Building the Cognitive Enterprise: Nine Action Areas

Deep Dive

IBM Institute for Business Value

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This Deep Dive document is the in depth version. For an abridged version, please read, "Building the Cognitive Enterprise: Nine Action Areas, Core Concepts."

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Introduction

A new era of business reinvention is dawning. Organizations are facing an unprecedented convergence of technological, social, and regulatory forces. As artificial intelligence, blockchain, automation, Internet of Things, 5G, and edge computing become pervasive, their combined impact will reshape standard business architectures. The "outside-in" digital transformation of the past decade is giving way to the "inside-out" potential of data exploited with these exponential technologies.

We call this next-generation business model the Cognitive Enterprise™.

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Executive summary

The impact of the convergence of multiple exponential technologies on organizations continues to increase. The digital journeys of the past decade are now becoming cognitive journeys driven by the maturity of AI, blockchain, automation, IoT, 5G, edge computing and other exponential technologies. As these capabilities are applied at scale, they increasingly result in change to the core of organizations—and their mission-critical processes—rather than to the experimental periphery.

We described this new phenomenon as "The Cognitive Enterprise"—a destination that is framed by business platforms derived from proprietary data and powered by intelligent workflows and new pools of expertise. We recognized then that these new approaches were allowing incumbents to strike back against digital disruptors and leverage their scale, data, skills, and channel power to win in this new era. We identified seven key success factors that underpin progress as organizations embarked on the journey to become Cognitive Enterprises.

Now, a year on, we see the vision of such transformations coming to reality, as more and more enterprises are seizing the opportunity to truly transform themselves. They are leveraging these new technologies in conjunction with their historic strengths to reshape their competitive positions.

Three key components underpin these emerging new business models:

1. **Market-making Business Platforms** leverage data as the new currency to reinvent competitive positioning and create new market opportunities, often straddling organization and industry boundaries.
2. **Intelligent Workflows** infuse end-to-end and front-to-back processes with exponential technologies to deliver exceptional outcomes and differentiation.
3. **Enterprise Experience and Humanity** recognizes that any new business platform will only succeed if it embeds a compelling experience for customers, employees, and partners throughout, while maximizing the full potential of the ever-evolving, human-technology partnership.

There are many great examples of organizations across all industries that are embracing the potential and embarking on the journey at scale. They are creating holistic transformation programs to underpin the ever-clearer strategic bets that they are placing. Many companies and governments, however, are still framing the opportunity and wondering how to start and how to escape from the "cognitive chaos" of multiple experiments and proofs-of-concept.

This report, therefore, sets out to do two things. First, showcase the latest ideas and examples of the Cognitive Enterprise brought to life. Second and, more importantly, go deeper into the "how" of building such organizations to derive utmost value.

As such, we have identified nine Action Areas which we see as critical to making progress and creating an outline framework for success:

These nine Action Areas, by key component, are:

– Market-making Business Platforms
  – Double down on "Big Bets"
  – Create a new business blueprint
  – Orchestrate compelling change

– Intelligent Workflows
  – Embed exponential technologies
  – Drive value from data
  – Deploy through hybrid multicloud

– Enterprise Experience and Humanity
  – Elevate human-technology partnerships
  – Cultivate smart leadership, skills, and culture
  – Perform with purposeful agility

We have also developed a clear point of view on how co-creation, co-execution and co-operation will be the vehicles through which enterprises can muster the diverse internal and external talents needed to pull off this transformation. We call this the IBM Garage™ approach.

We are all entering an exciting—but somewhat daunting—period of next-generation enterprise transformation. It is a fast-moving world, with many contextual challenges and uncertainties. Because this transformation is akin to performing "open-heart surgery" on our businesses and organizations, we also strive for certainty and de-risking of the journey. How we balance agility and flexibility with bullet-proof outcomes will be at the heart of success. The potential prizes for exploiting the power of these new amazing technologies to reinvent ourselves will be worth the effort.

Introduction

We are at one of the tipping points in history where the scale of impact of technology on business is significant enough to transform the whole way that business gets done. Like the mainframe, PC and internet before them, the convergence of new exponential technologies such as AI, automation, IOT, blockchain, and 5G have the power to change business models, reinvent processes, and reimagine the way we all work. We call this the emergence of the Cognitive Enterprise™.

At IBM, we see companies placing bets on the creation of business platforms to solidify competitive advantage and differentiation. These platforms must be massively digitally connected from the outside-in and fully cognitively enabled from the inside-out.

For over a decade we have been embarked upon the "outside-in" digital transformation journey. We've been connecting our organizations ever more deeply to customers and external stakeholders, leveraging the power of the internet for pervasive connectivity, and driving these "digital" capabilities deeper into our cores. This trend is now beginning to be matched by the "inside-out" cognitive transformation journey as we access the power of our data through these new exponential technologies. Organizations are combining these two forces in a new wave of truly transformational change and structuring themselves around reimagined business platforms.

All companies are becoming technology companies, and all companies are becoming "platform" companies. They are establishing new sources of competitive advantage and exist in new open ecosystems that can straddle industry boundaries. This is not about transformation at the edge of the organization, nor a place just for experimentation and proofs of concept. We are in a chapter of change that is substantive enough that the core of our organizations—the mission-critical processes and the underlying legacy infrastructures—need to be reinvented by the application of these technologies at scale. This is about "big bets!"

The big bets that we see our clients making around the globe, and the business platforms that they are seeking to compete on, leverage three main elements:

- The 80 percent of data that still resides inside the firewalls of incumbent players, which is often combined with new external data sources,[1]

- The capacity to innovate through technology around the core workflows that define their differentiation, and

- The ever-increasing expertise of the people who can seize insights from the data and reinvent the way they perform along the workflows.

As we construct the picture of the winning Cognitive Enterprise, we see three main building blocks of success (see Figure 1):

Market-making Business Platforms

A "Market-making Business Platform" is the most fundamental component to get right first. It is the new instantiation of the business strategy of the organization and the clear "North Star" for the investment priorities and change initiatives required to shift to the future. We call the platforms "market- making" because they need to be focused, critical, and impactful, whether they reinforce competitive position within an industry, shape a new role in an industry context, or open up cross-industry market opportunities.

Sometimes an internal enabling business platform (for example, talent, finance, or risk management) can be strategic enough to set the company's agenda. The choice of platform focus and the degree of doubling down on investments that the enterprise makes, therefore, define its core intent and narrative for the future.

Intelligent Workflows

"Intelligent Workflows" are the extended end-to-end or front-to-back processes that, through the application of technology at scale, define the customer experience and economic outcomes at the heart of the new business platforms. Organizations need to identify the most important workflows and related value pools in front-, middle-, and back-office areas that will differentiate the company or industry.

Once clear, organizations can apply the right combinations of exponential technology, leverage the power of targeted data, and enable these workflows with next-generation applications in a reinvented hybrid cloud IT infrastructure. Then, the relevant capability layers (see Figure 1) can be architected, transitioned, and built out in service of the intelligent workflows and business platforms. Together, they deliver huge potential for cost optimization and wider value realization, as well as future-proofing the enterprise.
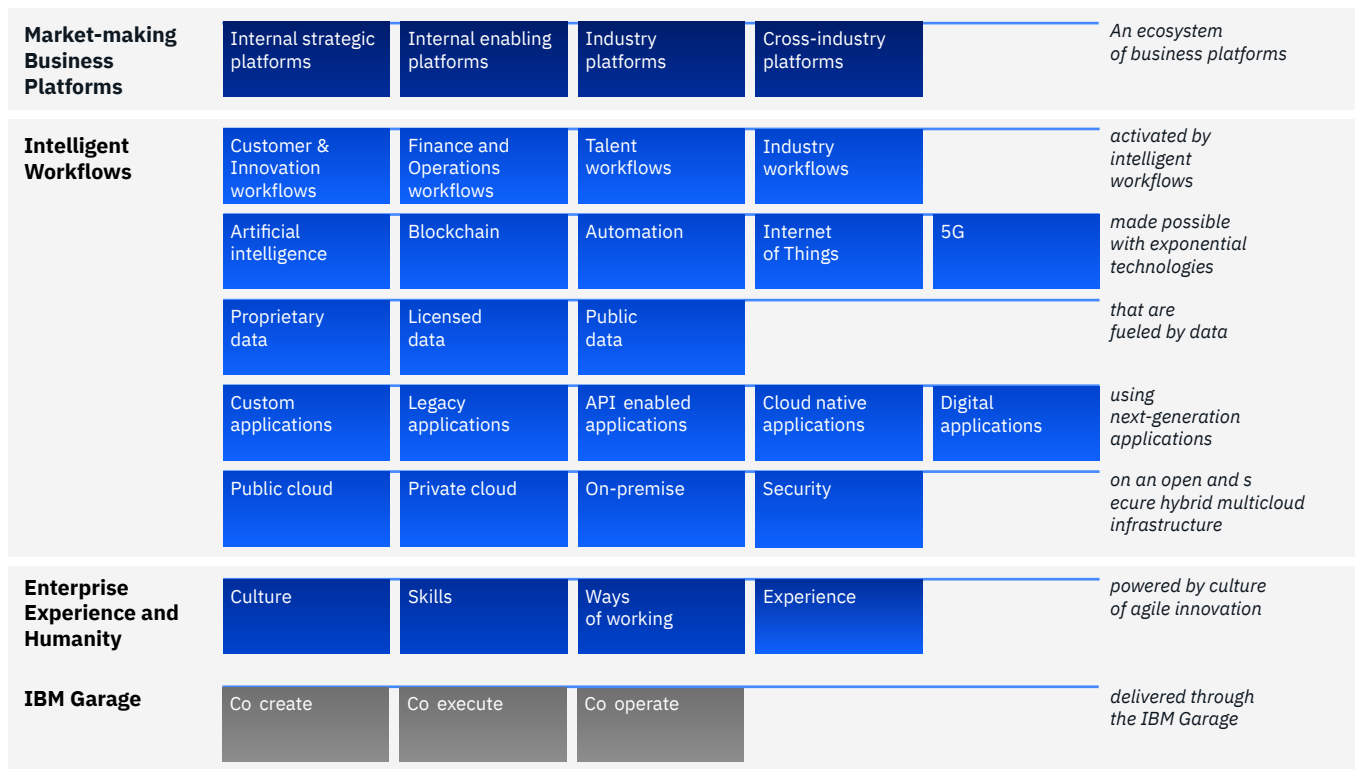
Enterprise Experience and Humanity

Perhaps the most essential component of the Cognitive Enterprise is what we have termed "Enterprise Experience and Humanity." Ultimately, for all the technology centricity of this new world, it is the power of the "human wrapper" that envelops and leverages this technology that will be the core of lasting differentiation.

Figure 1

The capability layers of the Cognitive Enterprise

Seven layers build on each other in an integrated way.

Market-making Business Platforms	Internal strategic platforms	Internal enabling platforms	Industry platforms	Cross-industry platforms		*An ecosystem of business platforms*
Intelligent Workflows	Customer & Innovation workflows	Finance and Operations workflows	Talent workflows	Industry workflows		*activated by intelligent workflows*
	Artificial intelligence	Blockchain	Automation	Internet of Things	5G	*made possible with exponential technologies*
	Proprietary data	Licensed data	Public data			*that are fueled by data*
	Custom applications	Legacy applications	API enabled applications	Cloud native applications	Digital applications	*using next-generation applications*
	Public cloud	Private cloud	On-premise	Security		*on an open and s ecure hybrid multicloud infrastructure*
Enterprise Experience and Humanity	Culture	Skills	Ways of working	Experience		*powered by culture of agile innovation*
IBM Garage	Co create	Co execute	Co operate			*delivered through the IBM Garage*

The concept of "experience" is now extending from the customer to the employees that serve the customer, the enterprise itself, and the entire ecosystem to provide a seamless environment of value and purpose. Human-centered design is becoming an ever more important aspect of the business platforms and workflows, as well as the systems that underpin them.

The Cognitive Enterprise will therefore demand a new kind of leadership, emboldened by deep technology insights, and require new skills and culture to embrace this exponential potential. Perhaps the biggest challenge and opportunity will lie in the capacity to make the necessary changes in the pools of expertise, mindsets, and ways of working to bring this vision to life.

The areas that most organizations are struggling with as they embark on the journey to become Cognitive Enterprises are (a) how to really get started at scale, (b) which execution and funding vehicles to use, and (c) how to orchestrate the complexity of the change.

This report sets out our point of view, drawn from multiple real-life client examples, of the key action areas that we believe all organizations need to engage in to make substantive progress.

We are describing wholesale business and technology change and the reimagining of the mission-critical components of the company. Following through on this will require engaging all parts of our companies in new coalitions of executive sponsors and teams working across departments. This journey calls for strategic partnerships and extended open ecosystems.

It demands new, more agile approaches for co-creation, co-execution, and co-operation. We are on the cusp of the next period of true technology-enabled business transformation. We look forward to charting this journey together.

Each of the capability layers of the Cognitive Enterprise needs to be aligned with the others and must be constantly improved upon to collectively grow the strength of the organization.

1. An ecosystem of business platforms

Business platforms create new advantage from existing capabilities, then evolve and scale those capabilities over time. As organizations decide what type of platform to launch or build out, a few clear criteria have emerged:

– Deep-seated skills and expertise that can be leveraged for the platform's purpose

– Access to proprietary data that can be combined with external data sources to create differentiated workflows and insights

– Unique process innovation and performance potential through applied technology

– Channel access and network credibility to operate in the chosen platform area

– Scale, or potential to exploit and extend scale, through platform leverage.

2. Activated by Intelligent Workflows

Cognitive Enterprises operating on business platforms are often focused on being the very best in one core area, whether that's a customer-facing experience or an aspect of their supply chains. They are intended to produce entirely new outcomes and access new value pools. That ambition is achieved in part by reimagining strategic workflows.

Intelligent workflows deliver data to humans who need to make more effective and timely decisions. By automating routine activities, they free up employees to take on more complex decisions, bigger tasks, and new roles. They link processes end-to-end to straddle siloes and cut across functions to expose new outcomes that differentiate the organization from its peers. Intelligent workflows aren't just automated, optimized, and efficient; they're dynamic. They can flex and scale with ease (see sidebar, "Suncor: Building the layers of a Cognitive Enterprise" on page 8).

3. Made possible with exponential technologies

A convergence of new technologies, applied in combination, have the potential to transform all activities. Whether it is AI, automation, IoT, blockchain, 5G, or others, these technologies are maturing to the point where they can be deployed and exploited at scale.

What successful transformations often have in common is that they have made their customers the center of gravity. From there, they identify novel workflows and opportunities to apply exponential technologies in concert. It is the combined effect of these technologies that creates and captures new value.

Layering several exponential technologies—deploying them in concert, not discretely—further amplifies their exponential effect. In an enterprise, this enables better human-to-human and machine-to-human experiences, ever improving and scaling over time at a rate that exceeds traditional technological progress.

4. Fueled by data

Tenure has its advantages. About 80 percent of the world's data is tucked behind the firewalls of organizations.[2] And as they take advantage of new technologies (for example, sensors and videos), the data inside organizations grows exponentially. Incumbent organizations have also extracted data in abundance from activities in both online and physical domains. The data they've accumulated is often unique and proprietary. While it's theirs to exploit, most organizations admit they fall far short of utilizing its potential. In essence, they have big data but draw too little insight and value from it.

The gap between those who use data to great effect and those who fail to do so is growing.[3] And as we learned in the IBM Global C-suite Study, the gap exists on multiple levels.[4] It includes the capacity to curate the data they have on hand and apply it to decisions. And, importantly, it's seen in their ability to tap into new sources of data and to acquire and share data with ecosystem partners, a fundamental capability of industry and cross-industry platforms.

5. Using next-generation applications

The digital architecture of the modern enterprise isn't equipped for the extreme openness and flexibility that business platforms require. Today, legacy systems lock in outmoded processes and workflows.

The next generation of Enterprise Resource Planning (ERP) systems will act as a backbone for Cognitive Enterprises. Building on this backbone, workflows will use external and internal data and exponential technologies to integrate traditional processes. For example, by augmenting the financial journal entry process in legacy ERP with intelligent robotic process automation (RPA), companies can automate the collection, extraction, and validation of financial journal data from emails and other sources.

6. On an open and secure hybrid multicloud infrastructure

Intelligent workflows, by definition, span multiple processes and business functions, and thus will include many different applications. Front-office applications, such as customer inquiries (checking order status, for example), make up a large portion of what has gone to public cloud. At the same time, mission-critical, security-dependent applications, such as customer databases, transaction processing, finance and accounting, supply chain, and manufacturing are, in many cases, better suited to private cloud—or a mixture of public, private, and traditional IT.

In order to build out intelligent workflows, applications housed in different cloud environments will need to be orchestrated for seamless interaction and business agility. With open, hybrid multicloud, organizations can run applications in the specific environments best aligned with security, regulatory, and governance requirements. This needs to happen in a secure context that bridges the need to create frictionless customer, employee, and business partner experiences with the requirement to appropriately access permissioned data and link applications.

7. Powered by a culture of agile innovation

A culture of agile innovation embraces new skills, workforces, and ways of working, while humanizing the employee experience. As organizations migrate to new platform models, boundaries blur and frictions fade. Leaders are asking a deceptively simple but hugely consequential question: How fluid can both we and our workflows become?

In the Cognitive Enterprise, agile teams span organizational boundaries—between business and IT, as well as support functions. They are empowered to make decisions by the data and insights generated along intelligent workflows and intuitive tools that use exponential technologies. Leaders learn to "let go" by establishing a skills culture, one in which employees are motivated to learn and take on new roles, and by communicating purpose and goals with clarity.

8. Delivered through IBM Garage

Organizations need a fresh approach to build new platforms and skills while maintaining, modernizing, and operating their legacy environments. Attempts to build "digital islands" have largely failed to transform enterprises in sustainable, scaled, or other meaningful ways.

Where is the answer to this challenge? It's "in the Garage." The Garage approach involves the creation of cross-organizational spaces. There, cross-functional teams can come together with strategic partners—such as IBM, and other ecosystem players and startups—to co-create, co-execute, and co-operate to build the new business platforms.

They facilitate a full contextual understanding of what needs to be done to create new business platforms. They envision how legacy environments will be replaced over time with innovative microservices and APIs that are hosted in a modern, hybrid cloud.

Suncor: Building the layers of a Cognitive Enterprise

Suncor Energy, Canada's leading integrated energy company with a market cap of USD 50 billion, recognized two things as it embarked on a technology-enabled transformation.[5]

First, the trends supporting the emergence of the Cognitive Enterprise presented an opportunity for Suncor to drive a step change in performance and enable new ways to make decisions. These trends include the use of business platforms that straddle organization and industry boundaries, as well as the maturity of AI, IoT, automation, edge computing and other exponential technologies, often described as "Industry 4.0."

Second, for the transformation to succeed, Suncor would have to focus on its culture and new ways of working for its people. So, in May of 2019, it introduced "Suncor 4.0," setting a target to create USD 1.5 billion of additional free cash flow by 2023.[6]

Innovation has always been central to Suncor's success. It was already extensively using technologies ranging from autonomous haul systems and robotic process automation to remote sensing and drones. It was also harnessing digital technologies to advance data-based decision making to enhance cost and performance benefits and using real-time data to improve the safety of its employees and reliability of operations.

But Suncor 4.0 describes an even more ambitious journey: to accelerate and digitize Suncor's strategy. Sponsored by the CEO and directly led by the executive leadership team, the program is purpose-driven, people-focused, data-informed, and technology-enabled.[7]

The CEO created a Transformation Management Office (TMO)—a "control tower" of sorts for the transformation— to build on already completed digital work and accelerate Suncor's enterprise-wide transformation. The TMO's mandate is to act as a catalyst to accelerate transformational change that unleashes the full potential of Suncor's people and the organization. The office is focused on creating an engaging and productive workplace, enabling new ways of working, creating value from data and securing the company's future through the use of advanced analytics and other digital technologies.[8]

Notably, TMO roles were not established as part-time roles. Instead, people were pulled from their line roles to be fully dedicated to the transformation. And, to create space for transformation, the TMO facilitated a rigorous prioritization process to decide what lower-value work should be deferred or stopped altogether in order to focus on projects that would make a difference.

Suncor's Site Wide Lead (SWL) Advisor project is a good example of how it is becoming a Cognitive Enterprise. Suncor's Oil Sands Base plant specializes in the oil sands value chain of mining, extraction, and upgrading. Its operations are highly integrated, complex and capital intensive. Those operations had been overseen by an SWL—a role that looks at the end-to-end process and optimizes production.

To manage such complex operations, Suncor uses over 87,000 sensors across 35 plants, tracking more than 900 key metrics—a microcosm of the Internet of Things. Data readings from all those sensors are too voluminous for humans to analyze completely and generate useful insight. So, Suncor tapped the power of AI to make the most of real-time data readings.

It developed an SWL Advisor, powered by more than 100 AI models that analyze the complex data readings and provide useful insights about the operation. The SWL Advisor analyzes data from a variety of sources, including operational data, maintenance plans, and weather data to provide operators with insights on opportunities to optimize production. The tool also provides real-time anomaly detection, predicting critical events up to an hour before they occur. It informs operators, who can then respond proactively to reduce risk, maintenance costs, and downtime.

Insights and recommendations produced by AI still need to be reviewed by experienced SWL engineers with deep technical knowledge representing decades of enterprise experience. They ultimately make any required decisions, combining the best of machine and human capabilities. The initiative has the potential to generate business value in the order of tens of millions of dollars per year by turning complex and big data into actionable insights.

