

2021

TECH TRENDS

Thriving through disruptive change

Creating new options from disruptive effects

Dawn of the Post-COVID-19 Era

2020 ends with the world looking forward to the end of the COVID-19 pandemic while still grappling with the disruptive changes the virus caused to all facets of society.

Businesses were forced to accelerate their digital transformation plans to maintain operations. The economic fallout of restrictive lockdown measures meant that the digital channel was the only customer touchpoint available. Organizations that couldn't adapt either put operations on pause or shut their doors permanently.

Driven by demand, many technology trends accelerated. Machine learning algorithms continued to improve, Internet of Things (IoT) devices became more numerous, infrastructure needs shifted quickly, and data-driven business operations multiplied.

System and environment shocks

The rapid changes to the market environment following the World Health Organization's declaration of a global pandemic illustrate how external events can disrupt business. Governments reacted by imposing lockdown measures that meant many businesses couldn't open their physical locations, and even where they could, they still faced a situation in which consumer confidence was shaken. People either chose to avoid public places because of health concerns or restricted their spending due to an uncertain job market.

Many organizations responded by relying on technologically mediated environments to continue operations. Employees met from their homes via videoconference, students used online learning management systems to complete their school curriculum, and governments rushed to put more services online.

Reinventing value propositions

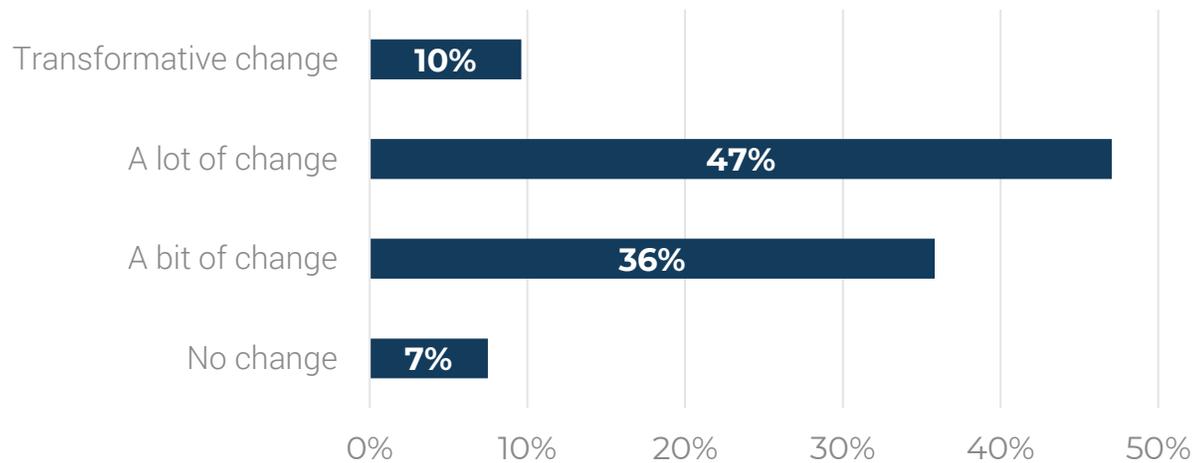
With technology playing a key role for all organizations just to maintain daily activities, IT was thrust into a critical function. No longer was the IT department supporting capabilities lower down the value stream – it was now core to delivering on the organization's value proposition.

Given the transitional period that's likely ahead, with the pandemic coming to an end and with all the other externalities that could disrupt operations, IT's role remains critical. Organizations that want to avoid disruption from the next crisis will need IT to support capabilities to plan for change and learn quickly. IT must focus on accelerating speed to value and enable flexibility and rapid redeployment of resources.

Things will never be the same

As part of its research process for the *2021 Tech Trends Report*, Info-Tech Research Group conducted an open online survey among its membership and wider community of professionals. The survey was conducted from Nov. 11 to Dec. 7, 2020, and collected 211 total responses. The survey was completed in full by 162 respondents. Chart percentages may not equal 100% due to rounding.

How much do you expect your organization to change permanently compared to how it was operating before the pandemic? (n=187)



