



The Cognitive Enterprise

Part 1 – The journey to AI and the rise of platform-centric business architectures

Executive Brief

We are on the cusp of the next big shift in business architectures, driven by the pervasive application of Artificial Intelligence (AI) and cognitive technologies to the core processes and workflows of organisations.

This generational shift will take the digital wave that business and governments are currently surfing to the next level and transform the way that employees add value and sustain their differentiation. The Cognitive Enterprise will leverage proprietary data, unique platforms and specialist expertise to achieve its goals. But what will the journey look like and what are the factors for success?

In this first installment of our series on the Cognitive Enterprise, Mark Foster, Global Leader of IBM® Global Business Services (GBS), describes how business leaders can begin to explore these new business architectures. These concepts are underpinned by case studies and insights from the 19th IBM Global C-suite Study.

How IBM can help

To help clients succeed on the journey to become Cognitive Enterprises, IBM brings digital strategy and design ideas, cognitive process skills and assets, and cloud application and infrastructure capabilities. The power of Watson and the IBM Cloud – combined with our industry insights and end-to-end (E2E) implementation and services expertise – can help organisations meet the opportunities and challenges of this next wave with speed and certainty. For more information about our reinvention offerings and skills, visit [ibm.com/gbs](https://www.ibm.com/gbs).

What we mean by ‘The Cognitive Enterprise’

On the heels of digital trends that are starting to mature, the next wave beyond digitisation has begun. The rise of new and exponential technologies – including AI, blockchain, the Internet of Things (IoT), robotic process automation, virtual and augmented intelligence, 3D printing and others – is teeing up another era of business architecture change. We define the result of such revolutionary change as ‘The Cognitive Enterprise.’

The evolution of technology-enabled business architectures

Over the past half-century or so, the business architectures of enterprises have evolved as technology gained importance in the shaping of organisations. Back in the early days of transaction processing, information technology began to support the business at scale for the first time. It helped to automate back-office processes and enabled the expansion of simple divisions and national business units into ever-greater scale. Over time, new configurations supported regional and eventually, global business models.

The advent of the personal computer moved technology to the front office. It allowed professionals and knowledge workers to be empowered by computerised tools for the first time. More flexible operating models emerged and the matrixed company came to be. As these capabilities were reinforced in the enterprise resource planning (ERP) wave, shared services models grew more common.

The growth of the internet – and the connectivity and pervasive access to globally shared data it created – has allowed the enterprise to truly look outward for the first time. New connections and relationships were forged directly with specific customer demographics and other groups, while supply chains synchronized across extended value chains and ecosystems. The ‘digital enterprise’ arose as organisations sought to align their processes, data and systems with new E2E customer journeys.

Following the rise of more comprehensive digital approaches in business, mobile technologies further changed the world by empowering consumers, citizens and employees like never before, with the ability to provide both immediate access to information, global social connections and by being ‘always on.’

Companies then carved out digital business models or tried to migrate their overall businesses into an even more comprehensive digital approach. Disruptive start-ups ensued and consumer digital platforms have become more universal and powerful. Mobile technologies further changed the world by empowering consumers, citizens and employees like never before, with the ability to provide both immediate access to information, global social connections and by being ‘always on.’ Now, all of the above comes together through ever more coherent and exciting experiences.

Even with this widespread digitisation, the speed of business has generally struggled to keep up with the faster pace of change outside the enterprise. Many organisations lost touch with what is happening outside their four walls, leaving them at a disadvantage in meeting shifting customer expectations, monitoring and optimising supply chains and performing efficient change management. In turn, newcomers have taken the opportunity to inject themselves into the mix as new competitive threats.