The SWL Advisor has become a key part of intelligent production management workflow for Suncor, generating production plans within minutes that previously took hours. The Advisor also takes into account operations priorities and constraints, such as scheduled maintenance. Putting AI to work at Suncor has also shed light on how humans can best work with technology, as well as what new skills they need, adding value that was never before achievable.

Charting the journey to the Cognitive Enterprise

There is no fixed recipe or definitive roadmap for the journey to the Cognitive Enterprise, and organizations are at very different starting points and stages. That said, we can see patterns of successful activity that begin to frame the key action areas we think are important. The sequence of initial programs will differ from organization to organization as business imperatives, context, and other change factors play out. We do, however, think that whatever the starting point, having a perspective on, and plan for, the Nine Action Areas we have outlined in the plan that follows will reinforce the likelihood of and accelerate the pace of success (see Figure 2).

Clarity about which market-making business platforms an organization is selecting as the core of its future competitiveness is clearly an important prerequisite. That said, some companies may find themselves backing into these choices as they see specific activities driving superior impact. There will also be emergent strategies that evolve from the exploration of the potential of data and differentiated applications of technology.

However, once the choice is made, doubling down on the big bet will be vital. It willalso be necessary to address the business architecture and operating model implications of the selection and put in place an overall transformation and governance approach to steer and coordinate the many moving parts that will result.

The success of the market-making platforms will depend upon the quality and differentiation of the intelligent workflows that underpin them. It is also possible for Cognitive Enterprise journeys to begin with the targeting of opportunity in a specific workflow that opens up the potential for a platform play.

We do see that the choice of which value pools to go after, and the related workflows to tackle, is critically important. These workflows need to appropriately leverage exponential technologies at scale. Then the data strategy to underpin the workflow redesign can be appropriately targeted, as well as the right application and hybrid cloud architectural choices. We see situations where organizations may start their journey with an enabling, broad-based data fabric or a definitive journey-to-cloud strategy. Soon, though, the need to define what the data and cloud is going to be used for becomes key.

Figure 2

Nine action areas

Market-making Business Platforms	Double down on "Big Bets"	Create a New Business Blueprint	Orchestrate Compelling Change
Intelligent Workflows	Embed Exponential Technologies	Drive Value from Data	Deploy Through Hybrid Multicloud
Enterprise Experience and Humanity	Elevate Human-Technology Partnerships	Cultivate Smart Leadership, Skills, and Culture	Perform with Purposeful Agility

The human-technology partnership and use of new skills and culture must underpin platform and workflow transformation, and cannot be started too soon. At the same time, these aspects are some of the hardest to durably change.

A sense of direction and a North Star for the required shifts is essential. As the platform and workflow priorities become clearer—and the scale of the human, team and leadership step changes evolve—more and more focus can be brought to the very difficult and complex interventions. Once we understand where the critical interfaces between human and machine will be, we can orchestrate our leadership and skills-building activities accordingly. Agility, too, can both be developed as a general "foundational" capability in teams and ecosystems and find focus and purpose in light of the other building blocks of the Cognitive Enterprise (see Figure 3).

As organizations architect the capability layers, AI can help accelerate a shift in cybersecurity, turning what was primarily a defensive proposition into a proactive one. In attempting to make such a shift, organizations should consider three important guidelines:

– Organizations must work to secure both the human and machine elements along intelligent workflows, data sources, their attendant applications, and the underlying infrastructure

– Security of business platforms will be critical to trust and their longevity, but companies need to balance this with frictionless customer and employee experiences

– The ecosystem of business platforms requires an open network approach to security across all parties, driving collaboration and insights at speed.

Figure 3

Enterprise transition from legacy to new
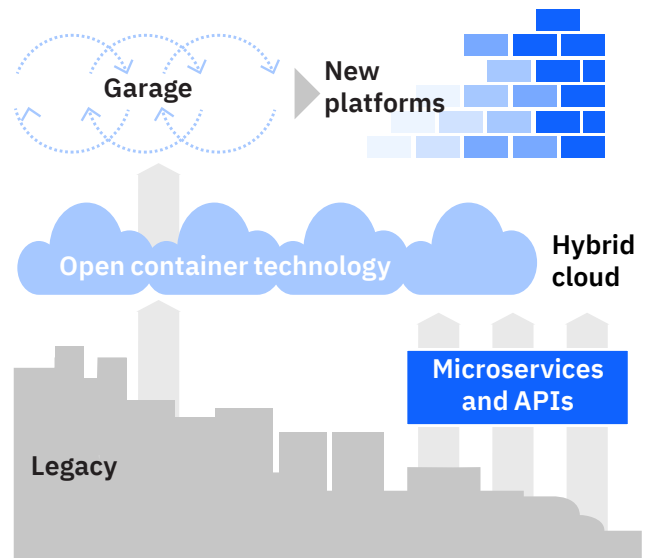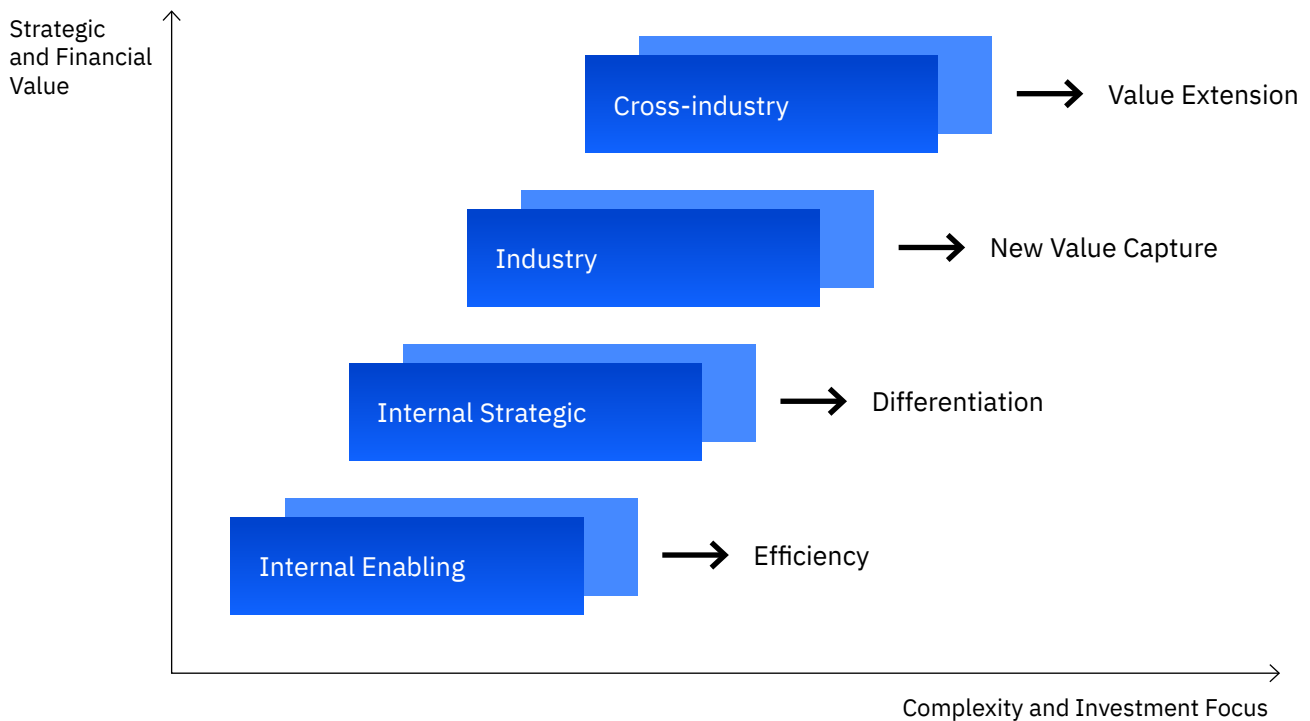
Chapter 1

Market-making Business Platforms

In every industry, leaders are being confronted with the decision of their lifetimes: how to respond to markets remade by platforms and the changing customer expectations that come with them. They're being asked to make big and bold bets on how the future will unfold.

As companies describe their platform strategies, they are anchoring to the idea of a "stage" or "field of operation"—an area where they can deploy a range of unique capabilities and establish a control point over a range of value-creating activity. Platforms can have a narrower inward orientation, extend across an industry, or even beyond it. Market-making business platforms can thus take a number of forms as they refocus organizations on their core advantages (see Figure 1):

- *Cross-Industry Platforms.* New ecosystems that straddle industry boundaries in areas such as mobility, entertainment, and more, establishing new ways to extend value

- *Industry Platforms.* Upon which multiple industry players can benefit from new digital, cognitive, and cloud capabilities to capture value

- *Internal Strategic Platforms.* Embedding differentiation with workflows that define the next instantiation of competitive advantage

- *Internal Enabling Platforms.* Dramatically more effective and flexible front-, middle-, and back-office processes.

Figure 1

Double down on big bets to build out competitive advantage

Platform choice really matters

A business platform doesn't just change the organization's business model; it becomes the new operating model, able to extract new value from data by algorithmically orchestrating processes or markets, and by providing new space to exercise expertise.

Platform strategies are, by definition, "boundary-busting." Internal platforms break through the siloes inside an organization, creating new economies of scale to leverage skills, intelligent workflows, and data for new value. Internal platforms, for example, might add value by providing warranty data to supplier networks, and they could create new customer experiences with proactive product replacements through retail outlets.

External platforms knock down the walls between organizations and, sometimes, the barriers between industries. An external platform, for example, could establish seamless, low-touch procurement and payment experiences shared by a supply chain or an industry. When scaled to include multiple supply-side and buy-side participants—including market intermediaries, such as banks and third-party logistics providers—it could pave the way for multilateral "netting" to improve the efficiencies of source-to-settle processes.

Industry and cross-industry platforms radically restructure organizations to achieve nonlinear growth. Once organizations have gone down this path, they often look for additional opportunities to broaden their success by participating in other platforms, or linking their platform to others in their ecosystem (see sidebar, "Yara: Cultivating a high-yielding platform for growth" on page 14).

Organizations adopting a business platform should have a singular overriding ambition: to be the best in a strategically selected area. They start by identifying what the core of their business should be and then marshal their investment and expertise to transform that core as a business platform. Deciding what is core is a critical choice with significant consequences. Almost always, the core is the part of their business where organizations have already established a differentiating advantage, supported by troves of proprietary data.

Most business platforms, even those already in the market, are engaged in a race of scale and speed. The prize? Attracting key members of the ecosystem. On platforms, speed is measured first as the speed of change. How fast—and how frictionless—can you onboard a new participant to your platform? How quickly can you respond to a new customer requirement? Can you assemble and reassemble new infrastructure and interfaces, new workflows and teams fast enough to outpace competitors?

On business platforms, transparency and trust are the hallmarks of close customer relationships. In the Global C-suite Study, the leading organizations are strengthening their relationships with customers by becoming trusted custodians of personal data and demonstrating transparency by revealing more information about their offerings and workflows.[1]

Blockchain-enabled platforms are natural conduits of trust. On blockchain networks, for example, organizations can demonstrate—to a deep level of detail—the brand promise, whether it's lowest price, or eco-friendly sourcing and manufacturing.

In operational terms, we believe that platforms will:

– Bring purpose and intent to the task of leveraging transformative technologies, especially AI, and to critical workflows

– Create the focal point for data curation from internal and external sources

– Provide the architectural frame within which agile management approaches can be exercised to move from the old to the new

– Set the direction for skills-building and culture changes required to develop the workforce of the future

– Establish the standards for necessary trust and security across their scope.

Yara: Cultivating a high-yielding platform for growth

Historically, farmers have relied on word of mouth and generational farming techniques to overcome obstacles and produce successful yields. Climate change and population growth now threaten the world's ability to produce enough food.[2] In response, the agriculture industry is turning to technologies such as AI, IoT, and big data to help.

In Norway, Yara, one of the world's leading fertilizer companies and a provider of environmental solutions, has partnered with IBM to build a digital farming platform that connects and empowers independent farmers.[3] This platform represents an important extension to Yara's existing business model, using farming data to provide enriching outcomes to farming families, and serving as a first-of-a-kind, competitive differentiator in the agriculture industry.

The platform aims to cover 7 percent of all arable land and help manage existing crops with capabilities such as damage prediction and weather forecasting.[4] It will also use IoT sensors and AI to improve agricultural outcomes for the next season. It has already been downloaded by farmers 600,000 times in one ten-week period and its adoption is increasing. The platform also paves the way for other advanced technology, such as blockchain, to provide full visibility of the provenance of produce to consumers purchasing it.

The cloud-agnostic platform follows a pay-as-you-go commercial model and will provide two data services: weather data and crop yield. An open innovation layer will enable Yara to create new groundbreaking algorithms, providing farmers knowledge and decision- making insights. Yara has also signed up for the IBM Food Trust platform, a farm-to-fork value chain, to expand its influence.[5] It will be able to expand its market opportunities by creating solutions that reduce a producer's global footprint and optimize the food chain.

Architecture inside and outside the four walls

As organizations create value outside the enterprise by collaborating with other institutions, the term "architect" as a job description might fall short. Enterprise architects need to think more like an urban planner building out a smart city—rather than the architect of an individual enterprise. Like urban planners, enterprise architects need to focus on creating shared value across the many ecosystems they work in and with. They have to think about the constant movement of where innovation happens, and facilitate the connections and flow of data among organizations.

Most organizations are likely to be composed of a series of business platforms, some of which they own and operate, notably those for their core business and back-office. Others they participate in, often to gain efficiency advantages. The challenge: how to create a new business architecture that reflects the platform reality of multiple business platforms and their interdependencies.

The destination for most organizations is scale of both data and transactions. Thus, enterprise architecture must take into account the increasingly fluid boundaries spanning an ecosystem. Because business platforms succeed in part by scaling fast and ahead of the competition, it's up to the platform owner to enable new business partners to join the platform as effortlessly as possible. They must engineer the platform for frictionless connection across all architecture layers: infrastructure, application, data, and exponential technologies.

While some platforms are positioned at the front end—directly shaping the customer experience—others massively enable internal operations. Yet, in all cases, leaders take advantage of exponential technologies deployed in concert. The time for "AI tourism"—automation pilots or proofs of concept with blockchain technologies— has passed. Organizations must now move beyond experimentation to industrial-strength scale operations. Therefore, they will need to make clear policy and architectural choices at all levels of the Cognitive Enterprise.

To establish market-making business platforms, organizations will need to instill new rigor and focus to move beyond experimentation, sidestep cognitive chaos, and balance stability with agility. Organizations will need to:

1. Double down on "Big Bets"

Make Big Bet platform choices and align their organization, assets, resources, and investments to rapidly scale and sustain the continued evolution of the platform.

2. Create a new business blueprint

Embed governance in a more open and transparent business architecture to enable rules, inform decisions made at the edge, and allow for the rapid reconfiguration of organizational components to create a new target operating model.

2. Orchestrate compelling change

Establish control towers to monitor early warning indicators, orchestrate change in real time, and develop iterative and proactive change management.

Action Area

Double down on "Big Bets"

The choices that organizations are making about which market-making business platforms to major on are existential in nature—they are the means through which organizations shape markets to their advantage. They are not experimental, nor are they peripheral plays that reside at the edge of the company. We are seeing organizations commit their future to these new markets and exploit them by applying data, technology, and new expertise at scale. The focus of these new platforms is anchored in the core of the company. They take advantage of traditional sources of differentiation and channels, as well as the organization's unique access to data, then evolve and scale those capabilities over time.

Companies have the opportunity not only to attack and secure new markets but also to restructure their cost bases for the long term—with a possible huge payoff to their bottom lines. They are creating platforms to ramp up their forecasting skills in concert with ecosystem partners and also to link IoT devices embedded in their physical assets across extended supply chains. We think that incumbents will—as we are increasingly seeing—strike back against digital upstarts if they can leverage their own historical data, ecosystem relationships, and physical infrastructure to orchestrate change at scale.

In creating a smart home platform, appliance-maker Bosch had the boldness to take on Google's competing platform, Nest, and also go directly to consumers for the first time.[6] Kloeckner Metals opened up its platform to its competitors in the steel market and introduced price transparency in a market where "open" is far from the norm.[7]

On platforms, products evolve to include supporting services. Services grow to become orchestrated and curated experiences for customers, partners or employees.

To deliver a curated experience, platforms extend offerings to adjacent spaces, connecting complementary products and services in a way that makes the experience more holistic. New value for the customer is created by the breadth and diversity of the interactions the platform owner orchestrates. Platforms that link connected cars with travel and hospitality providers, for example, can provide concierge services to create a new customer experience.

Organizations are learning to push what they once thought were the limits. This includes new ways to monetize products and assets. Instead of selling a car, platforms could offer customers the rights to use a car for a pre-determined period of time. The platform owner could bundle the purchase with by-the-ride insurance payments and pricing linked to safe driving habits and those that reduce gasoline consumption.

When platform orchestrators bring together multiple organizations to collaborate on a new customer experience, they gain something of extraordinary value: data from a wide variety of interactions and transactions. This capacity to extract data from multiple sources and convert it quickly to insight and learning is proving to be one of the platform's most sustaining advantages.

Incumbents have a distinct advantage over new players, thanks to their access to longstanding customers and deep knowledge, as well as related data from their processes, value chain partners, and competitive surroundings. Their unique access to proprietary data allows them to initiate new competitive plays or strike back with vigor if they are being attacked by an outsider. Not only do they have a data advantage, but they also have the expertise to do something fresh with it, especially if they find ways to harness the power of exponential technologies and intelligent workflows.

Any bet made on platforms needs to become the holistic and explicit strategic intent of the organization. The CEO, Board, and leadership need to espouse the North Star that the fresh direction represents and draws upon the organization's legacy values to create a compelling mission and vision.

Platform alignment with the organization's core values and purpose is paramount, as is support from its core DNA, culture, and skill development.

Michelin created one such platform by leveraging its 130-year history of innovation and expertise in environmental sustainability.[8] Its platform was built around its company's purpose—sustainable mobility—to establish new IoT-enabled fleet-management services for trucks. Using sensors embedded in tires, Michelin's platform

services help fleet operators maintain their vehicles and drive in a manner that promotes safety and reduces fuel consumption and CO_2 emissions significantly. "Our customers start seeing us in a very different way, as a company that can help them optimize their business, enable them to be more efficient, and generate more margins," says Eric Chaniot, Michelin's Global Chief Digital Officer. "We are also convinced our fleet customers will give preference to Michelin tires, so it is a way to both differentiate ourselves and drive the core business."[9]

On external multi-party platforms, the strength of an organization's ecosystem will be a determining factor. Those that don't have the clout to lead the ecosystem, or the leadership skills to collaborate on win-win propositions, are disadvantaged. Instead, they may choose to participate in a platform, and focus their investments on a differentiating platform that can interoperate with others. For example, many merchants choose to participate on State Bank of India's YONO platform to get access to its strong network of ecosystem partners and customers.[10] (See sidebar, "State Bank of India YONO: Attracting new customers with a next-generation platform" on page 18).

The choice of what kind of platform to build starts with a consideration of strategic capabilities (see Figure 2), including:

– *Unique proprietary data.* The ability to orchestrate and curate data so that it's AI or other exponential technology-ready, as well as identifying and accessing new data sources.

– *Deep expertise.* The technology expertise that is in such short supply, as well as the softer skills required for agility, collaboration, and ongoing learning.

– *Differentiated workflows.*The intelligent workflows that support the organization's capacity to scale with speed and stay open to change.

– *Exponential technology applications.* The combination of technologies that differentiate and automate intelligent workflows and create new customer, partner, and employee experiences.

Figure 2

Strategic platform capabilities

To create a winning business platform, clear criteria have emerged.
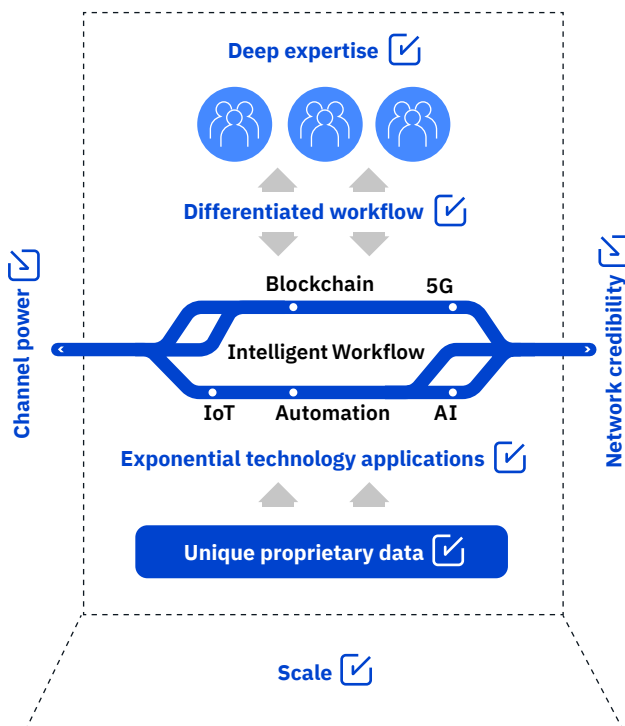
Channel power—or the lack of it—may also determine platform choice. It's never been easy for manufacturers to create direct-to-customer sales channels, as many have found out the hard way by alienating their trusted channels in their endeavors to create direct-to-consumer relationships. Retailers are more likely to have created the kind of trusted relationships necessary to attract customers to marketplace platforms. However, manufacturers and CPG organizations do have a chance to participate in and partner on other types of platforms that raise their visibility with customers and create new relationships and trust.