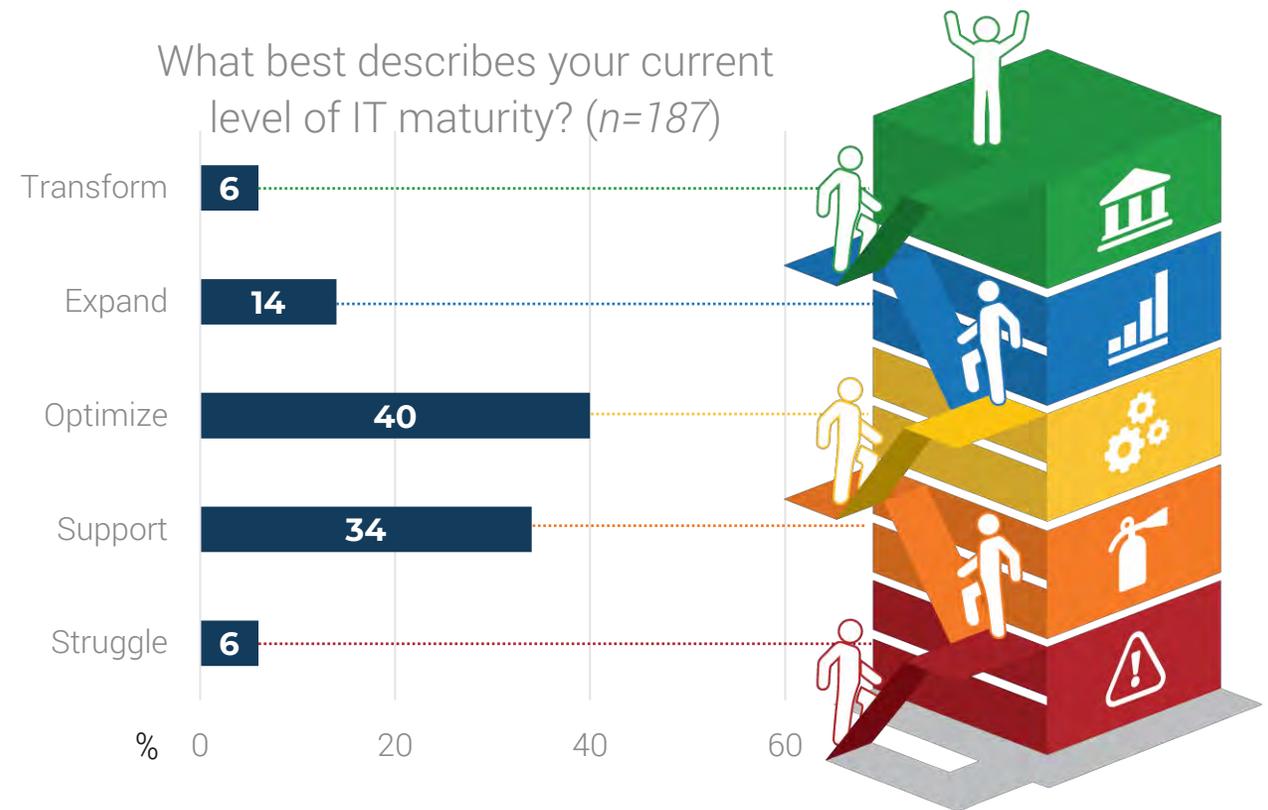
The end of the pandemic may finally feel like it's in sight. Despite that, professionals expect that things will not go back to normal. Instead, they expect that disruption will continue, with 47% saying they expect a lot of change in their organizations in a post-COVID-19 world. Another 9.6% expect transformative change, with a fundamental shift in their business requiring new ways of working.

Professionals
expect that their
organizations
will never be the
same as before
the pandemic

Despite the expected rate of change, many professionals don't feel their IT maturity is high enough to support it

IT must rise to the occasion

Only 6.4% said IT was ready to help the organization transform, and only 14% expect that IT can help the organization expand. IT must improve its capabilities if it's going to support the change that's ahead.



The pandemic highlighted how organizations are vulnerable to change from many contexts

1. Sustainable goals need digital solutions

- Climate change dominates international discourse. The United Nations' goal is to halve carbon emissions by 2030 and reach net-zero emissions by 2050.
- Many organizations are agreeing that sustainability goals are important to maintain business into the future and are enjoying related benefits such as energy cost savings.

2. Data sovereignty requires infrastructure flexibility

- Nation states are increasingly interested in how data is stored, transferred, and processed, and they are creating legislation to govern these interactions.
- IP theft remains a competitive threat.
- In many jurisdictions, individuals have the power to request access to their personal data that is stored on a company's systems.

3. Machine learning will create new business categories

- AI and machine learning are maturing and becoming integrated into more products and services.
- Startups are now harnessing machine learning capabilities to disrupt industries by entering with new business categories.

4. Lockdowns pushed organizations to a distributed model

- Governments continue to react to the pandemic by imposing lockdown measures that require many businesses to ask employees to work remotely.
- Regional regulatory bodies are limiting the speed at which the healthcare system can scale up its staff to deal with the increase in patients.

5. The digital skills gap requires that more voices get involved with developing technology

- Nontechnical workers are using new tools to keep up with a shifting job market that rewards digital skills.
- New access to AI and the ability to train algorithms comes at a time when society is skeptical of the use of AI by authorities.

6. Economic downturns demand new business models

- Startups with new products and services that could apply to an established market require enterprise or government partners to help develop proofs of concept.
- Diversified business models help an organization weather an economic downturn and recover more quickly.

Six trends will help organizations thrive through change

Absorb

1. Distributed Autonomous Organizations
2. Self-Sovereign Cloud
3. Digital Sustainability



The first three trends focus on capabilities and structures that can help your organization **absorb the impact of disruptive market change**. Lessen the blow of a crisis by strengthening all elements of your system and distributing the impact equally throughout.

