IDC White Paper

TURNING CIOS INTO DIGITAL ORCHESTRATORS

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Turning CIOs into Digital Orchestrators

Equipping CIOs to Orchestrate Companywide Transformation Through Emerging Technologies

What's in This White Paper

In this study IDC has partnered with Dell Technologies to explore how CIOs are collaborating with their organizations' leadership to identify digital use cases that drive strategic value, and how emerging technologies are being used to underpin and enable them.

In addition to leveraging ongoing IDC market research, the paper is based on a series of almost 50 in-depth interviews with CIOs around the globe to better understand their business requirements, approach to harnessing emerging technologies to address these requirements, existing barriers to benefitting from these technologies, and the quality of innovation-driven interactions with C-suite members to date.

Introduction

We live in a digital economy and industry peers are changing the rules of the game, finding the perfect combination of traditional and **emerging technologies**. These frontier companies are serving customers in powerful new ways.

IDC believes that the next 5–10 years will witness even greater shifts in the way businesses operate, transact, and exchange value. Even the terms that we use — "emerging" and "disruption" — signpost a period in flux.

New technologies will continue to reshape the way we work and conduct business. IDC predicts that **more than 50% of IT spending will be linked to DX initiatives by 2023**, up from around 30% in 2018 (source: IDC Worldwide Digital Transformation Spending Guide, February 2020). Against this backdrop, there's a real and present danger that the opportunity to capitalize on the emerging technology wave will pass certain businesses by.

AT A GLANCE

Digital transformation has broken out of the confines of IT and is now a C-suite concern. CIOs must quickly learn to talk in use-case terms and leverage emerging technologies such as AI and edge computing to orchestrate companywide transformation efforts.

KEY TAKEAWAYS

- More than $1.7 trillion will be spent on emerging technologies at a worldwide level by 2023 (IDC Worldwide Black Book 3rd Platform Edition, January 2020).
- The number 1 obstacle for CIOs is lack of technical staff able to envision business processes.
- CIOs should start by discussing business transformation initiatives with each C-suite member and deploying IT staff to scout for technologies that could have use cases in the organization.

Hence, **businesses need a blueprint for harnessing emerging technologies** to drive real value and navigate their organization's digital transformation. This high-stakes, high-speed mission rests with the CIOs. They need to place themselves at the center of the pitch once more.

Business Units Directly Managing Digital Investments

Digital is now business as usual — but in an ad hoc, sometimes disorganized fashion.

By following the money, you can see that business functions including operations, customer and employee experience, finance, and risk are not only pushing for higher investments in technology, but are also increasingly managing these investments. IDC estimates that in 2021, **more than half of technology spending will be funded outside IT and the shift will continue by around 1 percentage point a year** (see Figure 1).

"Without emerging tech, we simply won't meet customer expectations. Sooner than we think, people will demand to know how long the ticket queue will be before they go to the station. Such a use case can only be delivered through new technologies."

CIO, Train Operator

Increasingly larger amounts of those business investments will go toward disruptive emerging technologies. This was initially the case with cloud SaaS. Now other deeper reaching tools such as artificial intelligence, edge computing, 5G connectivity, and AR/VR are being piloted and deployed.

But these efforts are often disjointed — risking the sort of inconsistency down the road which could derail businesses' future transformation projects and choke future digital lifelines.

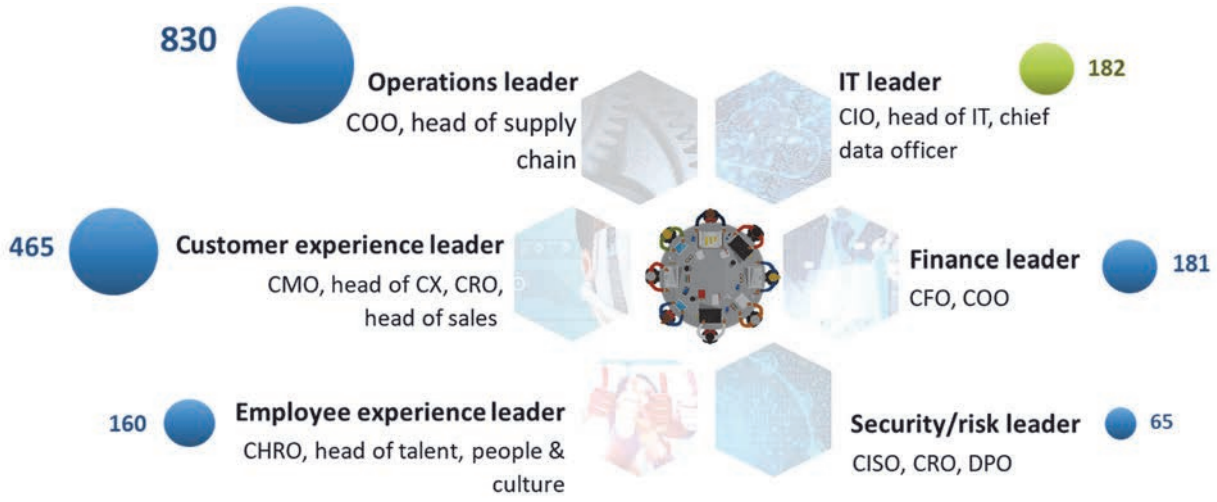
When LOBs Push Emerging Tech: Voices From the Field

