies, 78% of business leaders cite a lack of knowledge-sharing around digital initiatives implemented at their firms.[3]

While 53% of respondents said they had clarity on the digital path, a significant 20% said they did not.

Figure 6. Almost half the HLS firms had clarity on digital initiatives, though three-tenths are still unclear



Source: Infosys Knowledge Institute, 2019

For manufacturing respondents with high levels of clarity, a more in-depth investigation found that these enterprises sought the cloud to standardize business processes (63%), enhance stakeholder experiences (62%) and keep up with data security trends (59%). Higher levels of architectural consolidation on the cloud increase transparency into current business processes.

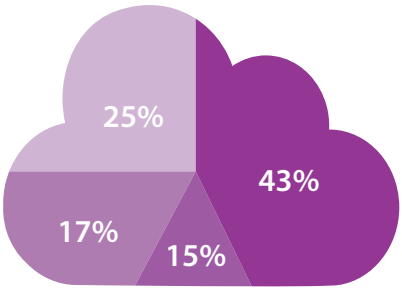
This in turn leads to better bargaining power with cloud service providers, increased data security and privacy, more efficient management of cloud instances, and reduced business risk.

High levels of clarity were expressed by respondents in the U.S. (64%) and by respondents in Australia and New Zealand (57%). In contrast, respondents from Europe had significantly lower levels of clarity (31%). According to the study data, there is a considerable difference in the way business and IT stakeholders from the U.S. and Europe engage during the cloud apps journey. Executive business leaders from the U.S. were at least twice as involved in activities across the cloud life cycle, from defining key outcomes to overseeing the program. Involvement of executive IT leaders showed a similar pattern, with a variance of over 55 percentage points between the U.S. and Europe when it came to evaluating external vendors. It appears that active executive business and IT leadership engagement can lead to higher clarity. The perspectives of senior leaders gained through experience and exposure can add significant value to such consequential initiatives.

Enterprise cloud applications adoption is well underway in manufacturing

Significantly, 58% of manufacturing firms have moved some or all of their applications to the cloud (Figure 7). This number is higher than the median across industries, where exactly half of firms had moved all or some of their major applications to the cloud. The advent of industry 4.0 and manufacturing's move to IoT-enabled machinery — for predictive maintenance, monitoring and identification of safety concerns — have made cloud computing a very attractive offering, given that cloud helps in the storage and analysis of this data. As firms become more cloud-centric, it makes sense that they also lift and shift their major applications to the cloud too.

Figure 7. 58% of manufacturing firms have moved some or all of their major applications to the cloud, a higher figure than the median across other industries



	Current state of cloud transformation (%)	Overall	MFG	U.S.	EU	ANZ
	Base	853	98	57	34	7
	Some pilots/proofs of concepts for cloud adoption are underway but, currently, all enterprise applications are still on premises	24	17	14	18	43
	Cloud adoption is underway for some applications/functions, but none have been completed	26	24	19	35	14
	Cloud adoption is already complete for some enterprise applications/functions	34	43	53	26	43
	All major enterprises applications have moved to cloud	16	15	14	21	

Source: Infosys Knowledge Institute, 2019

Respondent firms from the U.S. have gone even better, lifting and shifting 67% of applications (either all or some) to the cloud. European firms, though suffering from lower levels of clarity on their cloud apps transformation, are actually more progressive in cloud app implementation (21% have moved all major applications to the cloud). Australia and New Zealand, though advanced in terms of clarity, actually had the highest number of applications still on premises. This highlights that clarity doesn't necessarily lead to higher levels of adoption; rather, clarity gives firms a more considered approach to their cloud apps journey — with benefits such as business process standardization, data security and business/IT stakeholder alignment giving pause for thought on the cloud apps road map.

> *"Clarity isn't directly linked to adoption. Rather, clarity paves the way for a more considered cloud apps journey"*

Three choices for migration to the cloud: LOB, enterprise or both

Manufacturers must carefully examine the objectives and expected outcomes of a cloud apps journey before deciding on the cloud approach.