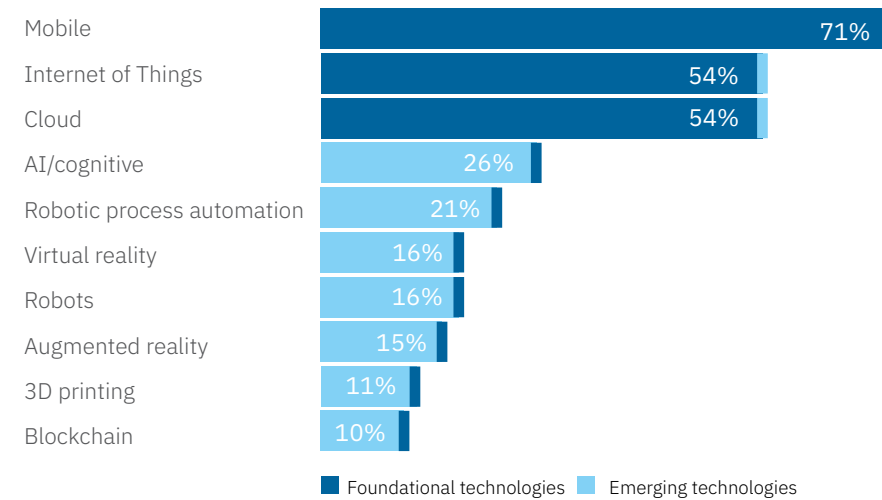
Just as these digital trends are maturing, the rise of exponential technologies – such as AI, blockchain, the IOT robotic process automation, virtual and augmented intelligence and 3D printing – is teeing up another era of business architecture change: the era of the Cognitive Enterprise.

Drivers of the Cognitive Enterprise

The latest wave of technology advances, presented through omnipresent mobile access, is giving organisations both new opportunities and disruptive challenges. From our upcoming C-suite Study, where we interviewed over 12,500 CXOs globally, we learned they are now preparing for a new wave of technology investments to reinvent and support their businesses. Already, 26 percent are earmarking funds for AI/cognitive technologies (see Figure 1), while there is a growing interest in other emerging technologies. The power of computing, networks and data is expanding at exponential rates and each is feeding off the other.

Figure 1

CXOs are planning investments in emerging technologies



Source: 19th Global C-suite Study, IBM Institute for Business Value (IBV).

A telecommunications and insurance company team up to create a new generation bank

Orange Bank aims to disrupt the financial landscape in France with a set of unique offerings, all aligned to new needs and an innovative customer relationship model. The bank created Djingo, a Watson-powered virtual advisor that is available to answer customers' questions and perform actions for them around-the-clock, all on a client's smart phone. While the virtual agent is the first point of contact, clients can be transferred seamlessly to a human agent, if required. The new 'phygital' and omnichannel model is fully integrated with the underlying banking and customer resource management (CRM) systems, as well as with concierge and advisory services, leveraging the strong client trust and skills of its Orange telecommunications and Groupama insurance founders.

The bank interacts with its clients through its own Orange Bank Forum, as well as via Facebook and Twitter. It continues to innovate, for example with predictive services, while it is preparing for future international expansion.

Singapore Airlines invests in digital initiatives to improve customer experience

With apps Fly Now and Roster for iPad, pilots will be equipped with relevant information and flight-related updates. The use of these apps is expected to enhance pilot productivity by digitising manual processes related to airline operations and regulations. These mandatory processes are critical aspects of flight readiness from pre-flight right through post-flight operations. ‘Singapore Airlines is investing heavily in digital initiatives to improve the customer experience, as well as enhance processes and efficiency in various aspects of our business operations,’ said Captain Quay Chew Eng, SIA’s Senior Vice President of Flight Operations. “Together with IBM, we are pushing ourselves further by introducing mobile innovations to the flight deck that will move us closer to more seamless flight operations.”

This creates vast potential for companies to understand and sense their performance, along with the environments in which they operate. It also results in enormous oceans (or swamps) of data, both internal and external – in which it would be possible to drown, if not strategically and skillfully navigated.

These new sources of potential business insight and opportunity sit on top of the layers of processes and systems that have arisen over the prior waves of technology innovation. Each generation has largely only been able to embrace the new by building on top of the prior model. So it is that we can see layers of ancient COBOL systems alongside aging enterprise resource planning (ERP) architectures and complex digital experimentation, all grappling to seize the value of the cloud and software-as-a-service (SaaS) as a means to escape from the past.

The Cognitive Enterprise that we imagine is able to create and use ‘platforms’ as a means to gain competitive advantage, to rise jointly with ecosystem partners above the complexity of the past while leveraging legacy capability – and most importantly, proprietary data.