A multinational manufacturer of lighting products is looking to upend its operational processes to compete with low-cost firms. Its production lines are partly automated within each building, but they're neither connected to each other, nor have real-time links to financial planning and ERP systems. The head of operations is testing a range of technologies, from collaborative robots to AR/VR devices.

The company successfully tested 5G connectivity and on-campus edge capabilities to tackle a series of use cases, starting with coordination of GPS-enabled autonomous vehicles to move materials across campus. IT was involved in the deployment, connection to local systems, and cloud compatibility analysis, but the initial thrust and virtually all funding for 5G deployment came from the operations side.

The pilot was successful, and new use cases requiring fast data streams are being worked on, including real-time ticket management for OT devices and on-stream, at edge analysis of images from a laser-device measurement machine.

FIGURE 1
The Digital Dream Team



Source: IDC Worldwide IT Spending Guide, Line of Business, January 2020; selected function groupings

CIOs Under the Spotlight

Where are CIOs in all this? Some have taken bold steps into the emerging technology space and successfully transitioned from proof-of-concept scenarios to companywide deployments. Others are less prepared, possibly distracted by the crucial but tiring task of picking up the pieces of the cloud explosion and conforming to the latest data privacy regulations.

Our research suggests many have underestimated the task at hand. More than 70% of CIOs in an IDC survey see themselves as "Orchestrators" in the C-suite, aligning budgets, stakeholders, and technology architectures across the different business units to deliver digital at scale. And yet they're engaging infrequently with CxO peers on business transformation projects, they sometimes lack industry business knowledge, or they lead teams that have gaps in technical knowledge.

These lags coincide with unprecedented pressure on leadership to deliver returns on digital transformation. CIOs are under immense scrutiny. But this is also an opportunity: to place themselves at the center of a transformation program that will future-proof their organization. To achieve this, they'll need to succeed along three axes:

1. To be credible DX Orchestrators, CIOs should permanently **change their language** and proactively structure peer conversations around **use cases**.
2. CIOs need to develop a **firm vision for emerging technologies** as tools to achieve the company strategic priorities.
3. IT leaders should gradually enhance **employee competences and skillsets** and transform their **IT stack** into a digital platform.

Examples of Industry-specific Use Cases: Voices From the Field

Some use cases only apply to one industry, meeting sector-specific business scenarios and needs:

A large European hospital is currently working on patient remote monitoring, virtual patient-doctor interaction, and hospital infrastructure monitoring solutions.

Manufacturing companies focus on use cases such as supply chain management tracking, hyper-personalized vending machine customer interactions, and autonomous in-factory operations.

Transport operators are developing passenger flow analytics initiatives, and utilities are expanding grid monitoring digital initiatives.

Speaking the Use-Case Language

With the digital paradigm tipping over from a discrete technology focus to one of **use-case** and **business-outcome** centricity, the need for CIOs to speak a new language is now more evident than ever.