The latter three trends of our report focus on **adapting to disruptive change**. Identify the gap between your current operations and where they could be in the new scenario, and make a plan to improve your capabilities to achieve that vision.

Adapt

4. Machine Learning by Design
5. Citizen Dev 2.0
6. Venture Architecture

Absorb

Use digital tools to renew the value proposition of your organization to reflect the full context of the market scenario.

Technology must go beyond business benefits...

	Distributed Autonomous Organizations	Self-Sovereign Cloud	Digital Sustainability	
TRENDS	<i>Collaborating without a central hub and taking control over the work day.</i>	<i>Balancing the capabilities of the public cloud with the control and privacy of on-premises infrastructure.</i>	<i>Using digital technologies such as software and machine learning to drive emission reduction and cost efficiency.</i>	
HUMAN BENEFITS	Trust	Privacy when working from home is respected, and work boundaries are clear and consistent.	Transparency in where data is stored and how it's used.	Transparency and accountability with digital tools tracking carbon emissions.
	Experience	Flexibility comes from employees having different work scenarios available to them.	Reduce the burden of complicated technical infrastructure decision making.	Values-driven customer interactions that build relationships.
	Resilience	Working remotely allows for more work-life balance flexibility by eliminating the need for a commute and office presence.	Consistency comes from working with data in the same legal jurisdiction as your customers.	Avoid climate disruption and reduce energy requirements.

...and improve human aspects of experience, trust, and resilience

Machine Learning by Design

Harnessing machine learning as a core piece of the organization's value proposition.

Citizen Dev 2.0

Enabling nontechnical contributors to use and create AI combined with low-code and no-code environments.

Venture Architecture

Developing and launching innovative new technology ventures from within.

Trust

Transparency in when AI is involved in a system and what role it plays.

Organizations can form relationships easier when they are open with their data and supporting resources.

Build relationships to work with an external community through inclusive and clear governance structures.

Experience

Unlock creative potential by using machine learning to brainstorm and quickly reinforce what works.

Realize empowerment by relieving workers from tedious tasks involved in their workflow.

Drive satisfaction in the customer experience by creating more convenience and more personal journeys.

Resilience

Avoid errors before they cause disruption by automatically detecting when a system is outside of its normal range.

Widening the available talent pool that contributes to technology solutions helps employees update skill sets and maintain their value.

Preparing new value propositions before the current ones are no longer valid helps avoid crises and broaden employee perspectives.

Adapt

Create a core of innovation that is continuously exploring new opportunities to diversify your business model.