CPG giant Nestlé is a case in point. It is both participating in and operating a broad variety of platforms that feature its goods. Together with major retailers, Nestlé participates in the blockchain-based IBM Food Trust platform.[11] Via QR codes, consumers can track Nestlé products from farm to factory to warehouse to store, getting the quality and safety assurances they crave.[12] More recently, in Japan, Nestlé began piloting an AI-enabled wellness app personalized by participants' DNA and blood tests to provide nutritional advice.[13] In China, in partnership with Alibaba, Nestlé operates a platform to help small merchants better promote and merchandize Nestlé's brands.[14]

An organization with strong channel power will find it easier to scale fast to get to market first. It can also become the entry point for new services. Telecommunication companies, for example, are becoming channels through which customers can engage in healthcare discussions. On a platform with other industries, they can become the channel of choice for "virtual medicine"—including online consultations with physicians.

We see leaders setting out on these new directions and making substantive investments to support their plays. Frequently, merger and acquisition activity reinforces the bets they are making, as does the overall allocation of capital.

Some of the most successful business platforms are more than a decade old. They demonstrate that platforms don't get to scale and then go into stasis. They continuously evolve with investments, expanding partnerships, exponential technology and data, and a steady development of talent.

Most importantly, the external narrative of the company needs to reflect the new areas of focus and the value proposition of its business platforms to create the right multiyear focus for sustained activity and development. For platforms that extend beyond the organization, credibility in the eyes of ecosystem members, and buy-in from them, are make-or-break conditions.

Organizations with large market share may need to resist the urge to assert control. Since it's difficult to lock partners into only one platform, it's better to attract participants than compel them. And because value created on an external platform should be a win-win scenario, platform orchestrators focus much of their attention—and investment—on nurturing and building out their ecosystems.

For example, Airbus's Skywise consortium onboarded more than 100 airlines and more than 9,000 aircraft by the end of 2019, after releasing its most recent module providing reliability insights, which was co-designed, tested, and improved in collaboration with its anchor partner, Delta Air Lines, entered into a digital alliance to build out new predictive maintenance and health-monitoring solutions.[15,16] Airlines using the platform cite numerous benefits as a result, including reduced fuel penalties, less fleet disruption, and higher productivity in maintenance operations.[17]

This is a phenomenon we've seen many times on blockchain platforms: the leading platform orchestrators eschew edicts that tip the balance in their favor, or even the favor of one participating organization over another. Their role is to be a neutral steward of value creation, creating an environment where every participant can prosper. The law of attraction is what gets them to scale.

As every company becomes a platform and technology company, the relationship between technology competence and business strategy changes, reinforcing the need for the talent and capability agenda to be reimagined, too. This means that the whole ecosystem of partners and joint venture collaboration is on the table. It is rare that a new market-making business platform will be created entirely from existing internal componentry.

State Bank of India YONO: Attracting new customers with a next-generation platform

More than three years ago, India's second largest bank, the State Bank of India (SBI), made an ambitious big bet. It adopted a customer-centric platform strategy to attract new customer groups, such as tech-savvy millennials, and increase cross-selling and loyalty with existing customers.

Beginning with an MVP approach of 25 customer journeys, SBI created a Digital Bank, an online marketplace for third-party offerings, and a digital Financial Superstore for its joint venture offerings under the brand SBI YONO (You Only Need One).[18] These three solutions, driven by AI-based advanced analytics models, generate timely customer insights that lead to tailor-made offers and campaigns.

The Digital Bank allows users to conduct all relevant banking interactions online, eliminating the need for branch visits. It also offers cardless cash withdrawals at more than 16,500 ATMs by generating a one-time code in the banking app. Not only does this reduce the need for plastic credit cards, but also the likelihood of associated card fraud.

SBI offers an online marketplace with personalized offers, selling a wide range of lifestyle products to customers. For this, SBI YONO partners with more than 100 e-commerce sellers, including Amazon, Thomas Cook India, OYO Total Holidays, and Tata CLiQ, among others.[19]

SBI's digital Financial Superstore ties together all financial service offerings by joint venture partners of SBI such as life insurance, general insurance, credit cards, securities, and mutual funds. It thus provides a one-stop solution for all of its clients' financial and lifestyle needs. It also offers calculators and comparison tools to help customers manage their financial lives.

SBI YONO's platform has been incredibly successful and growth continues since its public launch in November 2017. The platform already counts more than 4 million daily logins and, on average, more than 15 new use cases deployed each month. SBI is now working to bring its winning digital experience into branches, providing a differentiated omni-channel customer experience.

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Create a new business blueprint

Market-making business platforms straddle the heart of the organization. They represent a wholesale change to both the nature of work and relationships with business functions and partners. As such, they must drive a fresh look at the target operating model of the company. The business needs to be aligned and synchronized along the platform architecture to drive the outcomes that are thus desired. This applies to the core differentiation of business platforms on the front lines, as well as the interaction with enabling platforms that support the vision. Existing functional roles will be redistributed; where and how decisions are made will also shift.

At their essence, market-making business platforms create new value in new ways. They do so by bursting through organization boundaries and connecting activities in intelligent workflows. They require organizations to ease up on controls and major on relationships. In short, they necessitate wholesale structural and cultural changes to the operating model—thus creating a new business architecture.

This new business blueprint addresses the target operating model, decision framework, culture and skills, and roles and responsibilities, as well as how humans and AI work together in a business platform context. The blueprint helps organizations identify and execute strategic priorities, anticipate how each change will ripple across the organization, and relocate resources accordingly (see Figure 3).

The business architecture needs to be defined and must also set the tone for the other architectures that will underpin it—including process, technology, and data. The business platforms need to be extremely visible and drive the architectures. The platform blueprint is more like a master plan. It encodes the organization's vision—its long-term plans—and serves as a guide and dynamic roadmap to develop future growth. Because platforms are data- and technology-dependent, the "master" business architecture will need to be enabled by a set of master technology architectures. These architectures will provide the guide bars within which innovation and agile co-creation can thrive.

Figure 3

Business architecture sets the frame for the Cognitive Enterprise blueprint
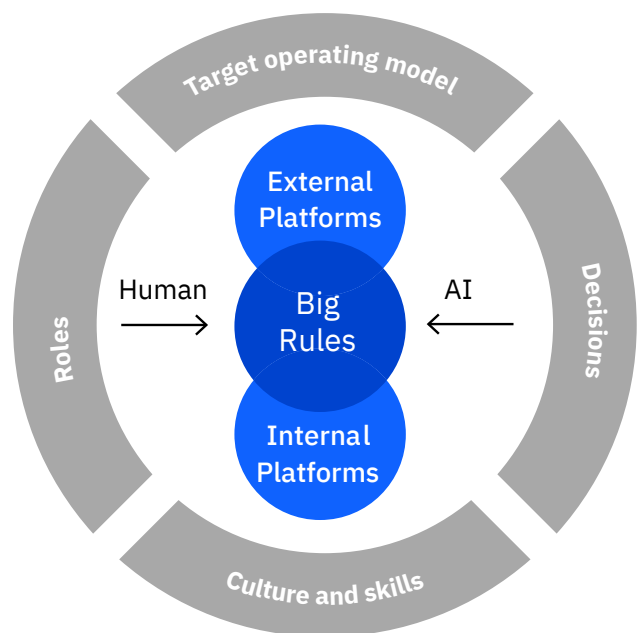
A further key principle here is the need for "openness" in the architectural thinking. All business platforms and workflows must be designed for seamless external connectivity. This includes frictionless entry for new participants—including the functions and departments within an organization. Open technological standards take down the biggest barriers to entry. Pricing and investment structures can become another barrier for internal and external participants.

Moreover, as organizations embark upon building platforms, whether inside their four walls or at an industry level, they cannot know what the final potential for extension or new modular capability might be. Open architectures faciliate this dynamic operating model (see sidebar, "TradeLens: Rules for a global shipping platform" on page 20).

TradeLens: Rules for a global shipping platform

TradeLens is driving a wave of change made possible by cross-industry collaboration. This open shipping platform, underpinned by blockchain technology, was launched to help digitize and modernize the world's supply chain ecosystems. It now comprises more than 100 different organizations and is on target to handle more than half of the world's ocean container cargo.[20]

The platform, developed by Maersk and IBM, lays the foundation for digital supply chains. It empowers multiple trading partners to collaborate—publishing and subscribing to a wide range of supply chain data—by establishing a single shared view of a transaction without compromising details, privacy, or confidentiality.

A few big rules or guiding principles govern how the platform will operate and expand, as well as how participants will interact and derive value.

First principle: TradeLens is an open, neutral platform available to any permissioned party to a shipment, anywhere in the world. All authorized participants can immediately contribute to and extract value from the TradeLens platform.

Second principle: The platform enforces a standard data sharing and permission model that governs which parties to a shipment provide data and which parties are granted access to that data. Sensitive information, such as trade documents, remains under the control of the providers across a distributed network of blockchain nodes. The model promotes greater transparency, makes data more widely available, and ensures security and protection of sensitive data.

Third principle: The platform maintains an open API environment, employs standards, and promotes interoperability as the foundation for ongoing improvement and innovation. A marketplace will allow third parties as well as participants to build and deploy applications on the platform.

As a single platform connecting the entire ecosystem for secure data-sharing and collaboration, TradeLens brings value to cargo owners, freight forwarders, rail, trucking, ports and terminals, ocean carriers, customs and other government authorities, and financial services. All parties benefit from seamless, secure sharing of real-time, actionable information, empowering the participants to streamline their supply chains and mitigate problems through predictability and exception handling.

The big bet for multi-party platforms will be decisions about what assets they own, what they orchestrate, and what they create in collaboration with others. This requires strategic choices about value levers. Although the aim is to be open, platform orchestrators may choose to own the most important control points to realize the most value possible.

Organizations need a set of "big rules," guiding principles that define the core accountabilities across the matrices that inevitably exist. These rules should be big, not exhaustive. Too many rules with too much detail choke growth. They lock organizations into one way of doing things, and a way that may quickly become out-of-date.

Every organization will need to determine its own big rules. It is imperative that the organization broadly and explicitly communicates these rules to drive alignment. A starting set for building out market-making platforms might include:

– Headquarters will set the core intent and focus of business platforms

– The market will define customer service models and channel choice

– Core back-office processes will be standardized

– IT architecture will be open.

Consumer giant P&G recently streamlined its operations in major markets to create ten product categories that drive growth through executional freedom. Category leaders have ownership and accountability all the way to the staffing levels of salespeople in the market. In smaller markets, as long as teams are executing with predefined strategies and are delivering on their financial targets, teams will have "freedom within a framework" to make real-time changes without the need for engagement with regional or global resources.[21]

Ideas such as "freedom within a framework" need to have clear definitions on two dimensions: what decisions participants are free to make on their own and what is constrained by a framework set elsewhere.[22] The exponential technologies, together with greater reliance on data-led decision-making and automation, will need to have these rules embedded in their business logic and algorithms.

In open ecosystems, participants must meet some basic standards to participate, but for the most part there are few hurdles to entry. Standards are usually maintained to preserve security, reputation, or compliance to regulations. A managed ecosystem controls which organizations can join and what ecosystems can do on the platform. Guidelines might include customer-facing pricing structures, engineering specifications, or quality controls. In general, organizations benefit by being as open as possible in order to scale and keep customers from roaming to other platforms.

Governance that establishes ecosystem participation should also take into account value distribution. This includes transparency—alignment across the ecosystem on what value is at stake and how each organization will benefit and contribute. Even though competitors on an industry platform aren't giving away what differentiates them, they often fear they might do so. This mindset makes clear consensus on value alignment a critical aspect of governance.

Because most organizations consider data their most differentiating asset, policies that explicitly guide the sharing of permissioned data—who can see it and under what conditions—are vital. Governance for AI models helps mitigate bias and uses AI in a responsible and ethical manner.

The new business platforms will also be subject to continuous improvement and learning from the feedback loops that are embedded in intelligent workflows. Exponential technologies allow organizations to extract never-before-possible operational insights that enable better, timelier decisions. For example, sensors, wearables, and robots are generating data streams for and from intelligent workflows on factory and shop floors. Virtual reality showrooms can capture data from customers' gestures, facial expressions, and vocal intonations as they interact with products they wish to buy. Digital twins, precise data replicas of intelligent workflows, are being used to troubleshoot logistics bottlenecks from afar, optimize machinery on a construction site, and monitor the safety of workers.

AI can make sense of intricate patterns of contextual data and learn from them. Every person and every thing becomes more knowable, and insights about them more actionable—not just in the abstract, but in the moment. Traditional hierarchical decision-making and information flows—up and down the organization chart— will therefore be disrupted.

As decisions that used to require a consensus from a large number of stakeholders and that used to take a lot of time go away, where and how decisions are made will radically change. This includes which decisions and parts of the workflow can be automated; which decisions depend on a human touch or broad consensus; and which decisions can be pushed out to the front lines of the organization.

As activities on workflows become automated, organizations will need to identify the escalation points for human intervention and decision making. Fears that automated, or "lights-out," workflows might run amok are allayed by both algorithmic and common-sense controls. Humans still need to periodically check that things are running as intended.

As organizations change the points along the value chain where decisions are made—often by humans and machines acting in concert—they'll create a new "meeting architecture." This requires the careful review and reconsideration of where decisions are made today, especially consensus-heavy decisions, such as sales and operations planning. Up to now, such decisions have typically required a cadence of meetings at multiple levels with multiple departments to achieve consensus.

Governance processes and meeting architectures that determine where, how, and by whom decisions are made, as well as delegated accountabilities, need to be adapted to this new world as part of a wider shift in management culture and systems.

Woodside Energy: Using AI to put knowledge at everyone's fingertips

Woodside Energy, an Australian natural gas producer, recently placed a "big bet" by investing in AI and quantum computing to help reduce operating costs and build the "plant of the future." These exponential technologies will help Woodside in areas such as operations and projects.

Woodside has been at the forefront of adopting AI in the oil and gas industry, harnessing the power of cognitive computing to extract meaningful insights from 30 years of dense and complex engineering data. Using AI technology to open the flow of knowledge has put decades of experience at the fingertips of employees across the company, helping them answer tough questions faster and enabling fact-driven decision making on complex projects.

Along with its investment in AI, Woodside is now rethinking the way its organization will innovate, accelerate, and collaborate. For example, it has adopted a Garage approach, which Woodside calls its "Accelerator." The Accelerator convenes business owners and others from the industry in a safe space to pilot innovative ideas that could drive business value. For its first Accelerator initiative focus area, Woodside selected transforming the employee onboarding experience using its AI-powered assistant (Willow) to yield a more intelligent workflow.

Adopting more efficient ways of working is just one indicator of a shift in Woodside's organizational governance and decision making—and its journey to become a Cognitive Enterprise. As a member of the MIT-IBM Watson® AI Lab and the IBM Q-Network®, it is now involved in the latest AI and quantum research.[23] This will help Woodside continue to adopt new technologies, build a new business architecture, and evolve its operating model.

Action Area

Orchestrate compelling change

We are describing wholesale change at multiple levels, from business strategy through core platform execution, intelligent workflow build-out, and massive technology enablement. This demands "change management on steroids." For many, the disciplines in this space have atrophied over the years. In any case, historic techniques are not fit-for-purpose in the environment of the Cognitive Enterprise.

The speed of change, exponential learning, complexity, and the fragmentation of solution components, together with the underpinning concepts of agile ways of working (such as squads, scrums, and sprints), raise the bar for the level of orchestration required (see sidebar, "Woodside Energy: Using AI to put knowledge at everyone's fingertips"). A world of countless sensors, bots, algorithms, microservices, and APIs—underpinned by new workflow and sub-workflow reinventions at enterprise scale—massively heightens the challenge to understand the status of change at all times. The same goes for a solid understanding of the organization's performance and its ability to predict challenges and future opportunities in real time.

Next-generation change management aligns technological change—the adoption of exponential technologies—with the organizational changes required to exploit them to full effect. And because the Cognitive Enterprise creates value by orchestrating multiple exponential technologies in concert, organizations will need to pay close attention to architectural elements such as open standards and human-centered design thinking. This combination brings users into the technology DevOps cycle, and not incidentally, also creates a cadre of change agents.

We have developed the "Control Tower" concept as a vehicle to lift the historic disciplines of "program management" and "dashboards" to a new level. This fresh approach is massively technologically enabled, and leverages automated data feeds and analytics. A control tower monitors environmental conditions in real time, increasing visibility and communications, and allows for speedy and intelligent responses. It provides alerts and tracks the moving parts of change initiatives, as well as the underlying business performance and outcomes.

It recognizes the dynamic and fast-changing nature of the transformation we are describing. As a fundamental part of the instantiation of the Cognitive Enterprise, it effectively becomes the "brain" of the company. At the apex of the control tower, senior leadership has visibility into the success of the business platform strategy and its execution, as it's being built. At the base are the fundamentals of the functioning of the next-generation IT infrastructure. In between, the performance of key workflows and Garage-enabled innovations can be constantly monitored and adjusted.

We see the control tower operating across multiple levels of the organization from overall enterprise performance to key business platforms, critical intelligent workflows, and major enabling technology platforms. It encompasses people, process, and systems activities (see Figure 4).

Control towers monitor activity in real time, sending alerts when critical junctures in a workflow get out of sync, data doesn't reach its destination, or compliance standards are breached. They can monitor apps as they move to clouds or customer calls gone awry. Decisions and their consequences are tracked and kept as part of the organization's institutional memory. Routine workflows can more safely run on their own, sending alerts when human intervention is required. Armed witha broad view of workflows and platforms across the entire organization, control towers gain a perspective that allows for organizational-scale change at speed.

Control towers bring exception management to full fruition. In situations where complexity makes it difficult to know where to intervene, control towers learn to detect even small deviations from plans and alert all necessary parties.

Control towers can zoom in on the minutiae and also reveal the big picture. They help leaders orchestrate the overall transformation program, monitor progress against performance targets, and identify areas that require more focus. (see sidebar, "OCP:A control tower enables 'pit-to-customer' workflows" on page 24).

An organization's control towers—its brain—marry the best of human intelligence with machine intelligence. Data streaming from sensors reveals context at scale. AI extracts insights from these rich data flows and shines a spotlight on areas that might otherwise go unnoticed. Experienced leaders often know intuitively which events could be critical to an organizations' success; insights from control towers lift management by intervention and long-term planning to a science.

Figure 4

The Control Tower provides new levels of insight and coordination
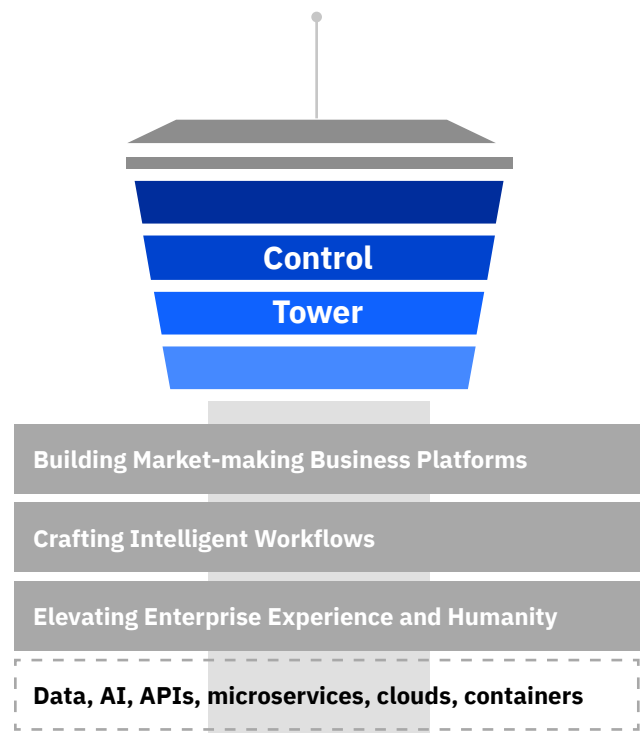
Control towers are just one aspect of the heightened level of the new change management that we expect to see. As new capability is continually fed into the organization, continuous learning becomes a prerequisite to leverage this evolving collection of capabilities.

As organizations embed AI and other exponential technologies into their control towers, their responses can become less defensive and more proactive.. For example, when DevSecOps— the integration of security into the entire DevOps lifecycle—is engineered into the control tower itself, it can efficiently monitor the performance and security of technology development. Security automation and vulnerability scanning helps detect possible exposures before they are exploited by attackers and remediate them continuously.

OCP: A control tower enables "pit-to-customer" workflows

OCP Group (OCP), in Morocco, is the worldwide phosphate production market leader with control of over 75 percent of the world's proven phosphate reserves.[24] Over the last decade, OCP has pursued a comprehensive downstream supply chain expansion strategy, which led to increased complexity. To manage this complexity, OCP created

Teal Technology Services as a joint venture with IBM to align its business with a comprehensive Industry 4.0 vision.

As a first step, OCP decided to establish a control tower at Jorf Lasfar, Morocco, the world's largest fertilizer complex. The control tower is the nerve center of OCP's operations, encompassing three functional areas: planning optimization and scheduling; real-time monitoring and supervision; and analysis and cognitive learning.

According to Ilias Elfali, OCP Executive Vice President in charge of Industrial Operations, "Control tower as a platform allows my team to react in real time to every meaningful event, act on data that is trustworthy, leverage advanced analytics and AI to grow our organization's capabilities to anticipate bottlenecks, and streamline orchestration of our key 'pit-to-customer' workflows. Our ambition through this platform is to achieve traceability of any product shipped to the customer throughout its lifecycle all the way to the raw material sourcing."[25]

The control tower gathers and consolidates relevant operations data from IoT systems, sensors, and other IT systems, creating a single "point of truth" across the enterprise. Based on this data, complex AI and data analytics models generate insights on key workflows and end-to-end processes. Deviations and associated countermeasures are recorded and scheduled into an AI engine for continuous process improvement and advanced exception management.