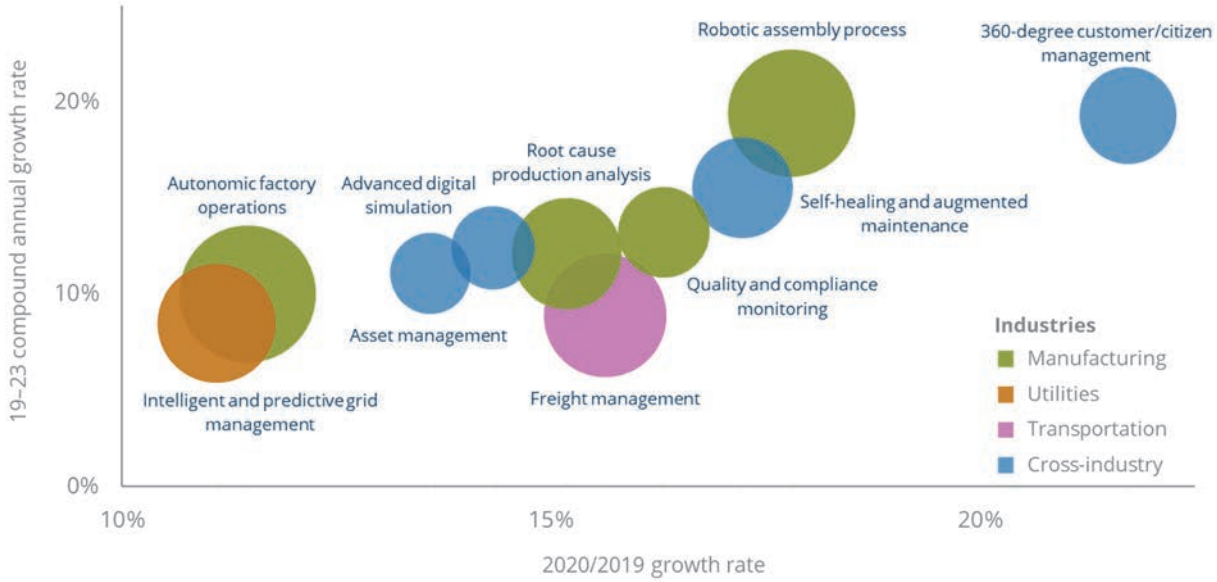
Use cases, defined by IDC as discretely funded digital projects that support specific business or societal goals (not to be confused with systems engineering's definition of a use case), are being used to redefine internal and external conversations toward strategic business priorities and benefits.

While leading use cases such as predictive maintenance, asset management, and smart buildings are horizontal scenarios applicable across multiple industries, in many situations the **use-case language is strictly industry specific** with very niche and sector-specific applications and usages (see box on the left).

Different use cases may share common business outcome objectives such as improved customer/patient/citizen relationships, automation and efficiency (in terms of costs and time), new revenue streams, and higher accuracy. These outcomes should be the starting point for charting a use-case-intensive digital road map that can successfully engage the full C-suite and increase interest in tech-oriented approaches.

FIGURE 2

Leading Digital Transformation Use Cases Mark a Shift in CIOs' Language and Focus



Note: This chart shows the top 10 largest spending digital transformation use cases at a worldwide level, according to IDC's Digital Transformation Spending Guide. Bubble size represents 2019 end-user spending.

Source: IDC Worldwide Digital Transformation Spending Guide, February 2020

Speaking the use-case language for CIOs means starting conversations with both IT and business stakeholders with final business objectives and outcomes — postponing any technical details and technology requirements discussion to a later stage, when a series of enabling and key use cases have been identified.

"When we reach out to our internal stakeholders and customers, we do not talk about emerging technologies, we talk about this is what we can do and this will be the business outcome we can obtain."

CIO, Health Devices Manufacturer

To aid this, we often see instances of CIOs hiring business-focused IT specialists and creating "marketing units" within IT teams to foster the creation of business-outcome-oriented conversations with line-of-business and enterprise partners.

In essence, speaking the use-case language means talking about what technologies can do and their benefits for business paradigms, rather than the technologies themselves.

Examples of Industry-specific Use Cases: Voices From the Field

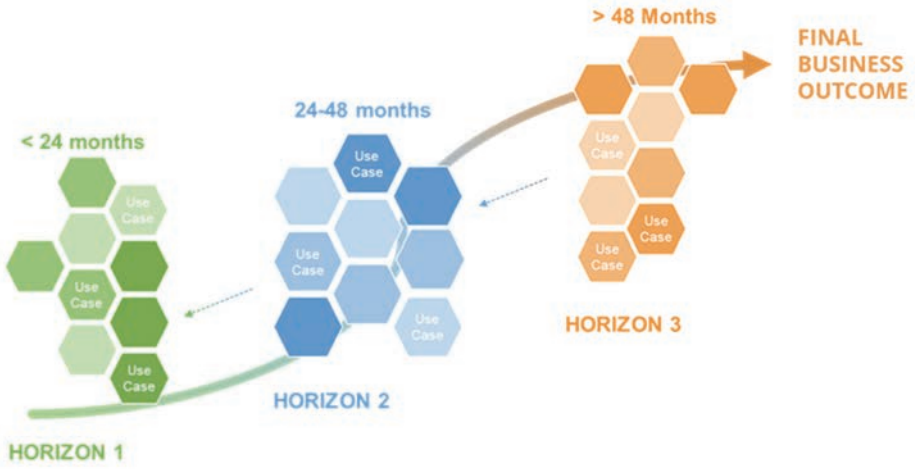
Some use cases are more horizontal and apply across multiple industries, such as:

Smart building solutions that enable organizations to effectively and safely manage spaces while tracking building conditions and energy consumption.