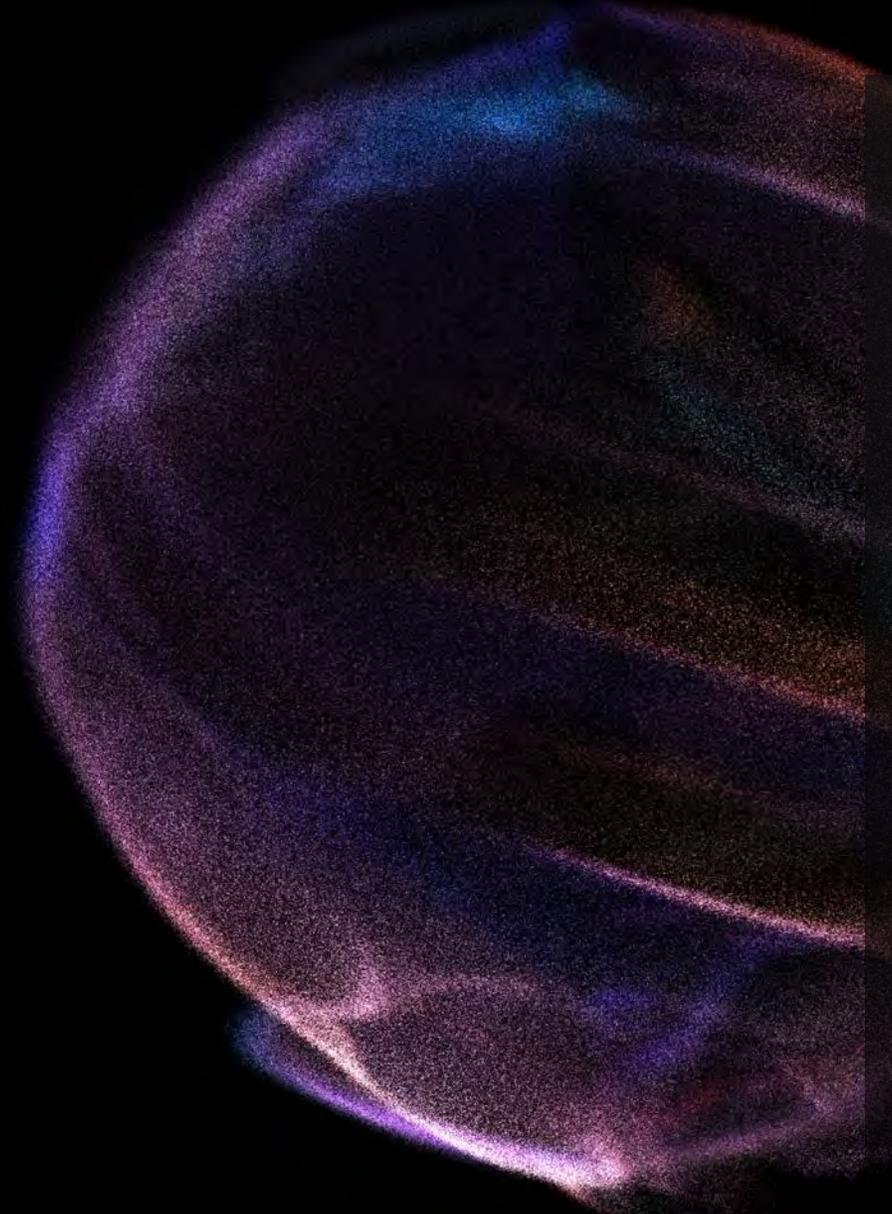


TREND 1

Distributed Autonomous Organizations

Collaborating without a central hub and taking control over the workday.

Absorb



“When you think about the role AI is going to play, you already see it weaving its way into the workplace, and it really is the concept of these augmented workers that you can liberate from work in ways you couldn’t before.”



Tim Minahan

Executive Vice President of Strategy
and Chief Marketing Officer at Citrix



Listen to the Tech Insights podcast:
How will we work with AI in 2035?

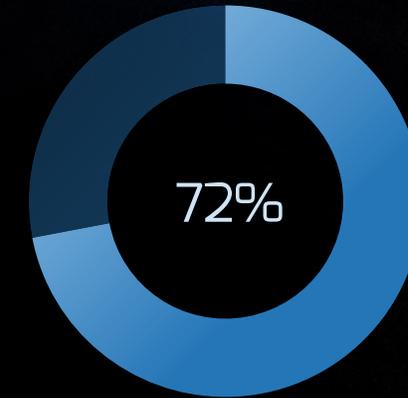
Distributed Autonomous Organizations

Collaborating without a central hub and taking control over the workday.

For the past 200 years we've embraced the work hub model. COVID-19 disrupted that on a major scale. Companies have been able to distribute work resources to their workers effectively.

In the future, AI could guide employees in properly prioritizing their days and performing the right actions at the right time. AI could also play a role in automating the “busywork” that tends to fill our work hours, allowing talented workers to focus on the value they are really hired to deliver. Employee performance could also be evaluated in part by AI, allowing for a leaner middle management layer (Minahan).

Companies that have adapted to remote work scenarios for the pandemic will find new opportunities to access talented workers. Instead of hiring workers within commuting range of an office or asking them to relocate to take a job, organizations can onboard employees from anywhere in the world and connect them to virtual collaboration platforms. In professions that are highly regulated by governments or require certification from professional bodies, there will be more friction in overcoming regional boundaries. But distributed ledger technology solutions give individuals or employers more autonomy in verifying credentials (HIT Consultant).



“72% of professionals believe that by 2030, technology and AI will generate more revenue for the organization than human workers” and will also surpass workers’ salaries for operating costs.

Source: Citrix

The 3 A's of distributed autonomous organizations

Manual processes to manage workflows are minimized, and automation is used where possible.

Automation

Workers receive AI-powered recommendations on how to prioritize tasks and improve performance.

Augmentation

Individuals are given more control over how and when they work, and organizations create more control over their ecosystems and resources to avoid disruption.

Autonomy

Case Study

Situation

As COVID-19 infections increased hospitalizations around the world, resources became strained and demand for healthcare workers increased. At the same time, these frontline workers carry a high risk of infection by virtue of their work and are estimated to make up 10 to 20% of all COVID-19 cases. When these workers are sick, they must self-isolate for at least 14 days, further exacerbating the need for more human resources.

Healthcare licenses are issued by jurisdictional authorities that are highly regionalized, but the urgency to distribute life-saving talent has authorities seeking new ways to certify workers.

Complication

Licensing bodies were overwhelmed by requests from retirees asking to be recertified, just-graduated students hoping to fast track their paperwork, and healthcare workers licensed in other regions who were willing to work. This left talent that was willing and able to help save lives waiting for weeks. While the pandemic required a national or even international response in coordinating healthcare workers, the infrastructure to coordinate that effort was lacking. Quite the opposite of having autonomy to determine which workers were qualified to deliver care, hospitals were mired in the bureaucracy of proving certifications, processing documents, and determining criteria.