The platform-centric organisation

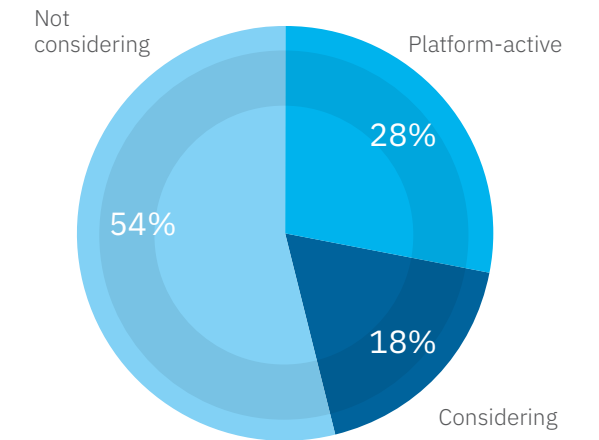
Many organisations and chief executive officers (CEOs) feel the imperative to transform and reinvent their businesses in response to the disruptive impact of these new technologies. They describe such strategic bets as ‘making a platform play.’ A full 46 percent of CXOs surveyed are either considering or already have active platform architectures (see Figure 2).

They seek to build out platforms for one or more reasons that may include:

- Securing their place within their own industry or market by reinforcing the digital and analog instantiation of their core capabilities and intent. This can often be used to expand geographic reach, too
- Aspiring to become an industry platform by providing a backbone capacity to markets where they operate with an expectation that other industry players will seek – or may even be forced – to leverage their platform. This goal requires strong belief in their own market position, core capabilities, technologies and business models
- Expanding the conceptual heart of their legacy differentiation to seize cross-industry marketplaces, just like automotive players that seek to become mobility platforms, hotel chains that transform into entertainment companies or insurance companies which aim to be savings providers.

Figure 2
Propensity of CXOs to engage in the platform economy

Stage of platform adoption



Source: 19th Global C-suite Study, IBM IBV

Maersk pilots a supply chain ecosystem platform

The trade digitisation solution developed by Maersk and IBM will leverage blockchains to bring trust and transparency to the international trade network and to digitise the cross-border supply chain process. The solution will help participants across the ecosystem of shippers, freight forwarders, ocean carriers, ports and customs authorities to save billions when adopted at scale. The blockchain network will optimise and increase speed of the shipping processes, could potentially fight shipping fraud and even begin to disrupt traditional trade finance. “We expect the solutions we are working on will not only reduce the cost of goods for consumers, but also make global trade more accessible to a much larger number of players from both emerging and developed countries,” said Ibrahim Gokcen, Chief Digital Officer, Maersk United States.

In each of these cases, the platforms being considered have some shared characteristics. For one, they wield the power of the organisation’s core expertise. That expertise is evidenced by its unique people, distinctive processes and proprietary data.

These platforms combine such enterprise-specific assets with the use of emerging technologies outlined above. The integration of a well-thought-through technology architecture with a new platform business architecture is critical to the competitive advantage sought in these plays. A platform will need to be digital and cognitive – pervasively connected to both the markets and external environments in which it operates and deeply rooted into the organisation’s internal workings, metrics and insights.

In particular, the combination of distinctive, cognitively enabled workflows, driven off unique combinations of owned and accessed data and leveraged by skilled workforces can create a competitive moat around these putative platforms. The long-term success of these plays will be predicated upon the fact that they continue to ‘learn exponentially’ and can keep up with ever-expanding bodies of knowledge and insight upon which they stand.

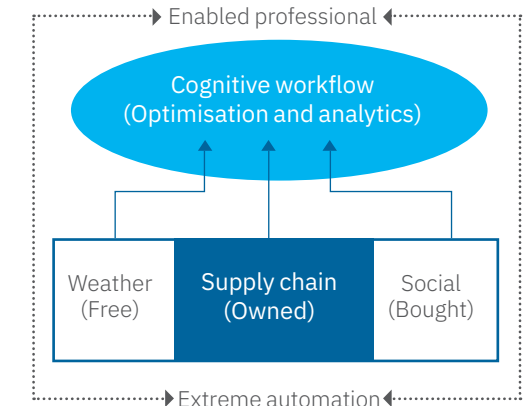
The learning enterprise

The Cognitive Enterprise of the future will therefore be composed of a series of ‘smart’ platforms – at least one of which leverages an enterprise’s core expertise. A successful organisation will need to engage with an ecosystem of platforms to support its business. Competitive advantage will depend on how well and how fast a core platform is able to learn exponentially and continually adapt to the shifting marketplace.

At the center of platform differentiation will be the workflows and processes. These workflows need to be infused with the power of proprietary data and powered by the latest forms of AI and extreme automation, including ‘sensing’ IOT technologies and blockchain (see Figure 3). Think of how supply chains, call centers and financial processes are already being reinvented. These workflows will also be able to ‘learn,’ and become ever more tuned and efficient as they leverage machine learning. As these workflows learn exponentially, the man-machine interface will continue to shift upward. This presents both an opportunity to expand the potential of personnel but also – of course – a threat to those unable to keep up with the increased pace of development.