360-degree customer/citizen management use cases that provide a 360-degree view of the customer (citizen or patient for public organizations), enabling better engagement and experience throughout the customer journey.

A use-case language also means putting in place a **digital road map by horizon**. Not all use cases require the same effort and digital maturity and not all companies share the same final goals and priorities. Therefore creating a detailed road map that starts from the final business outcome to be achieved, picking a few selected key use cases to get there and placing them across multiple time horizons, to climb step by step, is key.

FIGURE 3
A Digital Road Map by Horizon



Source: IDC research, February 2020

Only once an advanced use-case digital road map is in place will it be possible to **pinpoint the key technologies** required.

This is important as different use cases require different technologies to speak to each other. CIOs will essentially need to conduct a **symphony between the technology backbone and emerging technologies** to accelerate digital disruption.

Developing an Emerging Technology Vision

Ten years ago, the companies that were winning were creating the richest, most engaging, and best controlled data platforms (e.g., Netflix, Facebook). The bar is higher today — boosted by new digital scenarios and technologies, together with new requirements from both customers and citizens. Winning companies are:

- **Merging the physical with digital**, as this enables new experiences for customers and employees, as well as the simulation of physical processes in digital environments
- **Making the execution of tasks** (then processes, then whole companies) **autonomous** from both people and from the physical location of decision makers, so more and more repetitive tasks are automatically executed by machines that workers can remotely monitor and control — enabling speedy decision making and operational savings
- **Enabling a hyper-personalized customer experience**, facilitating better customer engagement and more targeted go-to-market initiatives
- **Fostering a data-sharing and monetization** approach, unlocking new business model scenarios and turbocharging intelligent transformation initiatives

"Emerging technologies are driving up value, reducing costs and time to market. If you don't look at those you are going to be in a tough spot. Similar to when cloud arrived years ago, it is not just about saving money but more about unlocking new opportunities."

CIO, Global Pharmacy Benefit Manager and Care Services Group

Emerging technologies build on established horizontal 3rd Platform pillars (i.e., analytics, cloud, mobile, and social media), accelerating the digital transformation road map. More than $1.7 trillion will be spent on emerging technologies at a worldwide level by 2023 (source: IDC Worldwide Black Book 3rd Platform Edition, January 2020). Between 2020 and 2030, these are differentiated between:

- **Core enablers of autonomy:** These are technologies that act as a first interaction point with users and machines, enabling new data and input acquisition across different digital scenarios. Among these, two are particularly high on end-users' innovation agendas:
  - **AI** algorithms, which mimic and augment human cognitive functions, automatically answering questions, discovering insights, and providing recommendations
  - **Edge**, in combination with the Internet of Things, which removes the airgap between physical objects and intelligence, providing local computing and storing capabilities
- **Accelerator technologies:** Those technologies that, when combined with core enablers, can accelerate and augment specific digital scenarios. These include 5G, drastically reducing time-lag and enhancing broadband capabilities; distributed ledger technologies, which enable new ecosystem hyper-connection dynamics; AR/VR, augmenting human experience; and more on the horizon such as quantum computing, 4D printing, and nanotechnologies.

In the next few years, new products and offerings from IT suppliers, price levelling, stronger external infrastructure, and higher digital maturity will lead to greater adoption of emerging technologies, with multiple emerging techs becoming mainstream. This means they will have achieved significant cross-industry uptake and have been implemented companywide beyond proof of concept.