The line of business approach allows a business unit to independently activate a new cloud service with less dependence on the enterprise IT team. Such an approach is best suited for situations that require quick deployments and minimal disruption to enterprisewide strategies.

In contrast, enterprise-level cloud approaches are complex, requiring immense efforts and ideal for long-term projects that integrate applications on a single homogeneous platform. Such efforts cause significant disruption and take a long time to complete.

Moreover, enterprises can select best-in-class software such as SAP SuccessFactors or NetSuite by adopting an LOB approach, whereas with an enterprise approach, they will have to use a standard platform.

The combination option presents the best of both approaches.

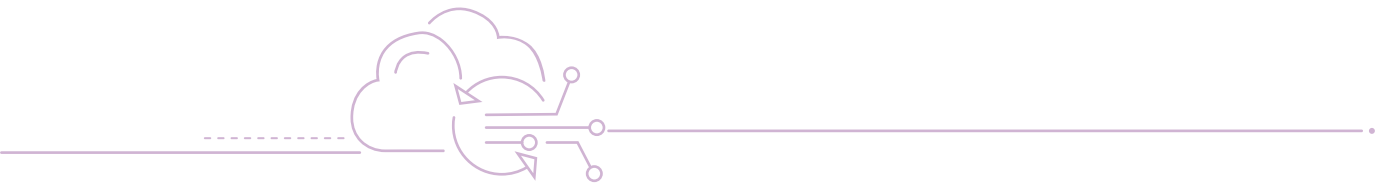
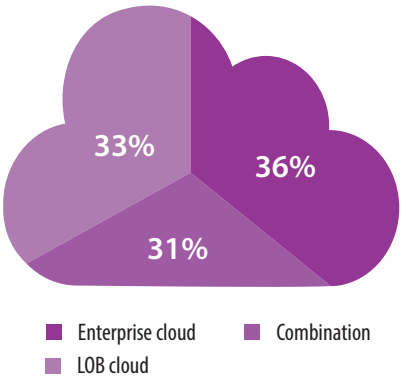


Figure 8. Manufacturing firms opt almost equally for enterprise, LOB and combination solutions



Approach adopted	Overall	MFG	U.S.	EU	ANZ
Base	814	95	56	32	7
LOB cloud	31	33	27	41	43
Enterprise cloud	39	36	32	44	29
Combination of LOB cloud and enterprise cloud	30	32	41	16	29

Source: Infosys Knowledge Institute, 2019

In manufacturing, the numbers of firms that went with the enterprise (36%), LOB (33%) and combination (32%) approaches was almost equal. This contrasts with the numbers for the consumer and retail industry, where enterprise cloud (41%) and LOB (28%) approaches were starkly different. Consumer and retail firms require seamless integration of applications for a more customer-facing business model – which means that the enterprise cloud approach is more attractive.

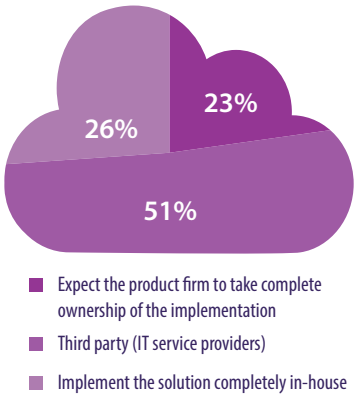
Please see the master report – Behind the Scenes of an Intelligent Enterprise: The Movement of Enterprise Applications to the Cloud - for further analysis of the advantages of each approach, and the apprehensions that can be mitigated using each one.

The implementation process

Once the cloud solution has been identified (SAP, Oracle, Salesforce, etc.), how do firms go about actually implementing these solutions? Is a third party a stronger choice, or should firms implement the solution in-house?

Manufacturing firms favor third-party implementations twice as much as in-house offerings (Figure 9).