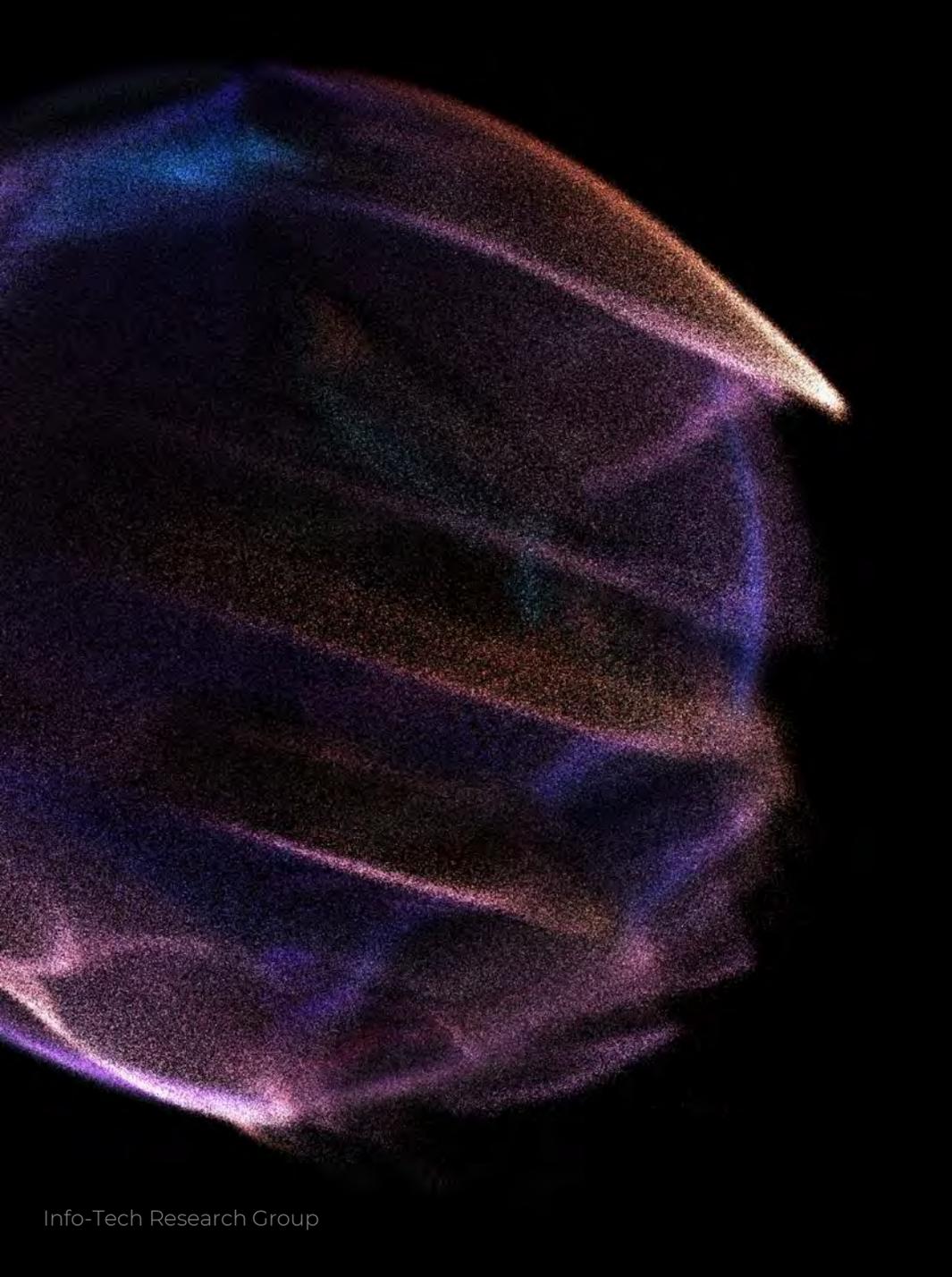
Source: Blockchain Research Institute

Resolution

Blockchain-based health-credentialing platform ProCredEx creates a trusted marketplace of verified credentials for healthcare workers. Rather than requiring each institution to independently verify the credentials of healthcare workers, this platform allows members to exchange credentials. Healthcare organizations can sell the credentials they've verified to other institutions, creating a new revenue stream, and buy credentials to onboard new employees more quickly.

ProCredEx has been adopted by several organizations, including National Government Services, Spectrum Health, WellCare, Accenture, and The Hardenbergh Group. It raised \$3.5 million in seed funding in January 2020 and as of November 2020 has completed more than 200 million credential verifications.

Sources: Ledger Insights; ProCredEx



DISTRIBUTED AUTONOMOUS ORGANIZATIONS

Human Benefits

Trust

Remote workers feel trusted by their organizations when the emphasis is on delivering results and meeting goals. Trying to recreate workplace surveillance through digital means, such as using analytics to analyze behavior on a PC during the workday or even watching an employee through a webcam, can erode trust by infringing upon a worker's private space.

Experience

Instead of dedicating their lives to an employer and being required to spend full-time hours working for them, workers could have more control in who they work for and when. Workers could choose when they can be on or off the clock and have the next highest priority task assigned to them by an algorithm (Minahan).

Resilience

Organizations often create a plan for employees to work remotely as part of a business continuity plan. With remote work being a normal part of operations, that aspect is already built in and businesses will be less affected by regional circumstances that could disrupt work.