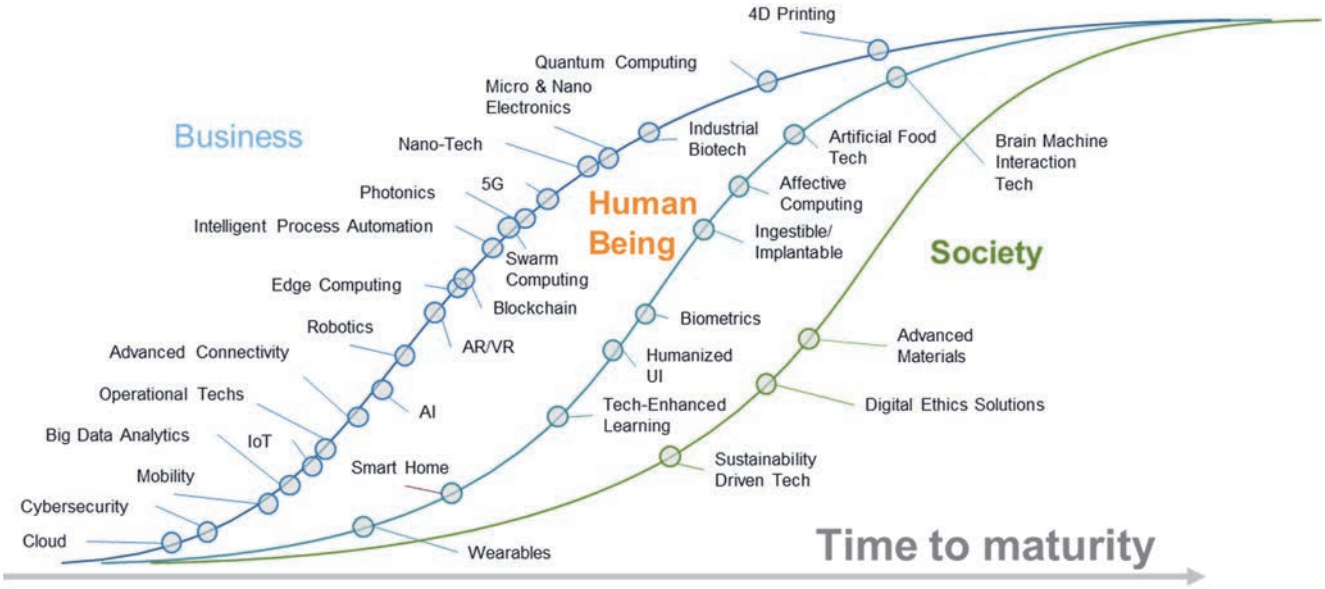
A CLOSER LOOK AT AI AND EDGE

AI is a set of technologies that use natural language processing (NLP), image and video analytics, machine learning (ML), knowledge graphs, and other technologies to answer questions, discover insights, and provide recommendations. The AI global market is expected to reach $98 billion by 2023, led by industries such as banking, retail, manufacturing, and healthcare (IDC Worldwide Artificial Intelligence Systems Spending Guide).

The **edge** is the multiform space between physical endpoints (a sensor, an industrial machine, a vehicle, etc.) and the "core" (the backend sitting in cloud locations or traditional datacenters) where users can support different workloads leveraging computing and storage platforms optimized for edge environments. IDC mapped different layers of edge, each requiring a different compute and software approach and greater power. Worldwide edge infrastructure spending is expected to reach $21 billion by 2023 (IDC Worldwide Edge Infrastructure Forecast).

FIGURE 4

The Emerging Technologies Landscape and Key Impact Waves



Note: The chart shows the key emerging technologies positioned on their time to maturity along three main curves representing the three key areas where they are having or will have the greatest impact (business, human being, and society).

Source: IDC research, February 2020

Some of these technologies are very niche, and this will limit their uptake. They will be deemed to be too industry specific to gain horizontal traction across multiple industries — industrial biotech or advanced materials, for example, are unlikely to find traction in sectors such as banking or insurance. However, the real challenge for CIOs and digital strategists will be to:

- **Select** emerging technologies according to how they prioritize use cases and their digital road maps
- **Link** them to **traditional infrastructure**
- **Scale up** emerging technology initiatives to drive companywide digital foundation disruption

Developing an emerging technology vision requires organizations to work on a selection of personalized emerging technologies, based on strategic priorities and supporting use cases, vertical and industry needs, and the maturity of the organization.

Enhance Employee Skillsets and Transform the IT Stack into a Digital Platform

Let's assume the CIO is speaking a business language: couching IT requirements in business terms and within a specific business context. The IT leaders have gathered a list of emerging technologies that could be relevant. Early use-case ideas emerge and get tabled with line-of-business counterparts. Someone, often the CEO or a member of the board, is conscious of the central role IT plays and "watches the CIO's back." These are all signs that this CIO is **working for a "Digitally Determined**" organization. Only around 50% of global organizations are at this level (see IDC Global DX Leaders Survey, June 2018, n = 1,987).

"Some board members are very connected to the market and generated the idea of 'treatment as a service.' We [IT] were then tasked to deliver the necessary back-end processes. They supported and challenged us at the same time."