The control tower infuses a progressive evolution into the roles and the skills required to operate it, increasingly exposing the organization to new technologies such as AI. Due to its initial success, OCP will be scaling out this platform to all of its mining and chemical sites.

Over time, new AI technologies, drawing on machine learning, will signal the proactive changes needed to keep up with new skills requirements, reconfigure intelligent workflows, and optimize operations on the fly.

Just as AI has transformed the maintenance of machines from failure detection to failure prediction and prevention, organizations will be able to better forestall systemic failures. By tracking alerts sent from decisions with bad outcomes, bottlenecks that choked a procurement pipeline, or apps that failed to scale, for example, an organization's lessons learned can be learned by machines. Deep learning applied to an organization's failures de-risks the transformation. Applied to the operations and external events monitored on control towers, predictive and real-time situational optimization could recalibrate complex logistics.

A set of approaches that mirrors the world of DevSecOps in IT will need to be transferred into the wider business. Agile and "Garage" techniques, which have been employed to drive fast cross-functional innovation, will need to be scaled and repurposed to deal with an ever-changing business-as-usual picture. Connecting all of this to the evolution of the skills, culture, leadership, and mindset of the organization will be critical.

Action guide

Market-making Business Platforms

1. Double down on Big Bets

Decide which platforms create differentiating advantage at your core and align your organization's data, skills, and investments to rapidly scale and sustain the platform's ongoing evolution.

– Rediscover your core and expand market opportunities by tapping into new data sources and ecosystem partners to curate new offerings and experiences for customers, partners, and employees.

– Choose platform types aligned to your capabilities, including your ability to orchestrate data and also relationships across your ecosystem while remaining open to change.

– Sustain platforms by prioritizing investments and resource allocation (for current and future advantage), including joint ventures and partnership choices to build out your ecosystem over multiple years.

2. Create a new business blueprint

Embed governance in a more open and transparent business architecture to enable rules, inform decisions made at the edge, and allow for the rapid reconfiguration of organizational components to create a new operating model.

– Establish a master plan that documents the current and future states of business and IT architecture to identify investment priorities and reallocate resources, including how to enable more open ecosystem connectivity.

– Codify big rules and governance to create new value by coordinating activities and collaborating across an ecosystem that is as open as possible.

– Create a new meeting architecture for decisions and decision rights that are automated and also pushed down and to the edge of the organization, enabled by new flows of data.

3. Orchestrate compelling change

Establish control towers to monitor early warning indicators, orchestrate change in real time and develop iterative and proactive change management.

– Initiate next-generation change management that is fast, frequent and iterative and built on the need to continuously refresh data, skills and workflows.

– Establish control towers for real-time visibility and monitoring of the constant and concurrent change of the many moving parts, including AIs, apps, microservices, and automated activities.

– Engineer control towers with deep intelligence and security to proactively de-risk the overall transformation and predict next best actions and outcomes.

Chapter 2

Intelligent Workflows

Market-making Business Platforms will stand or fall on the intelligence and innovation of the workflows that underpin them. As new end-to-end process models are knitted together through the power of exponential technologies and fresh combinations of data, higher customer expectations will be met, pain points will be eradicated, and greater economic outcomes will result.

Targeting, shaping, and building these Intelligent Workflows and the skills that surround them will become the core focus of the agile teams in organizations as they realize new value and experiences.

Introduction

Intelligent workflows, augmented by AI and infused with a range of other exponential technologies (automation, blockchain, IoT, 5G, and edge computing) at scale, underpin business platforms' capacity to deliver exceptional differentiated outcomes. AI combined with blockchain can capture information at the source and then route it to ecosystem partners for action. When a customer submits an insurance claim, for example, it could trigger requests across the platform ecosystem, scheduling a repair request and other notifications, and even negotiate and issue payments.

The expectation for seamless experiences isn't confined to customers. An organization's entire ecosystem—its business partners and suppliers as well as its own employees—has come to value just-in-time optimization and proactive responses. For enterprise operations, seamless means the synchronous flow of abundant and real-time data.

Intelligent workflows enabled by AI and the IoT, for example, can detect everything happening around them, from the movement of a person or a piece of equipment, to inventory turns or downed power lines. Organizations that quickly detect changes in the environment can optimize workflows for situational awareness, including the unexpected. Trucks could balance their own loads to automated demand. Sales forecasting could drive real-time supply adjustments on the factory floor.

We see intelligent workflows leveraging data and enabling expertise, as the key focus and starting points for market-making platforms.

These intelligent workflows are driven by the needs of customers (both external and internal) and deliver enhanced business outcomes in terms of value, cost, and experience. As such, they are more expansive than processes and straddle organizations and siloes. In fact, they are born from the shattering of existing processes, and the reassembly of end-to-end workflows.

In this next generation of how organizations compete, we have seen many great examples of intelligent workflows— across the front-, middle-, and back-office:

− Cognitive Care in Banking, where, for instance, user needs are anticipated and solutions suggested

− Smart Insurance Claims in Insurance, where IoT input can validate claims, and environmental metadata can be used to quickly resolve issues (see sidebar, "Groupama Assicurazioni: Intelligent Workflows speed and improve decisions" on page 30).

− Frictionless Supply Chain Planning in the CPG industry, where stock levels are set based on upcoming events and news triggers

− Intelligent Talent Acquisition, where candidate profiles are prescreened and annotated for optimum interviewer efficacy

− Automated Procure-to-Pay, where smart blockchain contracts trigger payment based on event updates, such as movement of goods.

The unexpected power of intelligent workflows

As we work with clients on designing intelligent workflows, we see that the act of redesign is a great way to identify which data sources and architectures are most valuable to the organization. These intelligent workflows also establish a framework for proactively reskilling the workforce to perform the new higher-value activities that the future requires.

Over the past year, we have analyzed over 200 intelligent workflow implementations in customer care, operations, finance, HR, IT, and cybersecurity to better understand how AI and other exponential technologies best work together. This analysis also revealed where they have the most impact (for an example, see Figure 1).

Our analysis proved that, compared to strong traditional execution, strong execution with AI and exponential technologies typically yields three times more benefits (see Figure 2). More importantly, these intelligent workflows lead to unique, valuable, and convincing customer, process, and competitive benefits.

From this work, we have learned that state-of-the-art intelligent workflows share key characteristics:

– Increasingly, customer-facing workflows are humanized, as well as automated, end-to-end

– Adaptive operational processes and workflows continuously learn and become self-aware in context

– Platform workflows are open and able to span entire ecosystem networks.

Figure 1

Progression path for customer care in a bank

As organizations grow their capabilities, AI and other exponential technologies can materially impact the intelligence of workflows.
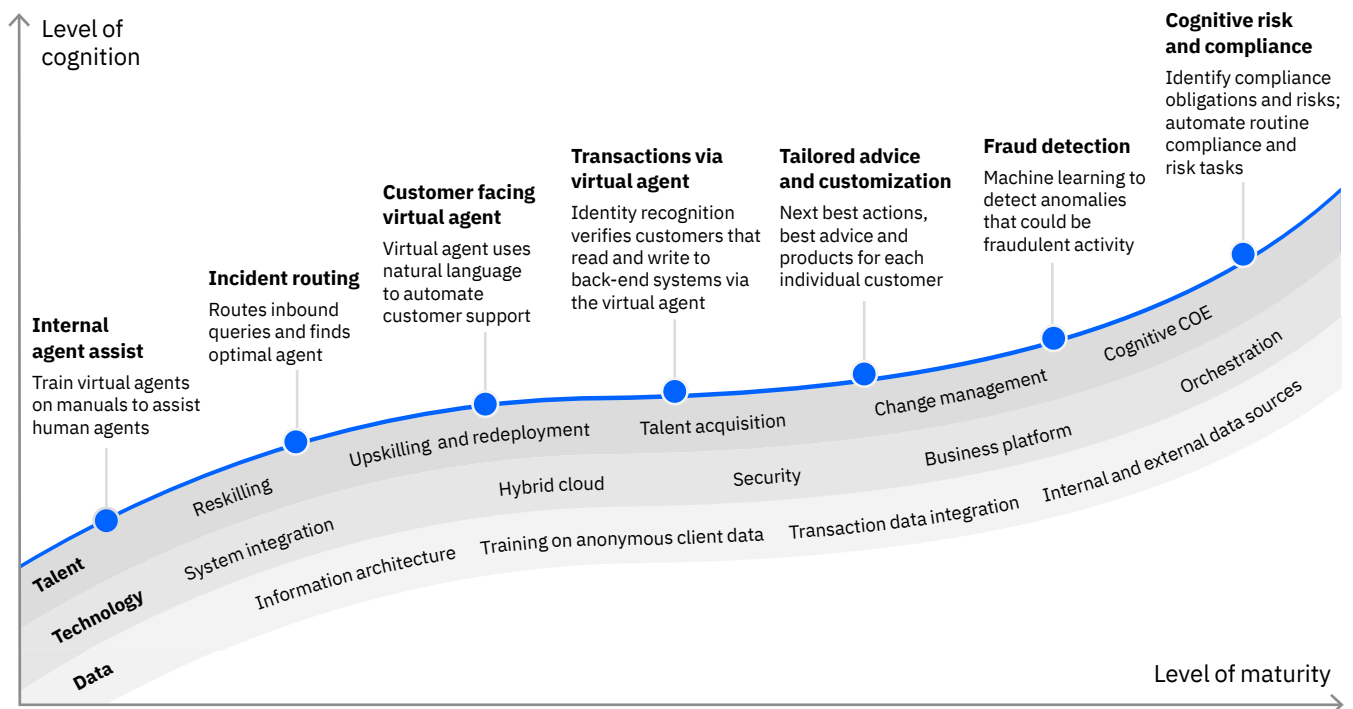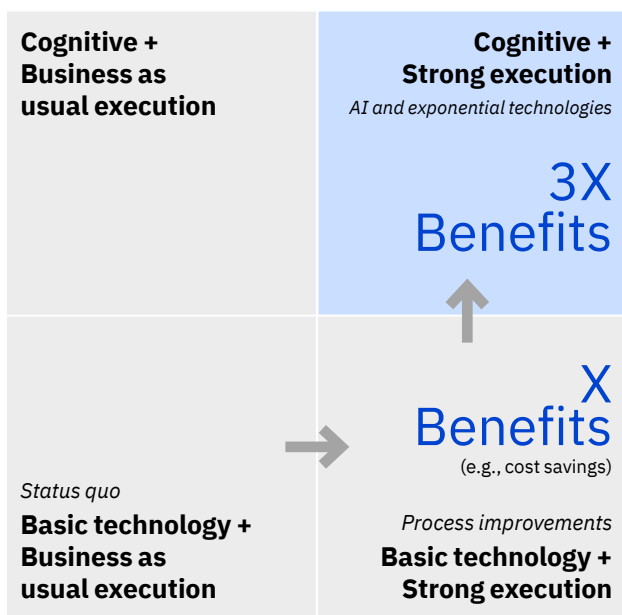

Source: IBM analysis

Figure 2

Impact of Intelligent Workflows

Our analyses of real cases demonstrate the clear benefits of implementing intelligent workflows.

Cognitive + Business as usual execution	Cognitive + Strong execution *AI and exponential technologies* 3X Benefits
Status quo Basic technology + Business as usual execution	X Benefits (e.g., cost savings) *Process improvements* Basic technology + Strong execution

Source: IBM analysis

Insight: AI in the boardroom

As corporations tap AI to transform themselves into Cognitive Enterprises, one group of leaders is finding it especially crucial to get up to speed quickly: corporate Boards of Directors.

The issue is particularly critical because AI is unlike other exponential technologies. For boards, understanding its potential is important, but understanding the technology itself, and how it works, is absolutely essential. Why?

AI differs in its nature from traditional software, which, though complex, is explainable. A set of instructions governs its outcomes. Not so with AI.

AI's greatest strength can unleash its greatest risk: it learns and, guided by algorithms, can adapt, refine, and alter its responses and decisions. It is therefore not always entirely predictable, nor easily explainable—it may not always be apparent why an AI system has reached a particular conclusion.

AI is also beholden to the data it is trained on and fed. Biased, faulty, or unreliable data will yield untoward results, potentially damaging a company's reputation.

A recent study by the IBM Institute for Business Value (IBV) reports that more than half of the 1,250 executives surveyed believe AI actually can improve their companies' ethical decisions. Yet, while 8 out of 10 directors believe the ethical questions raised by the deployment of AI are board-level issues, only 45 percent feel fully prepared to oversee them.[1]

Therefore, once boards understand how AI works, they need clarity on the best way to approach its governance, how to anticipate and assess the new types of risk it creates, and how to oversee management's definition of and adherence to AI ethical standards. For discussions with company management, boards should consider commissioning an analysis that outlines and quantifies the opportunities and threats of AI, including assessments of where, how, and why competitors are using AI.[2]

Groupama Assicurazioni: Intelligent Workflows speed and improve decisions

Groupama Assicurazioni, a leading motor insurer in Italy, has been offering telematics-enabled motor coverage since 2015.[3] To take full advantage of the benefits of the data it collected and serve its customers better, it needed to develop its own solution, based on data ownership access to analytics and AI.

First, Groupama Assicurazioni needed to establish an agile, customer-oriented and innovation-driven way of working within the company. So, its subsidiary, G-Evolution, collaborated with IBM—using the IBM Garage approach— and rapidly developed an initial telematic solution supported by Watson IoT™. The solution collects data from driving behavior and combines it on a cloud-based platform with other heterogeneous data such as weather data, traffic, and individual claims data.

By using unique AI models, this data enables digitally augmented, intelligent workflows that helps the company make faster decisions in processes, such as claims handling and emergency dispatch. As data quality improves, Groupama Assicurazioni expects such processes can be further automated.

Already now, more than 25 percent of its insured vehicle portfolio consists of connected cars, leading to more intelligent and data-driven operations. Indeed, assistance costs have been reduced by 50 percent and customer care costs by 45 percent, with a simultaneous improvement in service.[4]

Its digital journey, however, is not over. Next, the company wants to use the power of AI and the inherent benefit in its data access to transform its entire claims process, as well as introduce smart pricing options reflecting actual risk. Furthermore, the insurer is exploring how to use its capabilities to coach drivers on better, safer driving habits, making Italy's roads safer for everyone.

The world of cloud computing and related open architectures will be key to driving the flexibility, modularity and agility of the new end-to-end workflows.

The principle of openness is becoming increasingly critical to the architectures of an organization. This will allow platforms to be extended, as well as new applications and business areas to be connected to evolving processes and approaches. It will be important that the technology components that enable the intelligent workflows can be shared and moved as the wider environment is developed. The APIs, microservices, algorithms, and data sources that were once fragmented can now be orchestrated in loosely coupled architectures to derive repeatable value.

Move to the cloud

As workflows are transformed, the applications and infrastructure that enables them will be transformed too. This transformation will become the real value driver behind many organizations' moves to the cloud. The ability to leverage hybrid environments—combining on-premise, private, and public cloud capabilities—to address the specific characteristics and demands of a given workflow module will be key. As the value of wider application modernization is realized, and legacy infrastructure is decommissioned, it is important to ensure that solutions are open and portable.

We can envisage the orchestration of the hybrid multicloud environments that will result from all this activity as a key layer in the control tower, which oversees the overall transformation effort. Here, too, the principle of openness will be critical.

Intelligent workflows are the starting point for market-making platforms, and a framework for reskilling and new ways of working. For that all to happen, organizations will need to:

1. Embed exponential technologies to change ways of working

Apply exponential technologies to build highly dynamic and intelligent workflows that radically change how work gets done and new experiences are designed. Teams that span functional boundaries can work in parallel, iteratively, and with greater degrees of autonomy to unleash exceptional productivity and innovation

2. Drive value from data

Leverage curated data across intelligent workflows to mine the most important value pools. Establish robust governance to engender trust in your data and AI models so that decisions can be pushed out to the front lines of the organization

3. Deploy through hybrid multicloud

Adopt hybrid cloud to access data and put it to new use, house intelligent workflows, and modernize applications in a flexible, open, and de-risked manner. Use the journey to the hybrid cloud to bridge the divide between business and IT.

Action Area

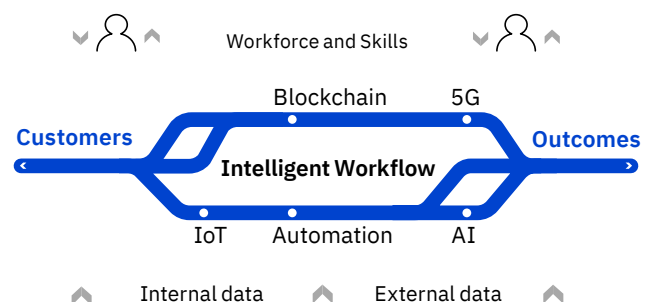# Embed exponential technologies

The key building blocks of the new market-making business platforms and the Cognitive Enterprise itself are intelligent workflows. When augmented by exponential technologies, such workflows radically change how work gets done and how new value is realized (see Figure 3).

These workflows need to be identified and prioritized based upon the business platform intent and the workflows' potential for differentiation. Intelligent workflows will be defined as widely as possible to exploit the full end-to-end and front-to-back potential of the workflow. They are bigger than traditional processes—which often have been left independent of one another, limiting their efficacy—and straddle existing functional siloes. They are driven by customer (internal or external) demands and deliver economic and experiential outcomes.

For example, a customer-care workflow in banking could integrate a front-end virtual agent to back-end activities, such as fraud detection and Know Your Customer (KYC) to resolve customer issues instantly, with substantial revenue uplift and a new customer experience.

Figure 3

Exponential technologies embed intelligence into workflows

We live in an age where exponential technologies such as AI, IoT, automation, blockchain, and 5G can be leveraged at scale and in combination to truly change the nature of workflows and deliver vastly superior effectiveness and efficiency. This means that the critical requirement is to work out how and where these technologies can have the most impact and drive the biggest returns.

Having a critical workflow in mind is a vital starting point for experimenting with multiple approaches to identify new value pools and uncover sensitive pain points. Using targeted agile approaches, such as the IBM Garage approach, organizations can experiment at pace with the application of technologies to exploit opportunities and solve issues. Tapping into different pools of expertise on the business and the technology sides of the organization—as well as into those of partner organizations—will surface new answers from best practices, reusable assets, and the latest research insights.

The value pools and pain points provide vital direction and focus to the data science tasks involved. In a world where exponential technologies depend upon the raw material of data, data availability and quality are key to the design of intelligent workflows. The difference between "hunting" for the right data to meet a workflow need and "fishing" for it in hope of finding some insight is an important distinction. Recognizing this can vastly reduce the wasted effort of collating and cleansing non-value-added data sources.

Another major facet of embedding exponential technologies is the relative impact they have on the workforces and skills that sit along the workflows (see sidebar, "IBM Human Resources: Using AI to better understand—and grow—a team's skills" on page 36). In some cases, correcting the imbalance in these aspects will, in fact, be the value pool to be exploited or bottleneck to be removed.

Organizations need to understand the effects that a combination of technologies will have on the scale and complexity of the human tasks that are not "automated." At that point, they can devise the agenda for the upskilling and reskilling that full-scale implementation requires.

To design an intelligent workflow, organizations need to view how the application of exponential technologies could change three things concurrently:

– *People:* including employees, ecosystem partners, and customers, from the perspective of the desired experience

– *Processes:* that straddle silos, are change-tolerant, and create new value

– *Data:* framed by the need to support decisions, learning, and automation.

To reimagine the employee experience, for example, organizations might consider how more agile teams could work in parallel; employees could make more decisions on their own; or mundane tasks could be automated, freeing up employees for higher-value activities. To reconceive processes, the first step is to envision how processes could be linked and extended from outcome to starting point. For example, procurement processes that span activities from source to pay will link to functions from finance to operations or sales activities that link tasks from lead to cash to include supply chain and finance functions.

The objective isn't just to connect processes end to end, but to infuse processes and activities with intelligence. To do so, organizations determine which insights are needed to provide more prescriptive guidance for decisions. They design for data that feeds situational awareness and enhances predictive capabilities. And they establish feedback loops to enable a two-way flow of learning among humans and machines.

Intelligent workflows are different in kind than processes. Processes function like the backbone of the organization; intelligent workflows function more like its nervous system. They are a highly sophisticated sense and respond system, extracting information from the environment, determining the appropriate response, and sending signals and feedback to the right people and other workflows at the right time (see sidebar, "Insight: From processes to Intelligent Workflows" on page 35).

What happens when these technologies combine to generate contextualized and hyper-localized data, for example? When ecosystems can share data on blockchains while maintaining control over proprietary data, what new market-making platforms might result? Questions like these drive the ongoing design of newly dynamic intelligent workflows.

When an insurance company has the capability to curate and analyze unstructured data, for example, it could allow customers to submit a photo of damage to their home from a storm instead of filling out a lengthy form and waiting for an inspector to show up. That's new value for the customer, but also for the organization. Agents freed from the need for in-person inspections can be redeployed to higher-value tasks or new roles. One insurer has taken it a step further. Its customers don't have to even take and submit a photo. After a severe weather situation, the insurer is sending drones to assess its customers' rooftops. The

drone, supported by advanced AI capabilities, can determine the difference between damage to shingles caused by hail versus birds or normal wear and tear.