Uncertainties

Executive bias. Leaders of present-day organizations tend to think they will continue operating centralized organizations staffed by permanent employees into the future, even though that vision is not shared by lower-level staff. Decision makers hold more influence in how organizations are structured, so this view could push back against workers' urge to spread out and work remotely. (Or did the pandemic cause them to rethink this, as suggested by Tim Minahan?)

Source: Citrix

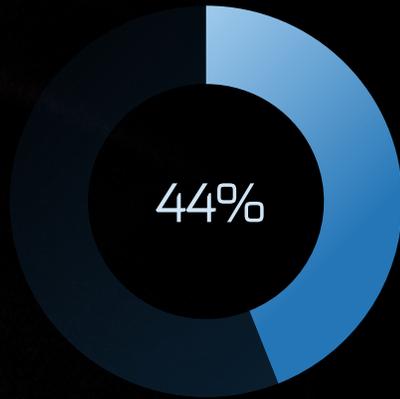
Governance. Managing credentials on a distributed ledger changes the power dynamics of a system. Entrenched gatekeepers will have to let go of attitudes on how intellectual property is managed and how new employees are vetted. Giving organizations and individuals more autonomy will depend on a willingness to change.

Source: Healthcare Financial Management Association

What's Next

Blockchain consortia have been forming around the world as cross-organizational mechanisms to develop governance standards for the use of blockchain technologies in various industries. While the formation of these bodies was overall slowed during the pandemic, the consortia formed by the healthcare sector rose.

In 2019, healthcare accounted for **9.2%** of all blockchain consortia being formed. That rose to **16.7%** in the first half of 2020, with the focus being on use cases for contact tracing, medical supplies tracing, and credentialing. This indicates more blockchain adoption is ahead for the healthcare sector in 2021 (ESG Intelligence).



Many businesses were forced to support remote work scenarios during the pandemic, but that doesn't mean they're ready to give up on the office entirely. In our survey, 44% of businesses say they won't be ready to operate without a central work hub for at least another 12 months.
(Info-Tech survey, $n=170$)

DISTRIBUTED AUTONOMOUS ORGANIZATIONS

Recommendations

Initiatives

To develop your maturity toward being a distributed autonomous organization, pursue initiatives that will have the following outcomes:

- Increase individual autonomy. Create processes and tools that allow employees to get their work done without having to rely on others.
- Increase organizational autonomy. Diversify and vertically integrate your supply chain where possible to increase your organization's control over its key inputs.
- Boost digital collaboration among workers.
- Reduce the friction of working asynchronously across time zones.

Info-Tech Resources

[*Sustain Work-From-Home in the New Normal*](#)

[*Build a Digital Workspace Strategy*](#)



TREND 2

Self-Sovereign Cloud

Balancing the capabilities of the public cloud with the control and privacy of on-premises infrastructure.

Absorb



“I want to use emerging technologies to solve hybrid cloud challenges for me too. I'm going to use AI/ML to do that analysis and the interrogation of resources to help me create better decision making around how we deploy resources in the cloud.”



Craig Tavares
Global Head of Cloud, Aptum



Listen to the Tech Insights podcast:
The flexible future of cloud
computing with Aptum

Self-Sovereign Cloud

Balancing the capabilities of the public cloud with the control and privacy of on-premises infrastructure.

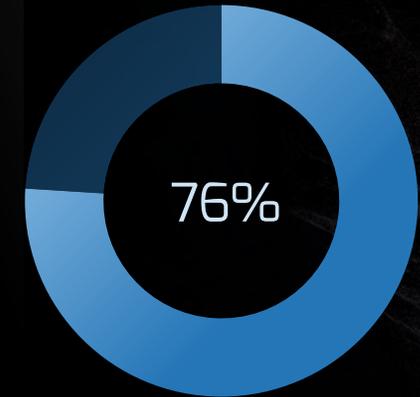
The pandemic had an uneven effect on the cloud computing industry. Some industries needed to ramp up digital capabilities to meet the growing demand of a world stuck at home, while others saw their infrastructures shrivel as conducting business became very difficult or impossible.

The growth of public cloud services shrank for the first time in several years, but many expect a return to accelerating growth in a post-pandemic world (Analytics Insight). That leaves customers requiring a flexible infrastructure to meet the challenge of fulfilling peak demand while also controlling costs.

2020 also saw increasing complexity of the regulatory environment around cloud computing. The executive branch of the US government waded into the market to require Chinese-based firms to boost data residency in the US. A Court of Justice of the European Union ruling invalidated the EU-US Data Protection Shield, leaving organizations doing business in Europe to draft custom agreements around data sharing (McCarthy Tétrault). It's anticipated other economies around the world have additional draft legislation on the table for data residency requirements.

Regulated industries demand stronger end-to-end encryption from cloud providers. Until this year, encryption was possible only while data was in transit and at rest, but now it's possible for data to be encrypted while being processed. Google's Confidential Computing launched a cloud service that allows virtual machines to remain encrypted while being processed. IBM now offers an open-source toolkit for developers to start building with homomorphic encryption, which also allows data to be encrypted while in use (ZDNet).