Figure 9. Third-party service providers are by far the most attractive choice for implementing solutions at manufacturing firms, with 52% of the vote



Product Implementation (%)	Overall	MFG	U.S.	EU	ANZ
Base	844	97	75	33	7
Third party	39	52	53	52	43
Implement the solution completely in-house	36	26	24	24	29
Expect the product firm to take complete ownership	25	23	21	24	29

Source: Infosys Knowledge Institute, 2019

The numbers for use of third parties in manufacturing were 13 percentage points higher than the median for all industries surveyed. Why are manufacturing firms opting for this approach? Perhaps the strongest reason is that partnering usually results in faster implementations and higher chances of success, along with high levels of skill transfer and the possibility of acquisition of the service provider (please read the report — Infosys Digital Radar 2019: Barriers and Accelerators for Digital Transformation in the Manufacturing Industry — for more detail on this). The manufacturing industry is going through a renaissance with the advent of predictive maintenance and sensor-led engineering; firms are seeking partners for their ability not only to implement cloud, but to provide thought leadership on other emerging technologies.

Manufacturing enterprises from Australia and New Zealand were least inclined to work with third-party service providers (43%) and showed a higher preference than the average for using product firm implementations (29%).

Preparing for the cloud challenge

Enterprises in this research cited operational and technology issues as the major challenges (Figure 10). The top cited pain point was an accurate estimation of time and costs (59%) for implementation, and this view was shared across industries, though highest in manufacturing and high tech. Collaboration with external stakeholders (55%) and application refactoring to suit the cloud architecture (55%) also figured highly.

Figure 10. Issues across people, process and technology were top of mind for manufacturing firms undergoing a cloud apps transformation

Challenges (% Top 2 box)	Overall	MFG	U.S.	EU	ANZ
Base	840	97	56	34	7
Accurate estimation of time and financial costs involved	51	59	61	53	71
Collaboration/integration with external service providers/stakeholders	47	55	59	45	71
Application refactoring/tweaking to suit cloud architectures	46	55	61	44	57
Tracking and monitoring systems/processes on cloud	51	54	55	47	86
Deciding on choice of tools/technologies	48	54	59	42	71
Pace of execution and implementation of the initiative	48	53	57	41	71
Promoting a culture change within the organization	48	52	57	41	57
Aligning existing legacy systems/architectures and technology environments	49	48	52	41	57
Lack of high levels of clarity in the execution road map	45	47	47	41	71
Absence of an internal dedicated cloud team to drive the initiative	45	46	50	38	57

Source: Infosys Knowledge Institute, 2019

From a cluster perspective, the business-focused group was most concerned about deciding on the right tools and technologies (68%), and again, accurate estimation of time and costs (68%). As can be seen, this is significantly higher than the median across industries. Being more mature on their transformation journey and seeking ecosystem solidarity, these manufacturing firms are looking to remain competitive while having the capability to react to adverse market conditions. Data security is also high on their agenda, as is an enhanced end-customer experience. As they move from one digital initiative to the next, more roadblocks appear to impede progress, and the pain point becomes more severe. However, as we have written elsewhere, these firms are also much more confident about surmounting these obstacles.

Conclusion

Industry 4.0 has made manufacturing firms around the world hyperaware of the need to continuously upgrade to new technologies and find efficiencies across people and processes. Cloud is a huge enabler of this transformation, making firms at once more nimble, agile and dynamic.

This research sought to uncover drivers and objectives behind the enterprise cloud apps journey that many manufacturers are on. It found that business-focused firms are further along on their cloud apps initiatives, and their maturity has led to a more external-facing perspective. These manufacturing firms are looking to innovate quickly, have an eagle eye on their partners and the wider ecosystem, and care deeply about customer experience. Other firms — in the agility-focused and IT-focused clusters — have a stronger focus on business agility and IT transformation, using cloud more often than not to "keep the lights on."