All of this activity to design and assess new workflows for greater impact results in the creation of an intelligent workflow blueprint (see Figure 4). This is essential for the move from indiscriminate experimentation with exponential technologies to a more focused and sustained investment in game-changing capabilities. The beauty of blueprints is that they open up new vistas, ways to see and then build out new value from intelligent workflows.

The blueprint acts as a business case, defines prioritization, and is used as a planning tool to go after the opportunities in a particular workflow. It can be used to sequence the building blocks of value, and the "modules" of intelligent workflow build-out so that they are open, extensible, scalable, and portable.

Figure 4

An Intelligent Workflow blueprint
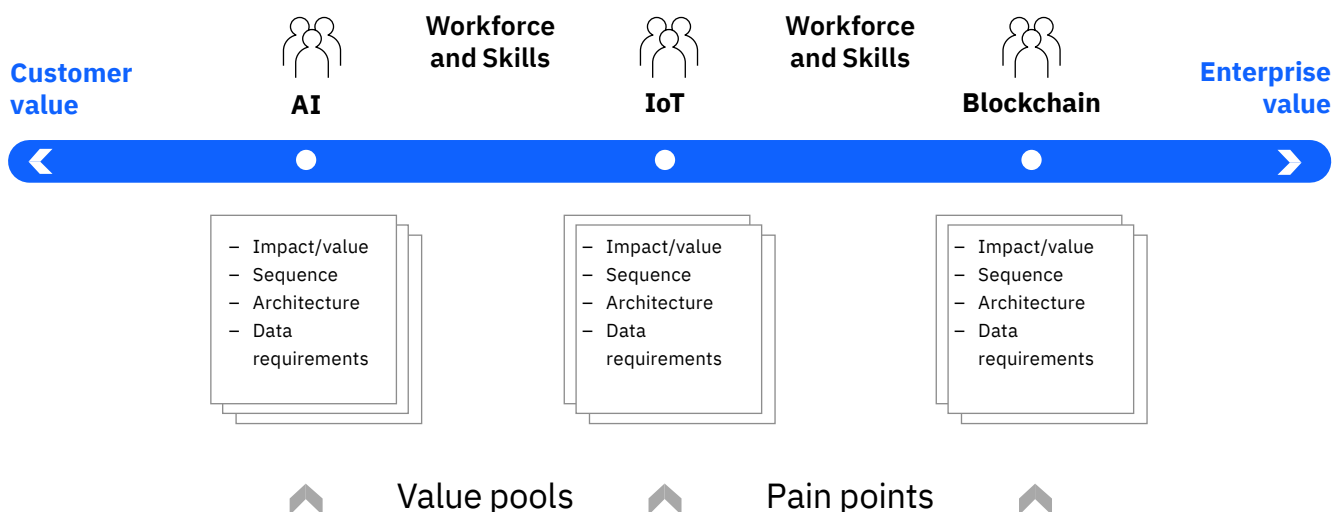
Medtronic: Building talent by building a better employee experience

Medtronic, headquartered in the Republic of Ireland, is the world's largest medical device company. It is engaging in a comprehensive cognitive transformation project to prepare for future challenges. The HR organization was one of the first functional areas to engage in the cognitive transformation.

To tackle some of the world's most challenging diseases, you must have and empower the right talent. So, Medtronic decided to use the IBM Garage approach to assemble the right people, technology, and data to transform its employee experience.

The HR Garage introduced agile and lean startup approaches, as well as enterprise design thinking, to introduce new ways of working within the HR organization. This new, innovation-driven culture enabled Medtronic HR to start recreating its service offering with a strong focus on the value it generated for end-users.

Within just 90 days, Medtronic was able to identify 17 HR use cases, conduct two AI-enabled proofs of concept, and develop an MVP. A key objective of the initial use cases was to assist managers with HR tasks and free up time. The first MVP consisted of a chatbot to help employees find answers to common HR-related questions. The chatbot guided managers through simple HR problems, such as employee transfers, and made it easier to engage with HR.

Medtronic's cognitive HR transformation now covers more than 17 areas of innovation, with an expected multimillion-dollar payback. Medtronic also expects it to improve customer satisfaction and help with employee retention.

Importantly, these "building blocks of value"—people, technology and data—have introduced new innovation competencies into Medtronic's HR function. So, it is now expanding the competencies across other functions and moving from employee experience-led design within HR to human experience-led design across its organization.[5]

By putting in place the right "packages" of technology, people, and data as intelligent workflows, organizations can create new building blocks of value, which are then developed and deployed by teams in agile sprints (see sidebar, "Medtronic: Building talent by building a better employee experience").

Then, the building blocks can be deployed to a wide variety of environments and on the cloud without modification. The business cases for next-generation enterprise applications, such as SAP S/4HANA, Salesforce, and Workday will be enhanced by intelligent workflow thinking, which adds color, differentiation, and higher value to the core process functionality of these software solutions.

Approached as modular workflows, options multiply to balance cost with investments and reconfigure intelligent workflows for differentiation. Organizations can standardize some activities for cost take-out and efficiency, or choose to consume those activities as a service. They can also choose to differentiate these more standardized workflows by layering innovative and proprietary modular workflows across them.

A more standardized order to fulfillment workflow, for example, could be differentiated by a modular workflow that solves a classic "last-mile" challenge such as order expediting. With AI applied to customer and logistics data on a blockchain, IoT sensors monitoring all kinds of environmental conditions, and mobile apps sending up-to-date information to truck drivers—all connected across an intelligent workflow—delivery windows could be measured in minutes or orders routed in the moment to wherever the customer wants.

Finding the right combination of technologies to apply will be key. Understanding where the value pools lie along the intelligent workflow is just as critical. The first question should be: where does the value lie today and where could we create new sources of value in the future? The answer shouldn't be confined to the value realized by the end-user or customer, but the value that could be created by all of the employees, partners, suppliers, and systems that participate in different parts of the workflow. A growing library of exponential technology benchmarks can help identify how these technologies, applied at scale, can drive business value in terms of productivity, flexibility and service (see Figure 5).

Insight: From processes to Intelligent Workflows

Given the inherent relationship between processes and workflows, understanding the distinction between the two is key to realizing their symbiotic value.

Processes consist of organizational tasks and activities, typically within a function, such as accounts payable within the finance function or lead management within sales. Traditionally, these processes have been siloed and left independent of one another, limiting their efficacy, while also leaving improvement opportunities untapped.

Workflows, by contrast, encompass related processes and often cross both process and functional siloes. They align with external or internal customer needs and enable clear, measurable, and improved outcomes from visibility into all related processes. Exponential technologies are applied in an integrated manner to the processes that sit along a workflow and data is shared across all processes.

Intelligent workflows connect the front of the organization to the back, create more effective end-to-end experiences, and learn from data, then improve themselves based on feedback. They are important for the experiential and economic value they create, but also for the opportunity to facilitate flexibility and de-risk an organization.

An organization's approach to building out intelligent workflows is often sequential, starting with technologies applied to a single process and culminating in a multi-process, multi-functional intelligent workflows.

1. Technology-enabled process improvements

For example, an organization might begin by applying AI to a single process such as accounts payable to automate invoices, identify anomalies, and provide next-best actions to quickly resolve open issues.

2. Multi-process or single function intelligent workflows

By linking the accounts payable process to requisitioning, purchasing, and receiving processes, the organization can create a low-touch procure-to-pay workflow. This enables an end-to-end data flow, creating an opportunity for teams to leverage strategic analyses to find new opportunities and mitigate risks.

3. Multi-function or business platform-centric intelligent workflows

Ultimately, a procure-to-pay workflow can extend to create a source-to-pay workflow by linking processes across multiple business functions. Organizations can identify bottlenecks and spot bundling opportunities. Pricing negotiations can be linked with contracts and downstream service-level agreements. Compliance with the organization's sustainability standards can be assured, differentiating the brand in the eyes of customers.

Figure 5

Intelligent Workflow stages

Stages as organizations move from singular processes to end-to-end intelligent workflows.

	1 →	**2** →	**3**
	Technology-enabled process improvements	**Multi-process or single function intelligent workflows**	**Multifunction or business platform intelligent workflows**
	Individual process within a single function, not connected throughout organization	Set of interconnected processes spanning one horizontal or industry specific function	Set of end to end processes spanning front to back, across horizontal or industry specific functions
Examples: Customer workflows	– Target prospecting – Sales cycle management – Loyalty program	– Customer acquisition – Customer engagement – Customer retention	**Examples**: Multifunctional intelligent workflows – Integrated customer care – Lead to cash – Source to pay – Plan to fulfillment – Integrated business planning – Strategic planning and supply chain optimization – Talent planning and management
Examples: Supply chain workflows	– Supply chain design – Strategic sourcing – Inbound processing	– Supply chain planning – Supply chain warehousing – Transportation process	
Examples: Finance workflows	– Accounts receivable – Budgeting/forecasting – Expense management	– Order-to-cash – Financial planning and analysis – Record to analyze	

IBM Human Resources: Using AI to better understand— and grow—a team's skills

The rapid evolution of technologies means half of what we learn will become obsolete or forgotten in five years.[5] And over the next three years, as many as 120 million workers in the world's 12 largest economies may need to be retrained or reskilled as a result of AI and intelligent automation—a set of interesting challenges for any Human Resources (HR) function.[7]

The IBM HR function concluded that, to meet these challenges, it needed to put skills at the center of the employee journey so employees could thrive in a culture of continuous learning. To do this, the function is using exponential technologies to create more intelligent workflows.

Understanding the skills the company has was a critical first step. Skills inference technology powered by AI now ingests over 230 million documents and 22 data sources (at 85 percent accuracy) and is fully transparent to employees. In fact, inference learns from employee feedback.

AI-enabled skills inference also fuels personalized learning recommendations via the IBM Your Learning platform, which is used by 98 percent of IBMers every quarter. Employees can easily find personalized learning as well as job recommendations based on their skills and access the most popular material based on their peers' experiences. They can also register for targeted learning channels, and explore the skills and badges aligned to IBM's in-demand roles.

Aggregate employee information also helps HR and business leaders see progress toward closing skill gaps in a business unit so it can respond to emerging needs. Understanding clearly each employee's skills enables IBM to reward employees appropriately for acquired critical skills. Each manager receives personalized pay recommendations based on an accurate understanding of the skills of the team, in addition to pay competitiveness, performance, and potential.

To compete for and cultivate talent, IBM is using AI to make its employee journey more engaging and differentiated. Over the past four years, this has led to an 18 percent increase in engagement and USD 100 million net benefit per year from advanced analytics and AI solutions.

Action Area

Drive value from data

Data is the raw material of the Cognitive Enterprise. It helps define the Market-making Business Platform focus and enables the mission-critical intelligent workflows. The data that lies within the four walls of the enterprise is a valuable source of differentiation. This is especially true when combined with targeted external or partner data sources that can have a dramatic impact on business models and value.

Incumbents already steeped in data from decades of operations are taking advantage of newly available external data sources to exploit new value pools. They're combining internal and external data to create hyper- localized data to do things like individualize pricing, optimize crop yields, and forecast on the fly. They're pulling data from cars on the road, oil rigs at sea, and refrigerators at home to anticipate what their customers need in the moment and employees should do next.

Data, held close and kept proprietary, has long been the incumbent's advantage. As new business models on platforms emerge, data shared across platforms is one of the surest ways to create the network effects and winner-take-most status these platforms can confer.

Unlike most assets, data is non-rivalrous, meaning the same piece of data can be utilized by any number of organizations to produce value. Moreover, the value generated by data grows exponentially when one dataset is combined with another. This is pulling organizations in opposing directions—between maintaining the proprietary advantage of their data versus sharing it widely across organizations.

Most organizations have yet to resolve this tension. Just 37 percent of more than 13,000 executives participating in the Global C-suite Study are acquiring and sharing data extensively with network partners. Not surprisingly, the leading organizations are more apt to do so, but even that number—56 percent—is relatively low, given the leaders' intentions for new business models and platforms.[8]
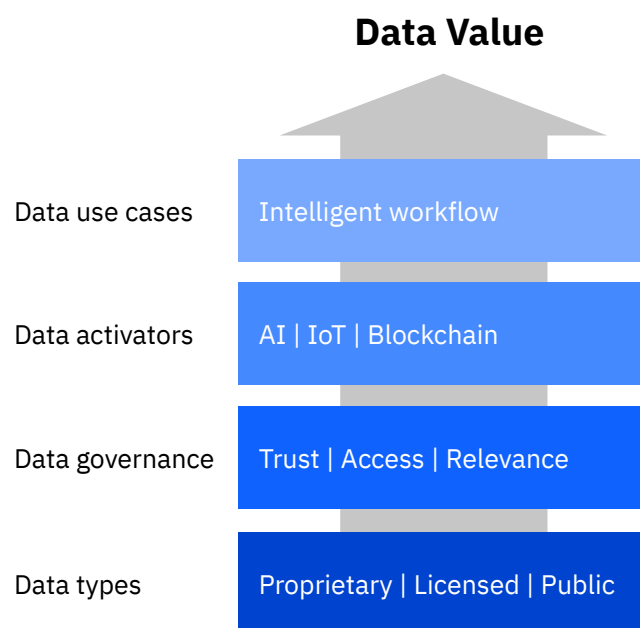
What's holding so many back? In the words of a US telecommunications CIO, companies are just beginning to learn how to "thrive through transparency while maintaining a strategic advantage."[9]

Not all data, however, is created equal—nor is it of equal value. Having the right data for the right purpose is critical. There is a clear reciprocal relationship, therefore, between the choices made in terms of Market-making Business Platforms and intelligent workflows, and the data needed to bring them to life. This relationship helps target the data focus, as well as surface opportunities to exploit the data at hand. Organizations need an information architecture to underpin their business and workflow architectures.

Data readiness is a pre-condition for value—and readiness includes attributes like accuracy, cleanliness, standards, openness, and permission. These are hard things to certify across all of the data in an organization and even harder given the proliferation in quantity and granularity of available data. While tools such as AI can help organizations see patterns and the forest from the trees, it remains important to know where to focus vital data curation efforts. It's estimated that 80 percent of the effort in deploying AI is getting data ready for use (see Figure 6).[10]

Figure 6

The value of exponential technologies rests on the accessibility and quality of the underlying data

Data Value

Data use cases	Intelligent workflow
Data activators	AI | IoT | Blockchain
Data governance	Trust | Access | Relevance
Data types	Proprietary | Licensed | Public

A key attribute of the Cognitive Enterprise is creating a culture of data trust. Recent research we have completed has highlighted that organizations that have truly learned to trust their data drive better business outcomes.[11] Clearly, when important processes, decisions, and customer and stakeholder interactions rely on automation and algorithms, the requirement for trust is heightened. We see a growing focus, therefore, on finding and reducing as much bias as possible from data sources, algorithms, and human decision-making in order to move ahead with these technologies at scale.

The sheer complexity of identifying and eliminating each piece of potentially biased data makes the process an excellent candidate for automation. New capabilities such as DataOps can automate the preparatory work required for quality assurance, freeing up data scientists to spend time on data models and information architecture. Moreover, organizations are learning to train the models themselves to recognize and automatically suppress biased data.

Trust, in all its forms, has become inextricably entwined with data. Today, customers are less willing to hand over personal or private information to organizations, yet they expect every enterprise to divulge detailed information about their offerings and brands. In other words, customers are asking for more privacy while demanding more transparency from you.

The use of externally accessed data— especially data from customers—is under scrutiny, as many business platform and intelligent workflow improvement ideas rely on such data. Our research shows that the principles of transparency, reciprocity (that is, receiving value back for data that is shared), and accountability are essential in the creation of the new business platform business models.

Customers' purchase decisions depend on data transparency, detailed product information about how products are manufactured and under what conditions, reviews from users and influencers, accreditations from third parties, and more. This demand for transparency extends across intelligent workflows. Partners in a supply chain rely on transparently shared data to eliminate blind spots and bottlenecks, as well as advanced capabilities such as just-in-time replenishment.

The transparency conferred on blockchains helps organizations prove their credentials. On blockchain networks, organizations can document the brand promise in detail. For example, a blockchain-based business platform that traces the provenance of coffee—supporting its sustainability claims as it moves from farm to factory to corner store—has trust built into its fabric.

If transparency must be proved, reciprocity must be earned (see sidebar: "Discovery Holdings: Giving people the data they need to be healthy" on page 39). Simply put, to secure access to personal data, organizations will have to give their customers something meaningful in return. The challenge? They often don't know what their customers would consider a fair exchange. According to one recent consumer survey, the promise of personalization alone may not be enough to make them share their data.

The third principle, accountability, is synonymous with brand integrity. This covers a commitment to data security and respect for data privacy, assurances that personal data is used in a fair manner and kept safe. Consumers choose brand trust as one of the most important factors to guide their purchase decisions. According to the 2019 Edelman Trust Barometer, 81 percent of consumers say they "must be able to trust the brand to do what is right."[12]

In our Global C-suite Study, 82 percent of leading organizations—those that excel at extracting value from data—have a singular focus on how they use and safeguard data to strengthen customer trust.[13] Organizations that abuse the trust of stakeholders in their use of data will increasingly risk coming under regulatory scrutiny. Ultimately, they could even lose their "license to operate."

Openness, a key principle of the Cognitive Enterprise, also applies to data strategy. Many business platform and intelligent workflow opportunities will derive greater benefits from sharing data with ecosystem partners than in keeping it for their own use. This sharing can enhance the value of incumbents' data and have a multiplier effect. As a source of value, however, organizations need to exercise care to prevent control points in a value chain from inadvertently being ceded. In addition, data sourced from others must match the quality and trust levels of their internal sources.

Discovery Holdings: Giving people the data they need to be healthy

Trust and data form the twin strands of Discovery Holdings' corporate DNA. The South African financial services firm started in 1992 with what was then a completely novel idea: provide health insurance that makes people healthier. Customers who sign up with its Vitality program agree to let Discovery track everything from their physical activity to their nutrition. In return, the company rewards those who make positive lifestyle changes. The more points they earn, the more perks they get and the lower the premiums they pay.

Discovery mines members' personal data for behavioral insights, which it uses to promote healthier choices. It also collaborates with other organizations to offer incentives. Under one such agreement with Apple and US insurer John Hancock (a division of Manulife), Vitality members can buy heavily discounted Apple Watches. They pay a modest upfront fee and, if they work out often enough each month, they pay nothing more.

"So Apple sells more watches, and we obtain more data [from the health and fitness apps on the watches]," Derek Wilcocks, Discovery's CIO, explains. That's the demand side of the company's business model. On the supply side, Discovery operates a joint venture with Australian fintech Quantium, using machine learning to extract clinical insights from blinded data and enable healthcare providers to make more informed decisions.

Discovery's approach rests on treating its customers with complete probity. "We collect highly sensitive data. In South Africa, for example, we have about 65,000 members on antiretroviral treatments for HIV. That's not something people would want to get out," Derek Wilcocks notes. "So, we've established a strong ethical foundation for the way we collect and use data. We go to great lengths to protect our customers' confidentiality. Trust is at the heart of what we do."[14]

Action Area

Deploy through hybrid multicloud

Cognitive Enterprises, with their business platforms and intelligent workflows, will be fundamentally enabled by hybrid multicloud applications and infrastructure. At heart, these new business models are what the cloud is for. This differs from the purely technology architecture-based thinking that we see in some organizations hellbent on "going to the cloud."

Hybrid cloud architectures straddle the worlds of on-premise systems (such as mainframes), private clouds, and public clouds. Organizations can access data from multiple disparate platforms and run applications across them, aligned under common policy requirements for security, regulatory compliance, and governance.

Hybrid clouds are where legacy systems accelerate the journey to modernization, achieve scale, and extend across an enterprise through APIs and software-as-a- service. As they do, data becomes seamlessly available, AI can achieve scale, and workflows can become more intelligent.
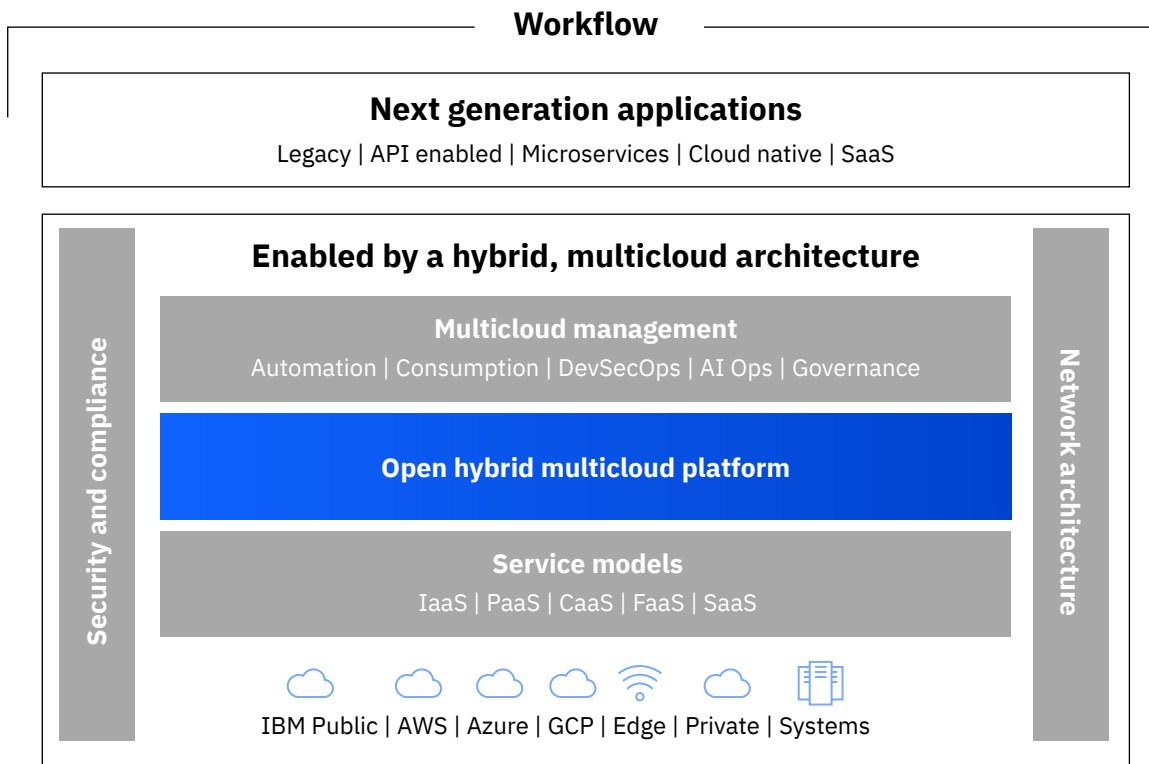
Legacy and new applications need to be evaluated on a case-by-case basis on where they should be housed— on-premise, private, or public cloud environments. As they make choices, organizations need to take architectural standards into consideration.