The combined effect is a greater focus on hybrid cloud infrastructure that can be managed by software. Customers want control over where their workloads sit from an infrastructure and geographic perspective. They also need their cloud management platforms to seamlessly integrate encryption, easily enforce policies, and receive recommendations on resources management. Machine learning will play a role in delivering those recommendations.



“76% of countries have existing or draft legislation in place to secure individuals’ private data.”

Source: AWS Infrastructure Solutions

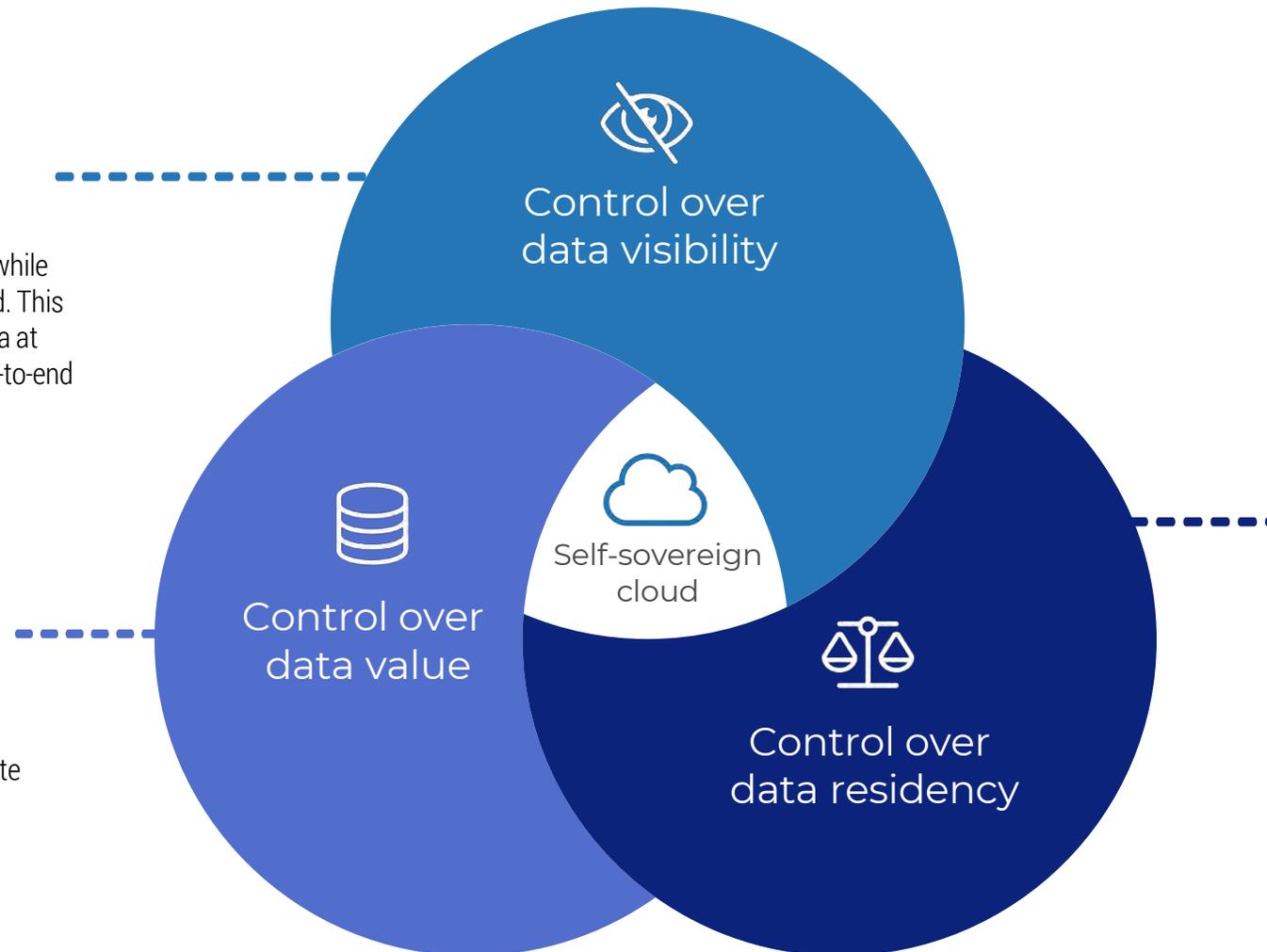
Self-sovereign cloud means maintaining maximum control over your cloud infrastructure

End-to-End Encryption

In 2020, the ability to encrypt data while it's being processed was introduced. This complements the encryption of data at rest and in transit to make true end-to-end encryption possible.

Optimal Infrastructure

Hybrid cloud infrastructure takes advantage of public cloud and private cloud to run workloads in the most effective and cost-efficient way.