> *"Far more manufacturing firms have moved applications to the cloud, partnering to increase speed and capability-transfer"*

A significant statistic in this research is that almost 60% of the respondents have moved either all or some of their major enterprise applications to the cloud. These firms are choosing external service providers for the most part, taking advantage of providers' technological capabilities and speed of implementation.

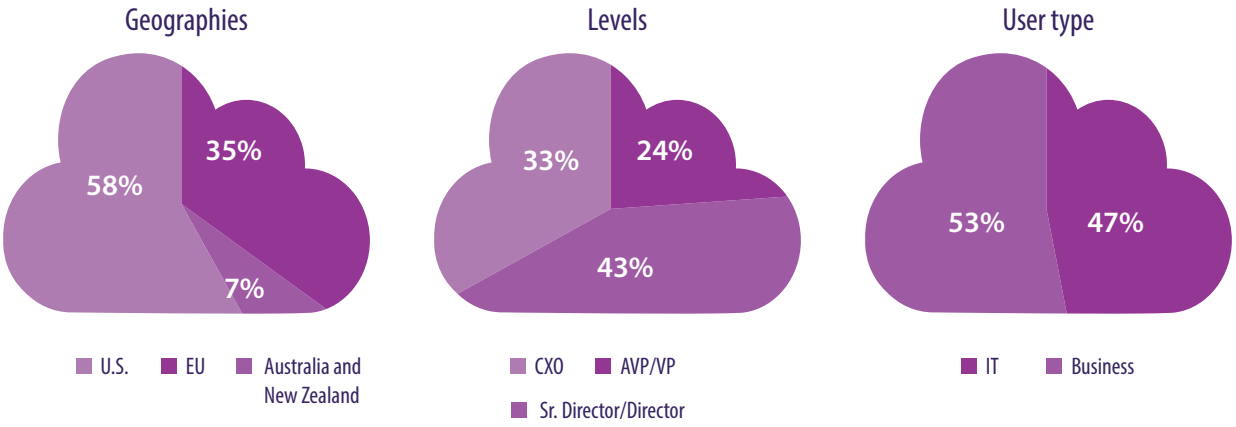
Manufacturing firms are also adopting LOB and enterprise cloud approaches almost equally — a difference from the higher traction that enterprise cloud approaches have cross-industry. This indicates that the manufacturing industry is more mature than average, and can employ either approach equally well, regardless of whether firms need to turn on a new cloud app service quickly or choose a more considered enterprisewide approach with all the complexity that entails.

Of course, this also means that the industry has strong inter-relationships between business and IT, and that many stakeholders are involved in cloud projects, regardless of scope. That said, one-fifth of respondents said their firm was unclear about the blueprint for the cloud apps journey. This was lower than the cross-industry average of 24%, but high enough to cause concern.

If manufacturing is to live up to the promises of digital transformation, business needs to work closely with IT and overcome operational and technology challenges around the cloud apps journey. In this research, manufacturing cited higher levels of concern than average around cost of ownership and collaboration with external partners. This is to be expected. The further a business goes along its road map, the greater the number of hurdles it will need to clear. However, it is these more technologically mature firms that will ultimately surmount these challenges and win the race of industry 4.0.

Survey methodology

A total of 98 manufacturing senior executives and leaders involved in digital and cloud initiatives responded to this research, which took place in the first quarter of this calendar year. To understand the pulse of the market moving forward, the survey was further validated by qualitative interviews with senior executives in September and October. Only companies with revenues exceeding $1 billion were invited to participate. Respondents hailed from the United States, Europe, Australia and New Zealand.



Source: Infosys Knowledge Institute, 2019

References

1 *ABB keeps the lights on with AI-based workforce management software, Microsoft*

2 *Ascending cloud: The adoption of cloud computing in five industries, The Economist Intelligence Unit*

3 *Is your digital transformation being held back by a lack of clarity?, The Telegraph*

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Notes:

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