Many organizations already have multiple environments in play as individual components of their legacy are renewed (see Figure 7). To date, this has often happened in a relatively piecemeal and limited way.

On average, most organizations have at least five clouds that are needed for particular applications. And if they don't have a hybrid multicloud environment, that's a challenge.

Figure 7

Dynamic orchestration with hybrid multicloud drives flexibility and speed

Workflow

Next generation applications
Legacy | API enabled | Microservices | Cloud native | SaaS

Enabled by a hybrid, multicloud architecture

Security and compliance

Multicloud management
Automation | Consumption | DevSecOps | AI Ops | Governance

Open hybrid multicloud platform

Service models
IaaS | PaaS | CaaS | FaaS | SaaS

Network architecture

IBM Public | AWS | Azure | GCP | Edge | Private | Systems

Without a hybrid multicloud environemnt, the more clouds they add, the harder it becomes to operate at the required speed of change. As they add a new service, reengineer a process, or take on a new business partner, instead of a seamless move to a cloud, they hit a brick wall. Sending data, workloads, and apps from one cloud to another creates an operational complexity that defies the ability of their teams to manage, let alone optimize. Instead of eliminating data siloes, multiple cloud environments may create new ones. Moreover, intelligent workflows could be stalled at the gate.

Hybrid clouds augment, amplify and can even embed exponential technologies. This enables organizations to access IoT data and devices just about anywhere, and extend AI virtually everywhere. With edge computing, organizations can move cloud capabilities to where the data is, rather than the other way around.

As intelligent workflows capabilities are designed and delivered in modules, cloud-centric approaches will enable the frequent and seamless "release" of new value.

The enablement of intelligent workflows at scale is the primary driver to a more wholesale architectural change. Intelligent workflows won't just span the enterprise, front to back, but their ecosystems end-to-end. As this occurs, their clouds will have to be interoperable with the clouds of other organizations. A hybrid strategy, by our estimates, adds up to 2.5 times more value than a public-cloud-only strategy.[15] That value runs the gamut from migrating more applications to removing duplicative processes, enhancing cyber security, and reducing regulatory risks.

Intelligent workflows will have an assortment of underpinning enterprise applications, varying implementations of embedded exponential technologies, and evolving data architecture needs. Each of these has the potential to be enabled by different components of a hybrid cloud environment. Applying a fit-for-purpose cloud architecture that meets workflow technology demands defines mission-critical enterprise change.

Business platforms will evolve their scope to include new partners, and intelligent workflows will extend platform reach. As such, the principles of openness and flexibility are vital in the enabling application and infrastructure architectures. Open source solutions and container technologies (such as Red Hat OpenShift) will allow for the ongoing connectivity of future modules of capability and new ecosystem components. What's more, architectural choices can be de-risked through "build once, deploy anywhere" approaches.

Microservices allow applications to be broken down into single-use services—such as inventory, shipping and accounting for an online retailer—so that teams can work on them in parallel. Containers bundle those microservices in such a way that they are portable. They can be easily automated and deployed to any cloud without modification. This enables the organization to move its applications and data as its ecosystem evolves and extend microservices with ease to participants on its market-making platforms.

To retain optimum flexibility in a hybrid cloud environment, organizations should implement an orchestration layer to sit over the clouds as part of its control tower. With an orchestration layer, organizations can monitor status in real time, make visible the connections that have already been made, and make decisions about where the cloud environment needs to be optimized, scaled, or made more open.

One of the biggest impediments to the creation of Cognitive Enterprises is legacy systems and their complexity. Hybrid cloud architectures can release the value of trapped data and functionality, along with handling the transition between old and new applications. Part of the solution will be the creation of abstraction layers that can help to insulate the reinvented workflows from the "spaghetti code" of the past. Inevitably, however, organizations are moving into a world where the wholesale rewriting of selected core systems will be necessary to enable intelligent workflows.

As all companies become technology companies, the concept of enabling IT and the role of the IT department is changing. At a very basic level, IT and the business are coming together through more agile and extended teaming models, while new centers of excellence supporting evolving exponential technologies are arising inside and outside of IT groups.

As technology and business become synonymous, the barriers between the governance of IT and the governance of business will become blurred. IT governance will need to become more sensitive to business issues such as data privacy and AI ethics, not to mention even more tightly aligned with business strategy. And the business function will need to be more open to and aware of technology considerations like cybersecurity and architectural standards.

The business platform and intelligent workflow framework can be helpful in organizing these new alignments and in establishing more fit-for-purpose governance models. We already see new coalitions of the C-suite coming together to drive these initiatives. However, as both "enabling IT" and "technology as the business" merge, whole new constructs will need to be invented, led from the top of the organization.

Action guide

Intelligent Workflows

1. Embed exponential technologies to change ways of working

Apply exponential technologies to build highly dynamic and intelligent workflows that radically change how work gets done and pull value levers to create significant new outcomes, both economic and experiential.

– Identify differentiating workflows for intelligent redesign, to connect processes end to end, straddle siloes and infuse data and skills to unleash exceptional productivity and innovation.

– Apply exponential technologies and realign skills to capture new value pools by mapping skills, assets, and technologies across workflows to determine priorities for automation, standardization, and differentiation.

– Deliver scalable and flexible workflows in "building blocks" composed of people, processes, and data so that you can build out rapidly and keep upstream and downstream components in sync.

2. Drive value from data

Leverage curated data across intelligent workflows to mine the most important value pools. Establish robust governance to engender trust in your data and AI models so that decisions can be pushed out to the front lines of the organization.

– Create new paths to value from data by understanding what data should be more widely shared—with permission—to ecosystem partners to accrue new value and create future advantage.

– Make the right data available to support decisions by implementing an information architecture that automates data readiness and tools that make data accessible to everyone.

– Establish robust enterprise-wide data and AI governance and ethics to mitigate bias, engender trust in AI-derived insights and answers, and use AI responsibly and ethically.

3. Deploy through hybrid multicloud

Adopt hybrid cloud to access data and put it to new use, house intelligent workflows and modernize applications in a flexible, open and de-risked manner. Use the journey to the hybrid cloud to bridge the divide between business and IT.

– Design for dynamic orchestration with hybrid clouds to operate at the speed of change, eliminate data siloes that could gate intelligent workflows and house the exponential technologies that differentiate them.

– Modernize legacy and deploy new applications with open and agile principles including microservices and containers that port applications to any cloud environment.

– Use the journey to the cloud as an opportunity for reinvention of intelligent workflows, with business and IT working in tandem to innovate while they shift work to the cloud.

Chapter 3

Enterprise Experience and Humanity

With so much change underway, organizations are redoubling their efforts to stay focused on what matters—understanding and responding to the whole human being, whether that person is their customer, employee, or ecosystem partner.

As exponential technologies become pervasive, the next great opportunity becomes the opportunity to elevate the work and skills of employees, to meet their aspirations and values, along with those of your customers and partners. This new enterprise experience has the potential to infuse fresh purpose into every endeavor.

Introduction

Organizations that have learned to delight and engage customers by curating rich customer experiences now recognize the need to do so as well for the experiences of their employees, their business partners, or ecosystem, all linked in one continuum. We think of this as the enterprise experience.

This raises the bar for expectations around the personal touch, human relationships, creativity, and empathy—qualities that allow companies to stand out.

Humans and AI at work

The interplay between people and AI, also known as augmented intelligence, resets organizations' expectations for what they can do. Bots, once relegated to online self-service customers, are now becoming trusted advisors to employees. They can help humans better interpret customer needs anywhere so more empathetic decisions are made on the front lines and in the moment, whether for a salesperson on a shop floor, a customer service rep in a call center, or a procurement specialist (see sidebar, "Crédit Mutuel: AI helping smarter agents make happier customers" on page 45).

Augmented reality and touchscreens are transforming storefronts. Virtual and augmented reality apps are creating immersive environments to build and maintain airplane engines, monitor agricultural fields from afar, and meet with customers in virtual showrooms.

Counterintuitively, the astute use of AI can deepen insights into what makes us human, as well as humanize the experience. Tone analyzers, for example, can read emails and tweets to determine if the writer is angry, frustrated, or thrilled. Sentiment analysis, alongside traditional demographics, can improve the prediction accuracy for consumer preferences.

A human-technology partnership requires trust. For humans to "partner"—instead of merely interact—with technology, hard experience design factors, such as the user interface (UI), tools and environments, will need to be married with soft factors such as empathy, behavior, story-telling, and radical collaboration.

For leaders, elevating the human-technology partnership requires first that they get to know—deeply—the exponential technologies available to their organizations. Then they will need to learn how to deploy those technologies to foster new experiences along the value chain.

In our Global C-suite study, the leaders stood apart from all others in their focus on AI to make sense of data in context and light up new paths forward. Seventy-two percent were planning large investments in AI or machine learning in the next few years.[1]

These AI-supported organizations turned decisions into iterative innovation and intelligent workflows. They're at the forefront of delivering customer experiences that are not just personalized but humanized, building trust through never-before-possible services.

Smart leadership skills

The Cognitive Enterprise is all about doing things differently, and this will require a different kind of leadership. That leadership will need to be more than simply tech-savvy: a deep and real understanding of the power that exponential technologies have to transform markets and to create new business models is vital.

The requirement for change has two components: leaders and teams. Leaders will need to implement a set of design principles that help lower the center of gravity, empowering smaller multidisciplinary teams to get to client-valued outcomes more quickly. When customer-facing teams span the full functions of the organization, including operations, they can be fully responsive to customers. But experience shows that change won't happen if an organization's leaders aren't able to let go. Leaders will need to empower cross-functional teams to make decisions that can enhance customer intimacy, keep a project on track, or remove a logjam with dispatch.

In every organization, the biggest change underway will be to its skills—not just periodic technology skill gaps—but the wholesale and frequent change of all types of skills across its entire workforce. This means leaders must own the skills agenda and continuously assess precisely where new skills are needed, and how best to help employees acquire those skills. Effective training programs and self-service learning systems are part of the equation. Learning by doing is equally important. To nudge employees along an experiential learning path, leaders will have to pay close attention to the composition of the teams they create, incorporating practices like project rotation, stretch assignments, and peer-to-peer coaching, while also exploring new areas such as virtual-reality based simulations and gamification.

The new learning organization

A deliberative skills agenda includes skills gap analysis, as well as a review of the programs for hiring, training, and managing talent. This should occur frequently as a joint exercise among functions—not just as an HR endeavor. New AI tools and systems now make this level of analysis possible.

Using data from an organization's HR systems, its social and collaborative spaces, and other sources, AI can infer which skills are available with significant granularity. As a result, organizations are developing talent frameworks in which they curate skills profiles based on their specific requirements, as well as industry standards. If they have access to deep data sets, both internal and external, organizations can even associate specific skills and competencies with outcomes and predict which skills will be important in the future.

An essential component of the new learning paradigm is the recognition that learning should be both continuous and deeply personalized. Employees expect experiences at work that are contextualized to the moment. These enterprises embed learning into every aspect of workflow so that employees can learn continuously and in the manner that suits them best .

Crédit Mutuel: AI helping smarter agents make happier customers

Crédit Mutuel, one of France's leading banks, has over 5,000 branches that receive more than 350,000 online inquiries a day—and volume is growing 23 percent a year.[2] Last year, Crédit Mutuel announced a digital reinvention, partnering with IBM, to better serve 12 million customers.

To consolidate its position as number one in customer relations for the banking sector in France, it continued to reinvent the role of client advisor by empowering them with AI to free up time. The bank set a bold strategy to infuse AI across all lines of business, positioning itself as the benchmark for relational banking in a digital world.

Crédit Mutuel launched several AI projects, including an email analyzer to manage high email volumes and a virtual assistant to decrease customer advisor response time. Customer advisors handle 1,000 customers across 400 product lines. The cognitive email solution analyzes 6 million emails per month and detects customer intent with more than 80 percent accuracy, enabling advisors to execute up to 1.5 million subsequent actions. Due to this, the bank reassigns 200,000 working days annually toward training, upgrading advisors' skills, and expanding sales activities. The pilots validated that AI technology could empower 20,000 employees across 5,000 branches, strengthening the human-technology relationship.

Nicolas Thery, chairman at Crédit Mutuel stated, "As a mutual bank with a strong local presence all over the country, we continue to invest in our branches to help advisors deliver more personal relationships with our clients. AI is a perfect working partner to assist our professionals, augment their service quality and help them bring more value to clients."[3]

Crédit Mutuel also established a cognitive factory that provides a fertile environment for identifying, building, and deploying new AI solutions. With many internal IT teams involved, IBM and Crédit Mutuel are creating industrial tools and training assets to efficiently expand cognitive solutions to 100 percent of the business lines of the company. Crédit Mutuel has now successfully launched 15 cognitive assistants across various lines of business, including a virtual assistant able to provide 15,000 different answers in nine business domains, from Savings and Credit to Insurance. This allows client advisors to find the right answers to most customer questions three times faster than previously and with much higher precision.

As the Cognitive Enterprise begins to adopt augmented and virtual reality to improve the customer experience, it can—and should—apply them to create more immersive learning environments for the workforce as well. This is particularly important in industries that rely on physical interactions, such as healthcare and manufacturing, and also appeals across generational divides.

In the Cognitive Enterprise, business platforms and intelligent works are constantly evolving to create new value for customers—and do so by helping to enable new ways of working. Agile teaming, empowerment, and deep collaboration are foundational. Leaders that hold themselves accountable for formulating and executing a dynamic skills agenda are the spark.

The Garage approach

The Garage approach involves the creation of cross-organizational spaces where cross-functional teams come together with strategic partners, such as IBM, and other ecosystem players and startups to co-create, co-execute, and co-operate the new business platforms. As such, garages become the physical instantiation of the change, a place where teams innovate, learn by doing, and build skills and confidence in the application of new technologies.

Garage environments can jumpstart innovation by putting technology options into the context of customer journeys, critical workflows, pain points, and value potential. They allow for early testing of ideas against customer and employee feedback, avoiding wasted activity.

Design thinking, agile and DevOps approaches move concepts quickly from ideation into day-to-day operation. Scrums, squads, and sprints can break up the build process into manageable, valuable building blocks. In the Garage, new business platforms can be developed at greater pace and lower risk, enabling benefits from continuous learning.

Creating a new enterprise experience, therefore, requires organizations to seamlessly interweave AI and other new technologies with the people who will use and benefit from them, while also cultivating a culture of continuous learning, adapting and applying what's learned. To do this effectively, organizations will need to:

1. Elevate human-technology partnerships

Embed the enterprise experience everywhere, which includes understanding how the organization's purpose: shapes the customer, employee, and ecosystem partner experience; ensures a continuum between them; and establishes the human-centered design that is the foundation of innovation

2. Cultivate smart leadership, skills, and culture

Develop leaders with a combination of business and technology acumen and the capacity for open engagement beyond traditional industry networks, who are accountable for creating a continuous learning and skills culture and proactively managing the redeployment of skills along intelligent workflows

3. Perform with purposeful agility

Drive purposeful agility that optimizes the flow of value and time to market, infuses structure to avoid agile chaos even as the organization lets go, and unfreezes the organization to move fast as it reinvents its core.

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Action Area

Elevate human-technology partnerships

The Cognitive Enterprise, with its smart business platforms and intelligent workflows, is massively technology enabled. But for all the value created by technology, it is apparent that the most successful organizations will be the ones that are able to fuse the power of technology with enhanced human performance and an enterprise experience (see Figure 1).

Expertise is a critical driver of the market-making business platforms that organizations choose for competitive advantage.

Figure 1

The human-technology partnership will "up the human game"

For this, incumbents can leverage their deep legacy expertise while also multiplying and adapting that expertise to make new markets. Workflows already encompass large numbers of skilled people—who are infused with an organization's culture and ever-evolving workforces of different scales and competencies. As exponential technologies are applied to create intelligent workflows, roles and jobs will change, but also much of this capability will be critical to the next instantiation of an organization's end-to-end and front-to-back processes.

Automation will take over repetitive tasks. AI will undertake instant analysis. IoT and 5G will allow organizations to gather information remotely. Blockchain will alleviate administrative burdens and the need to manually check processes.

A well-designed employee experience engenders trust with customers and with each other. Employees can be empowered with cognitive assistants and other mobile apps in handling customer interactions on the spot. Sales teams armed with next-best-action dashboards could instantly reconfigure options and terms during negotiations. Airline stewards could delight customers by being empowered to offer upgrades, waive a fee, or rebook a connecting flight at no charge.

The combination of human and artificial intelligence may be the world's most important feedback loop. AI can provide humans the answers they need to do their jobs, freeing up their time to apply creativity and pursue higher-value tasks. And the experiences humans have gained over a lifetime can train AI to deliver eye-popping results (see sidebar, "Lloyds Banking Group: Better customer journeys via human-centered design" on page 48).

Social workers are burdened by paperwork, often spending as little as 20 percent of their day on human interactions. Cognitive technologies can relieve that burden and also help them create personalized interventions for people at risk. Aspiranet, which serves families in California, has turned to AI applied to help youth make the difficult transition from foster home care to living on their own by providing personalized advice ranging from safe housing to employment and educational opportunities.[4]
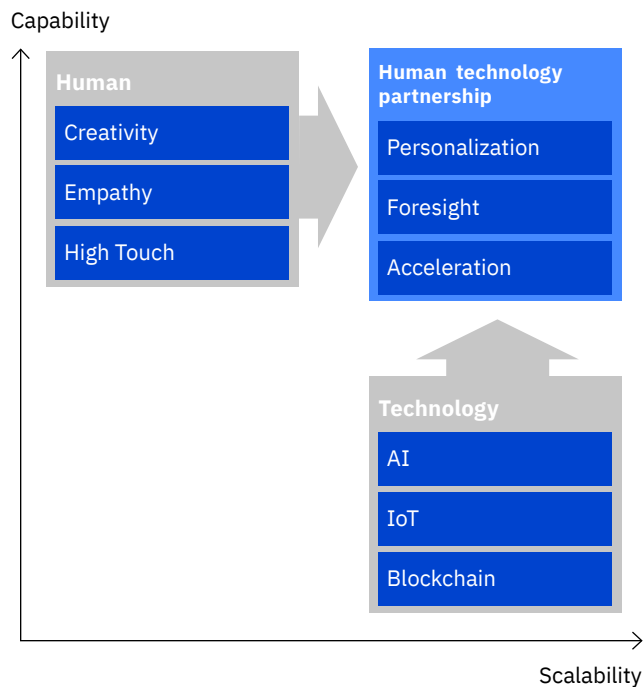
Lloyds Banking Group: Better customer journeys via human-centered design

In the world of banking, customers demand timely, personalized, and digitally enabled banking interactions. However, like most traditional banks, Lloyds Banking Group in the United Kingdom has to manage this digital demand across complex legacy architectures spanning multiple systems. To realize its "best bank for customers" vision, Lloyds needed to align around its North Star— "Transform the group for success in a digital world."[5]

Since 2014, Lloyds has exponentially increased its investment in digital banking. As a result, it has ranked as the top mobile banking app in the UK for the past three years. Lloyds aligned its strategic priorities to develop new sources of competitive advantage, including data-driven customer experience.[6]

It has taken a human-centered design approach by transforming 50 different customer journeys such as financial planning and retirement and 15 different enterprise journeys across central functions. By placing the customer at the heart of these propositions through the lifecycle, Lloyds is much better placed to align to its strategic vision of "best bank for customers."[7] In parallel, and to underpin the transformation, its IT infrastructure modernization focused on selectively upgrading core systems, standing up a hybrid cloud, and transitioning to more SaaS-based software.

In the latest strategic review cycle, it is focusing on better tailoring the experiences it provides to its segments of customers with lower market share and creating personalized propositions through enhanced data capabilities. The latest strategic review cycle will complete at the end of 2020, further establishing Lloyds as a digital banking leader.

Through its latest strategy, Lloyds is driving the use of virtual assistants to serve its clients, managing up to 5,000 conversations daily, increasing customer satisfaction by 10 percent and the containment rate to 25 percent. Lloyds has migrated more than 400 of its applications to the private cloud ahead of schedule and aims to complete the migration of 100 percent by end of 2020.

All of this will change the roles and activities in organizations. New platforms and workflows will surface new spaces for insight, create new areas for humans to add value, and continue to require empathy, relationships, and other soft skills to differentiate them.