CIO, Health Devices Manufacturer

All of those factors and working in a Digitally Determined organization help. But CIOs will still have to fight their way forward and tackle the obstacles within IT. Within their domain, CIOs must do the following three things to make a business impact:

- Expand the ability to think in business terms within the IT organization, through **mindset and structural team changes**
- **Build hard knowledge** on emerging and ancillary technologies — this means acquiring certifiable technical skills to operate the tools and make decisions about them
- **Construct** a new IT stack to support the data flows and developer demands

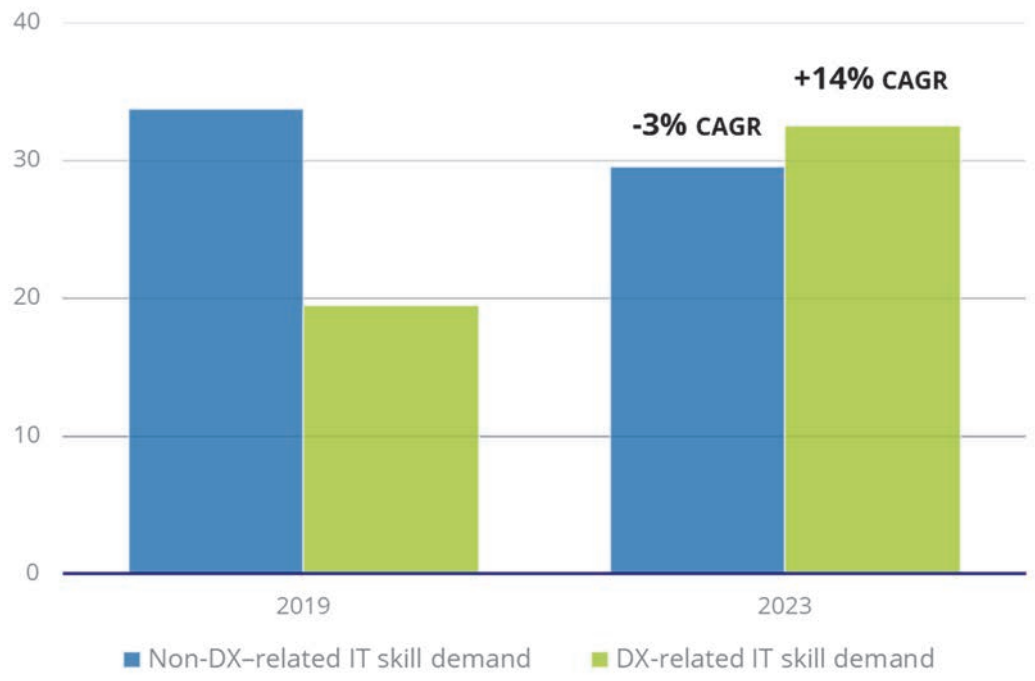
Based on both hard data and conversations with senior decision makers, IDC is convinced that the first challenge is by far the most strategic.

Soft Skills Needed for Business Relevance

Over the next four years, IT jobs requiring soft skills and hard skills linked to DX and related technologies will grow from 20 million to more than 30 million (see Figure 4). For example, strong demand is expected for roles in data management, analytics, and AI, as well as cloud-native application development and cybersecurity for digital platforms.

FIGURE 5

Worldwide IT Skill Demand by Relationship to DX, 2019–2023 (Full-Time Equivalent Million)



Source: IDC Worldwide Technology Employment Impact Guide, February 2020

There are many cultural barriers that are hindering the fluid adoption of emerging technologies within the IT department. Most are linked to missing soft skills, including the absence of a fail-fast-then-succeed mindset, including a lack of motivation to learn new technologies and an inability to speak in terms that resonate with the business through use cases.

"We [IT] don't really have people that can envision the use case or apply tech to business problems. This means a lot of ownership of that falls on a few senior people, such as the VP of apps. If we could commoditize that skill it would help a lot."

CIO, Manufacturing Company

Most CIOs are acutely aware of these negative forces. The most determined are attempting to overcome them by becoming programmatic in the way their teams interact with line-of-business representatives. Approaches that surfaced during conversations include allocation of IT staff to specific LOB departments through dotted reporting lines to tackle use cases in targeted "tiger teams" and deployment of "**business analysts**" to collect LOB requirements around use cases and then project manage IT delivery creation of "**technology explorer**" roles that gather or conceive use-case ideas — then scout the market for the right emerging technologies.

Hard Skills Needed to Make Emerging Tech Operational

On top of soft skills to enable meaningful exchanges around use cases, CIOs need to face hard gaps in technology knowledge as well. These arise in three major areas:

- **Industry-specific technologies** that were previously not dealt with by IT (e.g., smart meters in utilities, industrial operational technology systems in manufacturing, point of sales systems in retail)
- **Emerging technologies** themselves (e.g., programming languages targeting ML or AR/VR; device management of edge devices)
- **Ancillary "backbone" technologies** that support emerging tech workloads across multiple back ends (see below)

IDC believes there is no easy way to deal with hard-skill shortages, particularly in key areas such as data science for AI. Having a multiyear program to shift the skill mix in the IT department, executing "early seeding" of technologies that show potential (e.g., APIs, edge computing, machine learning), and putting extra investment in developer talent (as opposed to operational talent) can alleviate the pain. CIOs must be talented orchestrators here too.