The organisation’s people will, therefore, need to be in the front line of this cognitive era. In fact, CEOs ranked investments in people as most important of the top-five drivers to accelerate performance (see Figure 4). People will need to be facile in working in this environment of continuous process and platform revolution. They will be enabled to engage in ever-higher-value tasks and decision-making that is better and faster. As in past cycles of technological disruption, the legacy workforce will need to learn new skills, engage with new technologies and reshape career trajectories.

Figure 3
A Cognitive Enterprise workflow



Woodside is securing its future through capturing and releasing tacit expertise

Woodside, Australia's largest independent energy company, has been a global leader in oil and gas for over half a century. To successfully pass the torch to the next generation, Woodside had to harness the know-how of its best employees. This goal – to create a cognitive business to augment and share tribal knowledge – led to an industry-first partnership with IBM and Watson. Woodside hires and nurtures 'heroes' – highly intelligent employees with natural instincts honed by years of experience. While Woodside has been archiving its employees' reports, decision logs and technical evaluations for decades, it has also been losing swaths of irreplaceable corporate memory as older engineers retired, taking their instincts and experience with them. Watson has ingested tens of thousands of Woodside documents related to project development, each typically over 100 pages in length. It would take a human being, working all day, more than five years to read all this information. Watson can process it and produce meaningful answers in seconds.

Figure 4
CEOs' top five drivers to accelerate performance



Source: 19th Global C-suite Study, IBM IBV.

Most organisations describe cultural change as the biggest barrier to developing truly digital and Cognitive Enterprises and it is clear that business leaders will need to find new ways to motivate, organise and engage as the changed approaches to work evolve. The 'exponential learning' culture is going to be a step up again from the learning organisation that experts have described over the past couple of decades. Pace and agility of acceptance, adoption and adaptation will be paramount.

The composable organisation

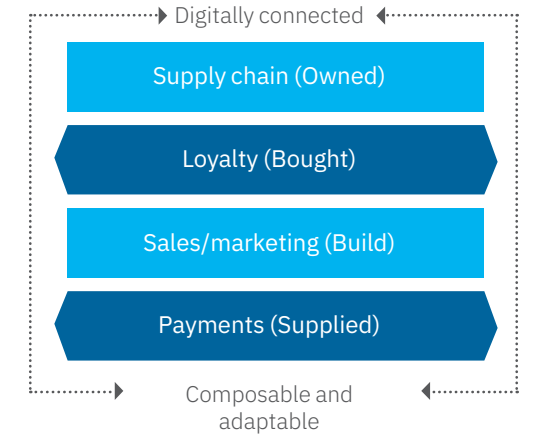
It is clear that, as platform-centricity becomes more widespread, not all players are going to be able to win. There will be a jostling for position and ascendancy and many organisations will end up having to leverage other more dominant platforms to survive. Even the most successful players, though, are likely to seek to leverage other organisations' platforms to complement their business models.

The Cognitive Enterprise will, therefore, be composed of multiple platforms – some owned, some bought and some borrowed (see Figure 5). The relationship between these platforms and the organisation will shift as their marketplace relevance and distinctive capacities evolve over time. If we assume that all platforms will be capable of learning to some degree, then those organisations best able to orchestrate the family of platforms that make up their expanded ecosystems should be well-positioned for success. The models of sourcing and outsourcing that we have become accustomed to will have to move to a new, more dynamic and flexible level.

All this requires access to a new skill pool – recruited, created or accessible through platforms – that naturally identifies, absorbs and leverages new data and technological developments. This may well become the most critical constraining factor for future organisational eminence.

The pervasiveness of the cloud is expected to make switching between platforms and plugging into new capabilities ever more straightforward. The areas of durable 'stickiness' will be access to data and the ability to leverage differentiated human skills.

Figure 5
A composable Cognitive Enterprise



The Volkswagen WE digital ecosystem

'We Commerce' is the first joint development within the Volkswagen WE digital ecosystem. After the customer's permission has been obtained, the cognitive abilities of the IBM solution will learn from the driver's preferences and habits in order to make recommendations that are as personalised as possible. This integrated service merges proprietary data from the car company – like fuel level, location and maintenance needs – with external data to enable access to services in the moment. Retailers, filling station chains, the hotel sector and restaurants will be able to use We Commerce to direct their offerings toward individual customers. "Our objective is to establish an open marketplace for developers so that they have the possibility of creating a joint digital platform. Volkswagen will benefit from our long-standing industry expertise, our cloud services and our AI-based Watson technologies as well as our digital design know-how," said Dirk Wollschläger, IBM General Manager, Global Automotive Industry.