The concept of enterprise experience is rising just as quickly as the evolution of the "hard"—or technological—components of the Cognitive Enterprise. Customer experiences remain a fundamental driver of change. (see Figure 2 on page 50). They are increasingly linked to the experiences of the employees who serve customers.

Whole enterprises are realizing that the way stakeholders experience the enterprise every day is at the heart of what we traditionally call values and behaviors. Also, in a world of ecosystems and networks, organizations see the need for this consistency of experience to extend beyond enterprise boundaries.

Experience in the Cognitive Enterprise will be delivered by humans and technology in partnership. As humans adopt better tools, they will "up their game;" as the technology becomes even more intuitive, they will increase their adoption of it. New technology solutions and their application to platforms and workflows will set a higher and higher bar for professionals who work with them, driving upskilling and reskilling. In turn, people will demand ever better design and functionality from their tools.

A call-center design, for example, could deploy AI to detect the tone of its callers and route calls to those best suited for the situation. The system could infuse a personal touch by asking callers whether they would like to talk to the last agent who handled their call, or, if they were dissatisfied, make sure that the caller isn't connected to that same agent.

At Club Med, AI-enabled systems can alert employees in call centers about the context of a call—what website pages customers were looking at, for example—as well as offer detailed histories of customer behavior. The company is now introducing a system that uses machine learning to analyze everything from customers' emails to the level of satisfaction they express in consumer surveys. In the next round, it will be able to personalize its interactions with every customer on every incoming call.[8]

Design thinking, experiential learning, co-creational models that incorporate agile feedback loops, and continuous learning and improvement will all need to become embedded in the Cognitive Enterprise. These will drive the ongoing evolution of business platforms and intelligent workflows. Human-centered design approaches—that engage wide bodies of stakeholders to understand and evolve needs and expectations—will become the default for such transformations.

The IBM Garage approach is designed to help embed enterprise experience. With a Garage approach, an organization creates entrepreneurial teams outside its normal operations. The teams are able to unleash innovation by co-creating with talent across disciplines and ecosystems and apply the principles of design thinking and agile to rapidly develop MVPs and test them for scale.

Kraft Heinz was able to accelerate innovation across the company to fulfill its founder's observation that "quality is to a product what character is to a man."[9,10] At the Garage, their teams co-created a state-of-the-art algorithm that measures real-time product information, predicts sales, and distribution alternatives. By embedding these insights into intelligent workflows, they are able to connect technologies and teams, ensuring that its product development, supply chain, and sales teams are now in sync. This new enterprise experience facilitates the kinds of collaboration needed to rapidly prototype and deploy new products, all based on live store data (see sidebar, "Generali: Humanizing the customer experience with AI").

An organization's purpose and intent will also be important drivers of the human-technology partnership in the Cognitive Enterprise. A strong sense of the organization's purpose, researchers recognize, is closely tied to employees' motivation to learn, take on new tasks, and acquire new skills. As such, organizational purpose isn't just a magnet for talent, it directly impacts employee eagerness to learn. It shapes the organizations' culture in profound ways.

Generali: Humanizing the customer experience with AI

Generali, one of the largest insurance companies in the world, is using AI to transform its business model and provide better customer and employee experiences as it becomes a Cognitive Enterprise. As part of its ambitious Excellence 2022 strategic plan, Generali France aims to transform insurance distribution through the "digitization of the agent-customer relationship." The plan promises to scale up automation and AI in core operations.[11]

AI has been a central strategic focus for Generali over the past two years and the insurance provider is bringing it to life by piloting various technologies. Generali partnered with IBM to set up an AI Factory in Paris to design, develop, and scale AI solutions. The AI Factory allows Generali to create innovative human-technology partnerships through collaboration with an ecosystem of partners including startups, platforms such as Microsoft and Google, and other existing solutions in the market.

Using human-centered design, Generali began to develop three virtual assistants for its employees and customers including Leo, an intelligent conversational agent that interacts with customers and prospects to help with questions, transactions, and generating new leads. Leo answers 300 queries daily with 75 percent accuracy. Letizia is another AI-powered conversational agent that works behind the scenes to help agents quote policy rates and register policy sales within the conversation. Over the course of the first year, Letizia has conducted more than 10,000 conversations.

Another solution created within the AI Factory helps sales consultants sell home insurance policies by converting voice calls to text, understanding the intent of the call and automatically delivering house insurance certifications without human intervention 60 percent of the time. A recent focus of the factory includes combining robotic process automation with AI technology to create more automated and powerful solutions.

Generali is looking to embed AI and other exponential technologies into its processes beyond customer service to create intelligent workflows, bringing it one step closer to becoming a Cognitive Enterprise.

In a recent IBV study, respondents almost unanimously agreed that the organizations' brand vision impacted the behaviors and decisions of their executives. But the numbers fall precipitously further down the ranks—to 58 percent of the leading organizations and 25 percent of all other organizations for non-managerial professionals; and 47 percent and 17 percent for support staff.

Too many employees— often those on the front lines—do not always have the data, tools, training, or authority to apply the brand vision to their day-to-day activities. And if leaders, don't communicate their vision effectively, these employees may be only dimly aware of it.

"Purpose," says Professor Dan Cable at the London School of Business, "is meant to elicit an emotional reaction. It is meant to be felt. You can't just talk about purpose." In other words, lofty speeches don't do the trick.[12]
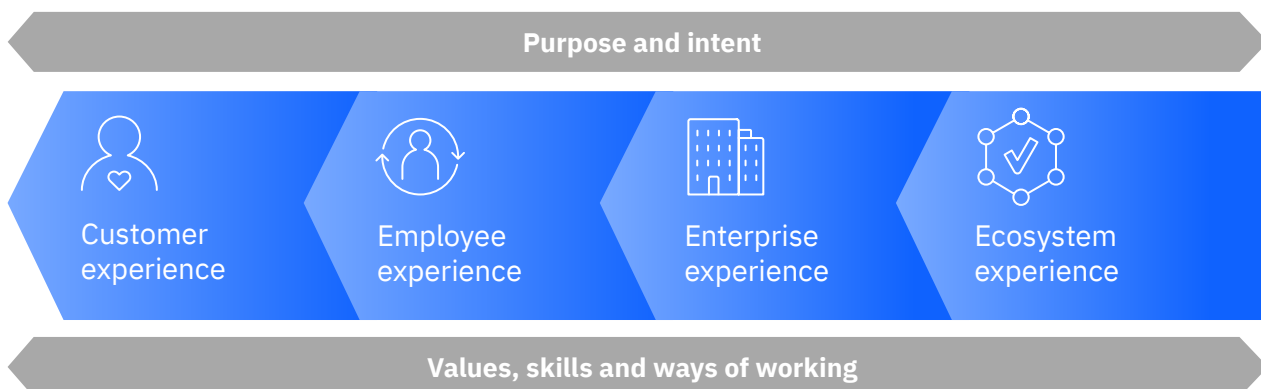
Leaders at Manulife, a multinational financial services company headquartered in Toronto, have taken the storytelling approach. "Culture is created by stories.

When we listen over and over, there's a comfort and reaffirmation of the values we believe in, the things we're afraid of, and what we feel protects us," says Francesco Lagutaine, Manulife's Chief Marketing and Experience Design Officer. But, he observes, "There is a tendency for organizations to say, 'Once we've said it, it's done.' But culture is built by constant reaffirmation. This is one of my key lessons learned: Never stop reminding people why we're doing what we're doing and recognizing their part in it."[13]

The ethical application of technology to do good and the transparency of an organization's positive impact on a wide range of stakeholders are becoming more and more important. Issues such as sustainability, inclusion, and trust demand attention. How people align behind the technology potential of the new models and approaches will be as important as, if not more important than, the technology's robustness.

Figure 2

Customer experience: built upon underlying experiences, defined by purpose, and driven by values

Purpose and intent

Customer experience

Employee experience

Enterprise experience

Ecosystem experience

Values, skills and ways of working

Ethics in AI

Critical areas of judgment—especially decisions that directly impact others' lives and well-being—are governed by standards of appropriate action. But the ethical parameters around AI remain undefined and vague, in some instances pushed aside as impediments to progress.

In a late 2018 study based on a survey of 1,250 C-level executives, IBM's Institute for Business Value found that more than half of the executives surveyed believe AI actually could improve their companies' ethical decisions. A majority also say AI could be harnessed as a force for societal good, not just for good business. And nearly all of the respondents currently adopting AI are formally considering ethics as part of their AI initiatives.

But first, the right ethical framework has to be in place.

While most major technology firms have issued their own guidelines, some have explicitly endorsed those from the European Commission's High-Level Expert Group. These guidelines define a human-centric "trustworthy" AI approach built around seven requirements.

Even if guidelines vary across regions and professions, the design principles from the European Commission's approach can serve as a best practice: a) an independent group with multidisciplinary, multi-stakeholder representation, b) an agreed declaration of human rights relevant to the mandate, and c) a stated direction toward concrete executional recommendations.

Our survey findings also suggest the need for more corporate education about and engagement with AI ethics issues. The World Economic Forum's AI Board Toolkit, developed through collaboration with various public and private partners including IBM, is a start in this direction.

Yet corporate education, professional standards, and effective regulation are not enough. There are significant questions about the tradeoffs between individual privacy and business value, regulation and innovation, and transparency and competitive advantage. Those tradeoffs deserve to be debated in a thoughtful, civilized, and collaborative manner.

What's at stake may be no less crucial than a wholesale rethinking of the social contract.

Action Area

Cultivate smart leadership, skills, and culture

Leading in the world of the Cognitive Enterprise is very different, in terms of the demands it places both on leaders' skills and approach to leadership. As more companies become technology companies and exponential technologies scale to open up more strategic opportunities—as well as threats—all business leaders will need to move beyond being merely tech-savvy.

If leaders are going to bet their business on new massively technology-enabled business platforms, then they need to understand the range of technologies involved, along with their likely future potential and development path. This involves deeper awareness of an extended ecosystem of fast-evolving concepts and solutions, and the ability to apply that knowledge both offensively to seize opportunity and defensively to manage disruption.

That's a completely different level of insight and understanding of technology than most leaders have today. It requires continual exposure to new technologies and ongoing learning (see sidebar, "CEMEX: A Digital Academy for the next generation of disruptors" on page 52).

As they build out new business platforms, all organizations are going to be transformed by technology; every company becomes, in effect, a technology company. There's no escape. On business platforms, the digital component of every offering is the part that's growing and creating the financial and experiential outcomes leaders count on. Technologies are (often) an organization's best bet to scale growth.

CEMEX: A Digital Academy for the next generation of disruptors

CEMEX, based in Mexico, is one of the world's leading heavy building materials providers. Over the past three years it has invested in an enterprise transformation to better compete and differentiate its proposition for its B2B customers and ecosystem partners.

It recognizes that this transformation must begin with its leaders. So the evolution of its business platform focuses on developing smart leadership, while still fostering a broader culture of innovation in collaboration with employees, ecosystem partners (including startups), academia, and established technology leaders. According to CHRO Alberto de Armas, "We realized that a traditional approach to change management would not work for an ambitious platform transformation agenda, customer-facing workflows, and a global footprint."

Starting with its top 80 executives, CEMEX pioneered a robust development program and learning environment to introduce its leaders to new concepts and skills, including business model innovation and emerging technologies. This program launched new digital approaches under the campaign "Being Digital", and today drives practical changes in how CEMEX is organized and the new skills it cultivates in product management, experience design, data science, and engineering.

In addition, CEMEX established a Digital Academy to systematically increase adoption of emerging skills needed across the enterprise. The Digital Academy used a new digital learning and development platform, CEMEX University, to provide a common corporate vocabulary, assets, and delivery channel. CEMEX University not only exposes talent to new skills and ideas, but also convenes talented people from across functional silos to experiment and learn together. The platform combines in-person learning moments with other learning experiences, such as the launch of the Monterrey Digital Hub, an innovation ecosystem connecting CEMEX with entrepreneurs.

These platforms are also providing CEMEX's talent the opportunity to help steer corporate strategy in an era of rapid transformation. In 2019, CEMEX expanded the platform with "Digital Foundations Program" an effort targeting senior leaders, managers, and the front-line to learn how to grow, lead, and work effectively. This next leg of its journey will scale a multidisciplinary foundation to encourage rapid ideation, problem solving, and value capture for CEMEX's growth strategy across geographies, customer segments, and products.[14]

Smart leaders will need to ask and then periodically ask again how could new exponential technologies—often working in concert—change my value proposition? In this respect, incumbents will need to think more like born-on-the-platform startups and digital giants.

The highly successful restaurant chain Sweetgreen, for example, was well on its way to a highly anticipated IPO, when its founders hit the pause button. Sweetgreen was known for its commitment to sustainable and healthy food supported by a transparent supply chain that fostered close relationships with local farmers. The chain had already established a strong sense of community among its farmers and customers when its founders decided they could do something more.[15]

They declared their decision to become a tech company, with big ambitions "to fix the entire restaurant industry and improve the health of the world."[16] To do so, they would evolve to a food platform. That meant many things, all made possible by new technologies. They would pursue many possibilities, from reconceiving their restaurants to be more like Apple stores to personalizing their recipes right down to the level of an individual's microbiome and letting chefs from other restaurants take advantage of their supply and delivery chain. As a self-declared tech company, their purpose both anchored and elevated their ambition.

As smart leaders in every industry are learning, they have to combine technology content with business acumen and empathy to develop a clear point of view about their organizations' strategic direction. Only then can they direct where major investments are needed.

Pundits call this "the pivot to tech." It has become somewhat of a trope for CEOs to say that their company has to become a technology company, when in fact many are a long way from realizing that intent. And, for some, it may not even be the right goal.

There is a difference between embracing the power of exponential technologies to shape new business platforms and intelligent workflows and really operating as a fully-fledged technology player, with the attendant economics and business models. Tech companies derive value—and their market valuations—from very unique platform economics and only a few truly survive to dominate their markets. For most companies, there is a middle ground where technology is substantively more embedded, but the value is still derived from what the company considers its core activities.

As business platforms straddle industry boundaries, leaders will need to look outside traditional industry networks to seek insights, build relationships in diverse sectors, and learn new ways to monetize ideas. This includes participating in the worlds of technology organizations and start-ups and finding ways to incubate fresh co-creational environments in the organization.

Courage, purpose, and clarity of intent continue to be the hallmarks of leadership. But as the nature of big bets stretches away from traditional areas and into new territory, the ability to set a North Star and communicate unambiguously about the organization's intent and the journey underway is more critical than ever. It is vital for leaders to set guide bars for the wider organization and reinforce prioritization of platform and workflow choices.

Alongside clarity and frameworks, however, organizations need to "let go" more as the innovation around platforms and workflows moves to the edge of the organization. This is where empowered and agile teams can come together to exploit data, find ways to apply technology, and innovate key experiences.

It is also important to recognize that new coalitions of leaders will need to be brought together across the executive team to make substantive progress in these new areas. Functional leads, CIOs, Chief Digital Officers, Chief Transformation Officers, and the line need to be synchronized with the platform and workflow transformation intent—including appropriate shared metrics and incentives.

For example, reconfiguring the meeting architecture in a CPG company's Sales & Operations Planning (S&OP) processes—a complex interplay of many related functions integrating to drive profitable sales—must be based on an agreed-upon set of design principles from the heads of global category/brand marketing, global and geo-level sales, manufacturing, distribution, IT, Finance, and even HR. Macro-level questions might include:

– Who owns the P&L? What tangible role do "shadow P&Ls" play? When and where are costs of goods sold and operating costs allocated?

– What is the role of the country general manager? What new or discontinued accountability does he or she have?

– Who adjusts brand- and country-level sales targets based on a dynamic promotion environment?

– What tolerance level is acceptable for demand and supply forecast (in)accuracy? Who takes responsibility for mismatches, and how does that occur?

Only then can a meeting architecture be cascaded to (cross-functional and cross-geo) management to design the more specific decision rights and handoffs that correspond to these guiding principles. Done poorly or in a sequenced, waterfall manner, reimagining this type of workflow could result in demand creation without supply, costly inventory build-up, and lower customer satisfaction. Yet, a successful outcome includes a lower process and organizational burden from the recurring cadence of meetings and pre-meetings, as well as a more accurate and timely matching of stimulated demand with dynamic supply.

Culture change is complex in the Cognitive Enterprise and needs to be accelerated in a way that takes traditional approaches off the table. Exposing the wider organization to the ideas and potential of new technologies and ideas is part of the answer. So is encouraging learning by doing.

Ultimately, though, culture change requires a more proactive skills agenda. And as more and more employees gain confidence in understanding and applying new technologies, they become change advocates. In turn, upskilling and reskilling at scale becomes critical.

As new business platforms are built and intelligent workflows are developed, the need for the workforce skills transformation will become more evident. Companies can get ahead of the curve by making deliberate moves to support affected populations. More than 120 million workers in the world's 12 largest economies may need to be retrained/reskilled in the next three years as a result of intelligent workflows and AI-enabled automation. In the past, the skills shortage has been most acutely felt at the technology side. Recently, things have begun to shift. In 2018, so-called soft skills dominated the top four competencies global executives seek. The soft skills in demand involve critical thinking and problem solving as well as collaboration and communication—all skills that rise in demand as AI and automation free up employees to pursue higher-value tasks.[17]

Employees with high IQ and EQ must now also have AQ—their Adaptability Quotient. This measures their ability to adapt and thrive in a fast-changing environment. Our research demonstrates that at this point in time, the skills gap in adaptability has reached a critical stage. To thrive in the era of the Cognitive Enterprise, leaders need to create the culture and environment where employees embrace change, can learn fast, and learn as they go.

As organizations redesign intelligent workflows, it changes what skills are needed and where those new skills should be aggregated. It's thus even more important that the skills agenda is deliberative, not an ad-hoc exercise but a system of governance.

AI can do much of the heavy lifting. For example, organizations are applying AI-based real-time skills inference to determine which skills will grow in demand in their organizations and which will decline. By making the process transparent and sharing that information with their employees, they encourage the workforce to avail themselves of new opportunities to learn. With greater frequency, AI is also being used to personalize learning systems inside the organization, including new initiatives for experiential learning.

A US healthcare organization led the industry in the adoption of a platform-based Talent Acquisition intelligent workflow that uses AI, automation, and data to drive a new agile operating model. It delivers an integrated and targeted experience for candidates and hiring managers, increasing hiring manage Net Promoter Score by 40 points and reducing candidate touch points by 66 percent (based on IBM client engagement).

It is almost as if every company needs to apply the "practice" disciplines of a professional services company on their pools of expertise. These disciplines enable the ability to accelerate the growth of certain bodies of skills, upskill target populations, and over time, sunset capabilities that are less in demand. We have learned that employees are more concerned about clear plans with deliberate, proactive actions to address the impact of these technologies, than they are with the technologies' potential consequences.

The lifecycle of many skills and their relevance is diminishing all the time. The Cognitive Enterprise needs to create a continuous learning culture and set of approaches: a culture that values the propensity to learn and embraces soft skills (such as collaboration) more than specific technical or business capabilities. As part of a wider push to enhance the employee experience, it is becoming more common to leverage AI and other tools to help direct and support continuous learning across the human resource lifecycle, and empowering employees to act (see Figure 3).

Figure 3

An empowered workforce is driven by inspired leadership and a culture of continuous learning

Action Area

Perform with purposeful agility

The structures that once supported a business and its people are fast becoming obsolete. Integration that was once vertical is becoming horizontal. Cultures that were once hierarchical are flattening. As market-making business platforms and intelligent workflows take root, they are hastening changes like these, crossing what were once natural organizational boundaries, and even stepping outside them. As such, the enterprise will require new coalitions of skills and capabilities from its people.

The world is embracing the concept of "agile," and most organizations are somewhere on the journey to create agile squads and embrace sprints, scrums, and standups. This has been valuable in opening up organizational siloes, breaking down barriers, unfreezing organizations, and spurring bottom-up innovation. The challenge with many of these activities, however, has often been identifying a clear outcome or impact. In some cases, "agile chaos" has resulted.

Agile ways of working can have huge value, but they need to be made more purposeful for greater effectiveness and efficiency. Transformation is taking place deep down in organizations. It involves massively different combinations of exponential technologies and people, including ecosystem partners, coming together in squads and scrums or ways that are otherwise more agile. They are composing transformational business platforms and intelligent workflows in bite-size pieces, quickly creating and then assembling these building blocks of value. If that work is not purposeful, there are too many way teams can get trapped in the purgatory of pilots or find that they have gone down a dead end.

To drive speed, work needs to be broken down into smaller releases of value and innovation. Iterative design relies on continuous feedback and learning (see sidebar: "Orange Spain: Teaming with customers to build better tools").

Orange Spain: Teaming with customers to build better tools

Orange Spain, a mobile network operator headquartered near Madrid, wanted to use cognitive solutions to redefine the way it interacted with and supported clients. The company aimed for an agile transformation of its customer service management function to increase customer satisfaction.

First, Orange developed a cognitive virtual assistant called Djingo. The first iteration of Djingo was able to refer clients to relevant online FAQs. By deploying its MVP to a select group of customers, the team was able to learn quickly, and gather new insights and ideas for improvement. Next, the team used agile methods to continuously enhance the tool with new and more complex functionality.

Today, Djingo can address complex customer queries with customized answers, and is even available via smart speakers and WhatsApp. At the same time, it grew in both functionality and reach: within a year Djingo is expected to process 7 million conversations.

When Djingo needs human support, it refers the customer to a human service agent and provides the agent with necessary contextual data. The virtual assistant has significantly increased agent productivity compared to agents without its support, improving customer satisfaction while lowering costs to serve.