Building a Hyperconnected Backbone

Observing successful experiences, IDC strongly feels scalability of any emerging technology implementation can only happen on the right **digital platform**. This backbone is defined by:

- **An intelligent core consisting of algorithms and models** that extract insights and trigger actions from the data. CIOs will turn to this intelligent core to collect data from an IoT environment or automate personalized marketing content for customers.
- **Fast, uncomplicated, well-governed data flows** at all layers, from sensor data to large structured and unstructured data sets to information at the API level.
- **Infrastructure and ready-made services that are immediately consumable** by developers building the code that makes emerging technologies business relevant.

"Infrastructure should be modular, and each module should be replaced very easily. Remaining adaptable is a must as no-one really knows the landing points of the emerging technology journey."

CIO, Train Operator

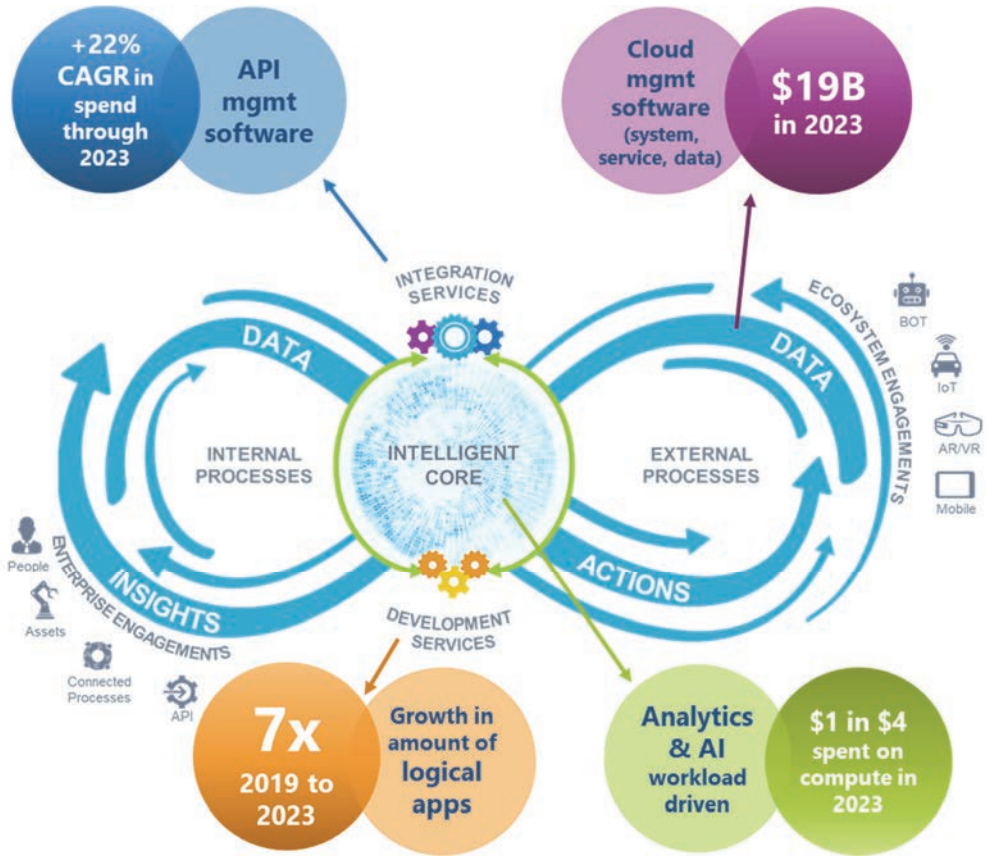
The above requirements are fueling hypergrowth in mid-stack software (what was previously called "middleware" and system management). These can be seen as the legs on which business-transforming technologies stand. They include:

- **Developer toolsets**, ranging from containers to ephemeral functions, to pipeline management tools
- **"Glue-like" software** such as API management software and services for high-performance in-cloud replication and data management
- **Control planes** for management, governance, and security for multiple cloud resources and distributed edge devices

Figure 6 displays the abstract view of a digital platform and some proof points on the fast adoption of the backbone tools needed to support emerging technology deployments.

Orchestrator CIOs are already mastering those areas or hiring to get there in the next 12 months.