How to transform into a Cognitive Enterprise

Staying competitive will require a deliberate and aggressive approach to building the Cognitive Enterprise, leveraging the right combination of ecosystem partners. Organisations should tap into their legacy essence and core expertise. The power of AI, in combination with a well-selected range of emerging technologies and proprietary data – properly harnessed with clear intent and a proactive approach to talent and skills-building – creates a timely opportunity to compete and win from a position of strength.

Clarify intent of core platform focus

In this platform-centric world, an organisation needs to do as much as possible to create the durable differentiation to win. Factors such as a company's market position, the competitiveness of its workflows, uniqueness of data and the skills of its people need to be scrutinised. Increasingly, it will be paramount to discern the essence of the organisation and envision its future identity in order to make these calls. Business leaders will need to be able to describe the intent with ambition and clarity, but also shape intermediate goals that can act as proof points that their enterprises are on the right track. Continuous sensing and awareness of shifting platform competitiveness will also be indispensable.

Re-engineer workflows to use cognitive capabilities

This is a critical first practical step in shaping platform competitiveness and building exponential learning capacity that will make a difference. It is important to identify the workflows that are key to supporting your platform expertise and intent. The leverage of new machine learning, sensing and automation technologies, in conjunction with proprietary (and sourced) data – especially those that lie at the heart of your platform differentiation – will be vital.

Reinvent your workforce proactively

This is another key early step in the cognitive transformation process. As the directional talent implications of workflow re-engineering become clear, then the potential emerges to engage proactively with the workforce. There will be a need to reskill existing teams, source new talent and manage legacy workforces. Communicating your vision and the value of the changes, as well as societal and community implications, is crucial. Organisations need to begin to instill an exponential learning and leadership culture, as well as to reward the required intensive teamwork and agility.

Curate proprietary data actively

This is a necessary component of building the Cognitive Enterprise and of fueling the distinctive expertise at its heart. After culture, the most common barrier we see to companies' digital journeys is access to a 'fit-for-purpose' data architecture. This architecture needs to enable a better organisation of, and access to competitive internal data and information, as well as to insight and innovation with regard to external data sourcing.

Secure your data, processes and platforms end-to-end

Security will be a pervasive concern throughout the Cognitive Enterprise. It will be essential to protect the differentiation of platform business models, customer relationships, unique data, proprietary processes and algorithms, along with the unique knowledge of people. Trust in a platform will be fundamental to its durable success. Data security – given its fundamental nature as a source of competitive advantage – will be the critical underpinning for success.

The IBM IBV, part of IBM GBS, develops fact-based strategic insights for senior business executives around critical public and private sector issues.

Integrate agility across organisation boundaries

This is required to drive continuous innovation and change. Many companies have already embraced agile working. Multiple examples of scrums, sprints and tribes are at work in the IT departments and business units of many organisations. This exponential learning world is going to require a velocity of capability-building that will transcend early models. It will be necessary to create truly integrated groups that straddle organisation boundaries – between business and IT, functional groups and external platform partners.

Revisit and adjust technology architecture choices continually

Organisations need to create a clear blueprint and migration plan, together with an assessment of architectural options and trade-offs. It is important to identify when to move from an experimental proof-of-concept to a model that can underpin the future competitiveness of the organisation platform. Throughout the journey to become a Cognitive Enterprise, regularly reassess your architecture to enable organisation-wide scaling, economic impact and ongoing adaptability. Be aware that a system platform choice made along the way can turn out to be either an accelerant or a deterrent to your medium-term ambitions, and be prepared to modify them as needed.

Conclusion

Some organisations are already making great strides to become Cognitive Enterprises. Their experiences help chart a path to this exciting, but challenging, future that offers opportunity for incumbent organisations to carve out a space amid new entrants and disruptors.

The major enterprises of the world sit on unique assets in their core processes, proprietary data, business networks and expertise. The emergence of the Cognitive Enterprise presents a unique opportunity to harness these capabilities to sustain these organisations into the next generation and reinvent them for a new age. This is not a passive ambition however, but one which requires boldness in the selection of platforms, full embrace of new technology potential, and profound reskilling of people and teams at all levels.

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