Djingo, however, is only one piece of Orange's new customer service transformation. Orange is also building a cognitive assistant for call center agents and in-store sales reps to provide faster contextual data on customer requests, real-time answers, and alerts. By adapting an agile way of working, Orange developed cognitive solutions more quickly, learn from real customer interactions and scale to transform its entire customer service management.

Additionally, by using AI to automate the analysis of more than 60,000 text documents in Orange's customer management system, Orange has reduced time-consuming administrative tasks and kept its talent focused on what really matters: its customers.[18]

If diversity helps teams generate breakthrough ideas, empowerment turns those ideas into outcomes. A team bogged down in meetings, constantly trying to win stakeholder agreement for every little operational decision, may not get anywhere and certainly won't move fast. In contrast, empowered teams have the agency to make everyday operational decisions on their own. They're equipped with the expertise and authority to deliver outcomes without relying on others for leadership or technical support. By pushing operational decisions down to the lowest level, teams deliver value at the pace of change.

The leader's role in purposeful agility is to describe outcomes with clarity, not how the teams do it. They tell teams where to go, not how to get there, empowering them to explore breakthrough ideas without losing sight of the goal. To help teams act in line with the organization's intent, progress toward the goal must be measurable.

Leaders clearly define and align desired outcomes across teams. They design for transparency so that they can see work in progress. With radical transparency, it's much harder to "game the system." Performance, decisions and results are visible daily through activities like standups and playbacks. They can be fed back to other parts of the organization to encourage learning and key an eye on overall performance and outcomes.

It's then up to leaders to stop measuring success by counting the number of agile teams but by raising the visibility of successful, measurable outcomes and the teams that develop them.

The Cognitive Enterprise framework, with its focus on business platforms and intelligent workflows, provides a clear context and delivers the guide bars within which all this innovation can take place and scale.

By pulling teams together from inside and outside the organization and aligning them to the core platform or workflow intent, organizations help reduce the risk of Brownian motion and concentrate the energy of these groups around clearer outcomes.

Figure 4:

Purposeful agility drives orchestrated teams through clearly defined outcomes
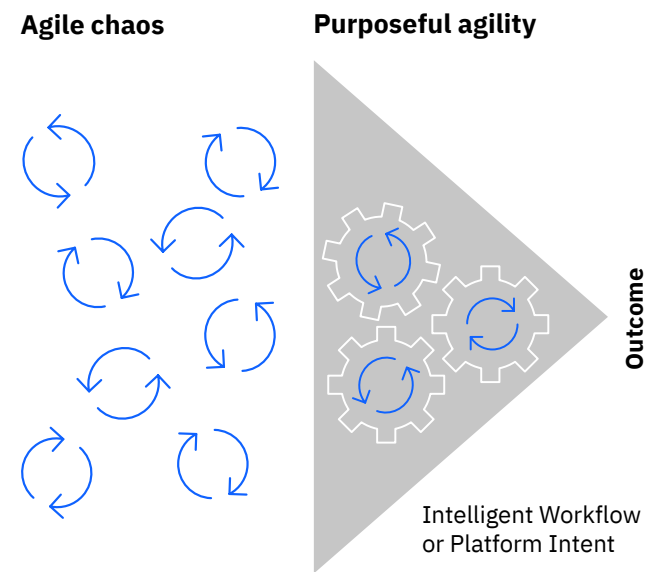
Purposeful agility lines up agile teams along workflows. If an organization has tribes, then have a tribe for each workflow or parts of it; have them think about how they are going to transform that particular workflow. By doing this, organizations bring that natural structure and purpose to what people are trying to do and they can build on each other more easily.

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As team sprints put in place the building blocks of the platforms or deliver modules of workflow enhancement, it is possible to direct the backlog of innovation ideas in a way that optimizes both returns and strategic alignment.

The Cognitive Enterprise therefore provides "grown-up" governance for agile activities. It can more readily connect those activities to major capital allocation and business case decision-making while still driving near-term progress and value.

In addition, this approach—purposeful agility—helps define the business architecture and other underpinning architectural choices. This means that if an idea that has been incubated is deemed "ready for prime time," then it should be more readily scalable. One of the biggest challenges we see with agile innovation is how to bridge the chasm from pilot to scale-up. Purposeful agility de-risks this activity (see Figure 4).

Ultimately, every agile ideation faces its moment of truth—the moment when it must scale. Anything an organization is ideating, no matter how agile they're trying to be or how much design thinking they've adopted, has to land in a bullet-proof place. And keeping that in mind from the beginning is a really important part of the change process.

To avoid innovation being trapped at the proof of concept, MVP, or pilot stage, organizations need to define the "scale-up" interface—the handoff, or off-ramp, from agile teams to the teams that will execute and scale it to industrial strength.

The ability to scale has to be fully integrated into the ideation process from the outset. Organizations do this, in part, by setting the guide bars of architecture. Those guide bars are the architectural choices organizations make from the operating model level right through to the workflow level and then into their application and infrastructure levels.

Just as important is a concept we think of as the changeover box. That's the moment when a relay runner passes the baton to a teammate. For organizations, the changeover box comes into play when their agile and execution, or steady state, teams come fully together to act as one. This can also be viewed as an approach to address a similar challenge—specifically, the relationship between high-growth digital businesses and the simultaneous transformation of the more mature traditional business.

Organizations need to define in advance the specific criteria for when the handoff occurs. As prototypes move to pilot, the stakeholders assigned to take over if the pilot eventually scales begin to become a bigger part of the team or take on more central roles. Running together in the changeover box, agile ideation and operational teams become the on-ramp back into the organization and out to the marketplace at industrial-strength scale. The IBM Garage methodology is designed to help with this changeover by enabling seamless co-creation, co-execution, and co-operation.

This approach is also very important for bridging the divide between the business and IT in the evolution of solutions. It jumpstarts the process of blurring the lines between these groups as technology becomes the business. Done in the right way, it can also be a huge accelerator of the reskilling, upskilling, and culture change agenda as players are exposed to the potential of the new technologies and learn by doing.

Action guide

Enterprise Experience and Humanity

1. Elevate human-technology partnerships

Embed the enterprise experience everywhere, which includes understanding how the organization's purpose, including its brand purpose, elevates the customer, employee and ecosystem experience, and ensures a continuum between them.

– Establish the organization's North Star purpose, its mission and values in service of the aspirations of its customers, employees and partners, and society at large to change the human experience.

– Adopt human-centric design to enhance enterprise experience, cultivate empathy, understand human needs more intuitively, design feedback loops for experiential learning, and move rapidly from experimentation to scale.

– Orchestrate compelling (trusted) humantechnology interactions to empower employees to make better decisions, work autonomously, and solve problems on the front lines and at the moment of need.

2. Cultivate smart leadership, skills, and culture

Develop smart leaders, accountable for creating a culture of trust and continuous learning and who can champion comprehensive workforce reskilling and upskilling, as well as learn to lead in new ways, with a combination of business and technology acumen and empathy.

– Embrace disruption and lead as a change agent by rethinking your role and your organization's value proposition as something much closer to the bold ambitions and culture of a tech company.

– Foster a culture of collaboration and innovation across ecosystems by finding new ways to let go and assembling new coalitions of leaders, creating the conditions for trust with more open rules of engagement.

– Drive accountability for new workflow-aligned skills with AI-enabled insights into when, where, and how new skills should be developed and platforms that support developing a skills culture for continuous learning.

3. Perform with purposeful agility

Drive purposeful agility that optimizes the flow of value and time to market, infuses structure even as the organization lets go, and unfreezes the organization to move fast as it reinvents its core on market-making business platforms.

– Team across boundaries to accelerate innovation by designing multidisciplinary teams able to work in parallel, iterate to speed the time to value, and empowered to act with autonomy.

– Adopt agile principles and design thinking mindsets while sidestepping chaos by establishing purposeful agility, and align teams to intelligent workflows to determine outcomes with clarity and set milestones.

– Sustain agile at industrial-strength scale through the careful design of the moment of changeover, the phase when ideation is complete and prototypes are ready to move back inside the organization to scale.

Chapter 4

New way of building: Garage

As organizations apply exponential technologies and reshape their workforces to build the business platforms and intelligent workflows of the future, they would seem to be embarked on a sure-footed path. But this shift in direction and decision-making creates uncertainty and a need to work differently. How does an organization innovate quickly while keeping appropriate guide bars in place to reduce the risk of disarray?

The answer: Garages. A bold, comprehensive approach that helps employees adopt new ways of working and thinking with the speed of a startup, but at the scale of an enterprise.

In becoming a Cognitive Enterprise, how a company transforms its business platforms and reengineers its workflows can make the difference between coherence and chaos. The IBM Garage approach is the perfect vehicle to initiate, execute, and reinforce the journey.

Organizational agility is essential, but implementing "agile" is not enough, and rapidly multiplying decentralized iterations can spiral out of control. To help mitigate the risks of rapid change, organizations need the right methods, mindset and technology to convene and unlock the power of teams across an organization. The Garage approach is just that: a bold, in-depth approach to innovation and transformation through collaboration and execution. It enables companies to co-create, co-execute, and co-operate the business platforms and intelligent workflows of the future (see Figure 1).

The Garage approach is fundamentally purposeful. We believe that, to harness the creativity and agility of an organization, it needs to have a clear, measurable intent. As such, we recommend that a Garage is focused on either helping to build a specific business platform or that is aligned with the reinvention of a targeted workflow.

Such thinking helps to bound the breadth of participants and focus the identification of pain points, value pools, and data sources. This will also help ensure that any building blocks of enhanced capability that emerge from Garage sprints can be part of a clear bigger picture by linking each sprint or phase of activity directly to the strategic imperatives through a structured frame. This, coupled with the core tenets of user-centricity and the human experience, enables both speed and value realization and is the key to meaningful, lasting, success.

Garages provide an opportunity to access the full ecosystem of a business to help co-create the future: customers, citizens, designers, developers, architects, partners, suppliers, resellers, regulators, and all other relevant stakeholders innovate together. The Garage straddles organizational boundaries, combining business and technology and internal and external sources of insight. Open collaboration with agile squads accelerates delivery, learning, and engagement. The Garage experience helps companies move faster, work smarter, access the right talent, and reconceive the way they build, innovate, and grow—and all of that in measurable, iterative ways.

Figure 1

Creativity and practicality come together in the Garage journey

Source: ibm.com/garage/method
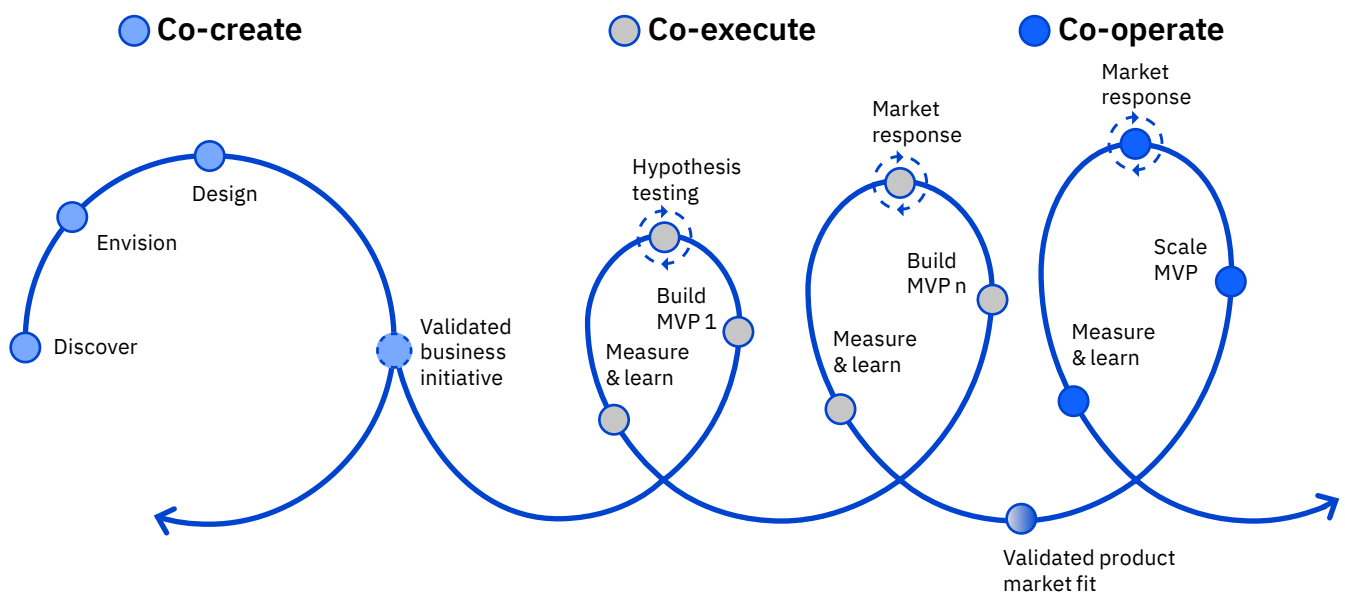
Insight: Risks to the Cognitive Enterprise

Becoming a Cognitive Enterprise affords compelling advantages. But the journey is not without some types of risk—especially if care is not taken when applying new technology and implementing new ways of working.

First, risks arise from the nature of exponential technologies—AI in particular. How and why an AI system reached a particular conclusion can be challenging to explain. But regulators and consumers alike will expect an enterprise's AI to be explainable, especially as its decisions relate to compliance and financial inclusion. AI also relies on the data used to train it—data which is the lifeblood of the Cognitive Enterprise. So contaminated data, or data of questionable provenance or reliability, could result in a crisis of trust, not only in the data itself, but also in any decision making based on it.

Related to this, improper or sloppy use of data and AI could risk "mass-scale digital influencing" and the proliferation of deep fakes. Also, companies will be held responsible for issues they presumably should have known about based on data they possess. Recently, several large financial institutions have faced scrutiny because internal data had indicated serious consumer protection issues, but that data failed to reach the right part of the company to be acted upon.

The very nature of human interaction with new technology can also introduce risk. As they focus primarily on the technology, organizations may tend to overlook the human element—and their workers' human needs, such as a fundamental purpose. Exponential technologies also tend to initially disrupt employment patterns and displace legacy skills, leaving those with outdated skills in a kind of limbo. So, as companies invest in exponential technology, they need to make a corresponding investment in people, particularly in culture and training.

New ways of working may at times have unintended consequences. If an organization is not prepared and vigilant, "cognitive chaos" could stem from an overwhelming proliferation of new technologies. At the same time, decentralized rapid innovation via agile squads can undermine an enterprise's focus and health. Setting a clear strategic focus and maintaining strong governance can help achieve the proper balance.

In a similar vein, regulators and customers alike will expect greater coherence and integration across a company's workflows—including risk management, such as cybersecurity, fraud, and anti-money laundering—that may currently be managed in distinct silos.

Finally, at the societal level, closed networks and proprietary ecosystems could distort and imbalance the market, thus reinforcing a divide between winners and losers, the "haves" and "have nots." Being alert for potential unintended consequences will help organizations incorporate the right risk mitigation strategies early in their journey to becoming a Cognitive Enterprise.

The Garage does need to be situated at the center of the organization if it is to assist with the transformation of mission-critical workflows. It needs to be visible, enabled with a clear mandate from leadership and connected to the macro governance and capital allocation disciplines of the organization. This focuses the output of innovation cycles on the most significant value realization and, if successful, can be rapidly and meaningfully scaled.

The Garage can utilize unique physical "space" in client or dedicated facilities, where design thinking and collaborative building take place. It can act as a visible signal of culture change in the Cognitive Enterprise. It can also have a virtual instantiation and leverage Garage virtual tools, methods, and practices to draw upon wider expertise and straddle geographic boundaries.

Scale-up is a core concept of the Garage approach (see sidebar: "Frito-Lay: Delivering snackable innovation" on page 63). We believe that by targeting big problems, engaging a breadth of stakeholders, and having Garages operate inside a company's architectural "big rules," the company can operate at the speed of a start-up and the scale of the enterprise. This thinking avoids organizations dying the death of a thousand Proofs of Concepts (POCs) or Minimum Viable Products (MVP's).

The Garage does not just access the right teams of people. It also draws in the full breadth of exponential technologies and solution components. It is designed to enable the combinational power of multiple technologies, reusable architectural components, and Research and Development to accelerate impact and progress. As such, this approach can bring deep innovation to programs such as Digital Reinvention®, ERP replacement, shared services reengineering and outsourcing transformation.

The Garage has a durable position in the full lifecycle of business change from Co-creation, through Co-execution and into Co-operation.

Co-create to envision the future

Uncover a new business opportunity or drive critical new insights into an existing situation. Ideate with your entire ecosystem, or with relevant smaller squads, to co-create a visionary, compelling, and energizing solution that fits within clear architectural guide bars.

Co-execute to build out and scale up

Expand and create additional squads to build out the team that will realize the future vision. Develop the MVP prototype into a first production-ready release and launch the solution into full production. At the same time, be ready to improve your solution based on what you learn from users and scale up rapidly with robust architectures.

Co-operate to iterate and continuously improve

Keep sharpening and hardening your tools, architecture, and reliability, while monitoring and testing for continuous improvement. This leads to continuous delivery that is crucial to deeply transform your culture. Much of the work can be done with distributed squads throughout the enterprise.

The Garage provides the perfect vehicle for the building of the Cognitive Enterprise. It can help to define and build the market-making business platforms, reinvent and re-engineer the Intelligent Workflows, and create the Enterprise Experience where the Humanity of the company is able to fully take advantage of the power of the exponential technologies at its heart.

Frito-Lay: Delivering snackable innovation

North Americans consume Frito-Lay products approximately 20 million times a day. The company must get the right product to the right place at the right time. With 25,000 Frontline employees, 300,000 customers, and 2,500 SKUs, how does it manage complex value chain logistics, distribution, and sales challenges?

To accelerate innovations to market and transform its Frontline sales force to meet consumers' changing needs, Frito-Lay partnered with IBM Garage throughout three phases.

Co-create

User-centered design thinking was the core of the co-creating phase. IBM and Frito-Lay employees sat side-by-side to complete over 650 hours of user research interviews and field visits. Every pain point from the user research was ranked and mapped to help ensure that the transformation backlog was prioritized by overall impact and value. By co-creating the backlog with value as the key factor, executives were able to make decisions more quickly. The teams were able to understand how the pivots and changes fit into the overall vision and direction.

Co-execute

One of the most exciting outcomes from Frito-Lay's transformation is that not only did the IBM Garage framework help continually enhance the core systems, it also established future innovations for the organization to seamlessly integrate. The teams built and delivered proofs-of-concept that were "vertical slices" of some of the largest challenges the organization was facing. The teams took these slices into pilot markets, with users learning and understanding what worked and what needed to change. The insights gained from slicing, piloting, and learning led to more accurate, accelerated solutions to the big problems.

Ultimately these innovations are what accelerated the transformation program. Frito-Lay was truly able to increase its agility within the co-execution phase by leveraging key accelerators: advanced agile techniques, design language system, value tree analytics, and control tower dashboarding.

Co-operate

Co-operating is defined in three different terms of scale for this company:

1. Frito-Lay has more than eight garage tracks. This kind of scale only comes when meaningful orchestration happens across the entire organization, including business, IT, finance, HR, procurement, and others. As they have scaled from one to many garages, the enterprise encountered new friction points and opportunities. This meant breaking out of traditional siloes and engaging the entire organization.

2. Scale to Frito-Lay also means getting the solution to their more than 25,000 Frontline employees. This means driving change in behaviors, operations, communication, change management, and ultimately the path for end user adoption.

3. And finally, scale means using technology to manufacture products to meet consumers' changing needs in order to get the right product at the right place at the right time.

After 100 weeks, Frito-Lay achieved these tangible accomplishments:

– The average duration to get a request in market has gone from 240 weeks to less than 30 days

– New features are pushed to market weekly

– Intelligent workflows are accelerating AI-driven ordering

– Customer-facing workflows are increasing and driving adoption.[1]

Conclusion

A new way to grow, a new way to compete

As leaders have discovered, it's time to move beyond the exploration of what exponential technologies can do and—if they haven't already   begin breaking ground on a new construct, the Cognitive Enterprise.

This shift from experimentation to scale to impact is a massive undertaking. It is the province of leaders asked to orchestrate value in ways once unimaginable and now attainable. Leaders will need to exert their best and rally their teams and partners to do three things at once:

Focus on framing and scaling business platforms for maximum impact
To rediscover the core of the enterprise and shape new market opportunities for competitive advantage, leaders will need to have a sure sense of their organizations' direction   their ambition and intent   backed up by a detailed blueprint of what it will take to get them there. They will need to think through and lay out new guide bars and control systems for the robust governance of organizations that move fast and, on any given day, have multitudes of concurrent changes underway.

Prioritize the design and deployment of differentiating intelligent workflows
Workflows are the building blocks that underpin the platform's differentiating advantage and expose new value pools. Because intelligent workflows require exponential technologies orchestrated at scale and the intensive upskilling of the workforce, identifying which workflows to build out first will be particularly important. Helping to make sure that the organization's data and AI is fit for purpose becomes a C suite imperative.

Strengthen and elevate the enterprise experience of everyone in the ecosystem
The outside in and inside out transformation of platforms and workflows culminates in   and is subsequently sustained by   purpose led experiences. The leader's role to communicate that purpose and bring it to new life is at the heart of everything they do. Paired with a strong commitment to demonstrably raise the skills of its workforce as well as its value proposition with partners, the enterprise experience is where leaders architect a new future by performing at their personal best.

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New way of building: Garage

The IBM Garage

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Notes and sources

Introduction to the Cognitive Enterprise

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Chapter 4: New way of building: Garage

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