FIGURE 6
Digital Platform and the Hyper Growth in Mid-Stack Technologies



Sources: IDC WW Integration and API Management Software Forecast, 2019–2023; IDC WW Cloud System and Service Management Software Forecast, 2019–2023; IDC's Worldwide Semiannual Software Tracker, November 2019; IDC FutureScape: Worldwide IT Industry 2020 Predictions; IDC WW AI, BDA, ICT Spending Guides (2H18, 1H19)

Where Can a CIO Start?

Digital Orchestrators need to execute change in multiple layers, from staffing to vendor selection to platform decisions. Doing that all at once can be overwhelming, so where should they start?

IDC recommends beginning with an **extensive exchange with the CEO** and/or the executive board to reset their strategic business priorities and measure their appetite for disruptive technologies. This will enable them to set expectations on the pace of change and level of support required. In parallel, setting up **regular meetings with each C-suite** counterpart to look at existing and new business transformation programs, potential use cases in development, and pockets of tech expertise is crucial.

They also need to be one step ahead of their peers by keeping abreast of what's coming down the track.

"The knack, for CIOs, is identifying why an emerging tech helps. You should look at the three boxes that make the difference for other C-suite counterparts: grow, deliver, and manage the business. If you're not able to strongly connect the technology to any of those boxes, you will have a challenge."

CIO, Global Pharmacy Benefit Manager and Care Services Group

Some CIOs are successfully deploying small teams to scout potential **emerging technologies** relevant to the industry and bring them to the table with business counterparts. Longer term, success will hinge on the ability to spread a business-oriented culture companywide through the IT organization while beefing up mid-stack technologies.

"Do work with diverse groups when ideating use cases. Do NOT expect the business to come up with all the ideas … At the same time, make sure you understand the technology well enough to go practical and not remain too abstract."

CIO, Footwear Manufacturer

IDC advises CIOs to:

- Start executing an aggressive, **multiyear skill shift** in the IT department toward developers and versatile staff (multiskilled team members)
- **Experiment with mixed IT/business roles**, whether through "dispatching" IT staff to line of business or using business analysts with tech knowledge
- Think about desired **final business outcomes first** and only after that, work backwards to select the emerging technologies required
- **Use "trickle budgeting"** — small investments on a regular basis to test use cases and expand gradually; if possible, co-fund projects with other CxOs to ensure co-ownership
- **Build data and security** scalability in emerging technology deployments from day zero, even for the smallest proof of concept
- **Bring in relevant business counterparts** in all vendor selection meetings where emerging technologies are discussed

Conclusion

Emerging technologies are career-defining springboards for CIOs with business acumen and lateral thinking. Focusing on use cases and orchestrating investments around emerging technologies with their peers is the only strategy that will enable CIOs to thrive in the mid term.

Most of the CIOs that IDC talks to want to become orchestrators. But, with too few CIOs actively discussing business use cases with their C-suite counterparts and given their scattergun approach to line-of-business investments, businesses may struggle to commit to further innovation. This could prove fatal for organizations struggling to compete in a digital world. Well-thought-out use cases — within a wider, joined-up approach to digitization — are key. To achieve this, businesses will need an advanced **emerging technologies vision** to pick the right tools, set out detailed road maps, achieve buy-in across the CxO table, and bring about a **renaissance** in the capabilities of their **staff and IT foundation**. Only then will CIOs make real progress in their Digital Orchestrator role.

Methodology

This IDC White Paper is based on existing IDC research, including IDC DX research, data from IDC's Worldwide Spending Guides, and buyer and vendor conversations. IDC also carried out in-depth interviews with more than 40 CIOs across Europe, North America, and Asia.

Definitions

IDC used the following definitions in this document:

- **Emerging technologies** are newer technologies that have not yet reached mainstream adoption that could rewrite business processes and transform use cases. Emerging techs include AI and IoT/edge computing. They do not include established digital pillars such as cloud, analytics, traditional security, and enterprise software.
- **Use cases** are discrete funded projects that support a business goal. They are part of programs aimed at fulfilling a strategic priority. Examples of use cases include remote health monitoring, intelligent transportation systems, 360-degree customer management, and production asset management.
- **Strategic priorities** are the objectives that an organization expects to accomplish over an extended period to achieve its DX mission. Common strategic priorities in the manufacturing sector, for example, revolve around building a digital supply chain, transforming production processes toward smart manufacturing, etc.

About the Analysts

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Giorgio Nebuloni is AVP for IDC's European Customer Insights and Analysis group. The group researches how emerging technologies such as blockchain and edge computing are adopted in various industries. It also advises IT vendors on how to set up their verticalization strategies.

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Andrea Siviero is a research manager for IDC's European Customer Insights and Analysis group. In this role he leads the emerging technologies research within the team, including both quantitative and qualitative vertical markets research.

About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications, and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

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