Compliant in Legal Jurisdiction

Increasing data residency requirements mean an organization must store data within a specific geography depending on where it does business.

SELF-SOVEREIGN CLOUD Case Study

Situation

Managed cloud services and data center hosting firm Aptum found that the pandemic had very different effects on the infrastructure requirements for its international customer base. Customers in some industries needed to scale very quickly. For example, retailers needed to support more e-commerce capacity.

Other industries had to scale back their cloud investments because there was no way to continue business, such as in the travel and tourism industry. Those customers had to maintain their infrastructure for minimum cost while also being ready to return to business when the opportunity arose. Some customers also needed to outsource data center operations because of health precautions limiting their own staff's ability to work at a physical location.

Complication

Aptum operates internationally, with data centers in Canada, the UK, and the US. Its customers are also based around the world and must adhere to various jurisdictional regulations. Recent developments in government regulation of how data is stored, transmitted, and accessed create more uncertainty for the future of compliance regimes for Aptum's customers.

At present, nine of the world's largest economies have data residency requirements. It's expected that more governments will introduce regulations in 2021. Aptum must also meet industry-level standards such as the Payment Card Industry Data Security Standard, which includes requirements for end-to-end encryption for specific data.

Resolution

Aptum recognized that customers wanted flexibility in the design of their infrastructure. Moving workloads between the public cloud and an on-premises data center provided better economies as business needs shifted. Certain applications provided better economies of scale in the public cloud, while others were better suited to non-metered infrastructure.

To assist its customers in strategically deploying cloud workloads, Aptum provides a cloud management platform with a machine learning capability to conduct forensics on workloads and forecast outcomes for value and costs. It provides recommendations to users on how to best optimize their workloads from a performance and cost perspective. It also makes recommendations for better security and account controls.

The platform also provides customers with visibility into where their data inventory is deployed and helps to match them with governance policies to ensure compliance can be maintained.



SELF-SOVEREIGN CLOUD

Human Benefits

Trust

Transparency in where data is stored and what it's used for is required for customers to trust organizations as data custodians. Applying the same policies consistently to data despite the infrastructure will help inspire trust.

Experience

A proper hybrid infrastructure is a complicated environment, and determining the best management approach isn't easy. Using machine learning to recommend how to optimize infrastructure alleviates one technical challenge faced by IT and allows them to focus on other strategic areas.

Resilience

A hybrid cloud approach that involves multiple public clouds not only provides organizations with a sound infrastructure to back a business continuity strategy but also creates the most flexibility for an unpredictable regulatory environment. Adapting to data residency requirements with a flexible infrastructure is preferable to other solutions to continuing business in a jurisdiction with a tough compliance regime, which could involve legal challenges or new business partnerships that wouldn't otherwise be warranted.

Uncertainties

Regulatory battles. An uncertain regulatory landscape around the world leaves companies unsure of what new data residency requirements could be introduced in various regions. To simplify operations, companies with an international customer base will mostly choose to comply with the strictest set of rules governing them.

Antitrust lawsuits. Hyperscaler public cloud providers are facing antitrust lawsuits. Google faces one in the US, and Amazon faces one in the European Union. Litigation will likely stretch out for years with unclear implications for customers of the cloud services divisions of these firms.

Post-pandemic era. COVID-19's grip on the global economy remains the dominant factor as we enter 2021. Whether efforts to distribute a vaccine or manage infections will be effective remains to be seen. If the post-pandemic era does begin, it will unfold one region and one industry at a time, leading to an uneven economic recovery.

What's Next

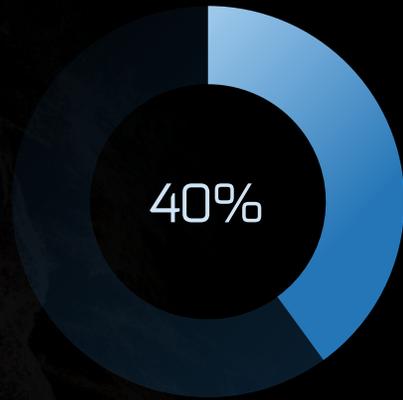
Expect cloud providers to respond to the regulatory environment by accelerating efforts to provide local nodes in more regions. More efforts will be made to provide cloud capabilities on premises as well with various options for appliances providing public cloud infrastructure within an organization's own firewall.

Future regions announced by hyperscalers:

Amazon Web Services (AWS) – Spain, Switzerland, Hyderabad, Jakarta, Osaka, Melbourne (“Global Infrastructure,” [AWS](#))

Azure – Austria, Taiwan, Denmark, Western US, Mexico, Spain, Sweden, Poland, Greece, Israel, Qatar, Taiwan ([Microsoft Azure](#))

Google – Poland, Australia, Canada, India, Qatar ([Google Cloud](#))



Navigating data sovereignty legislation could mean migrating data to be stored in the right place at the right time. Yet four in ten organizations say they won't be able to achieve it for at least another 12 months.
(Info-Tech survey, $n=179$)

SELF-SOVEREIGN CLOUD Recommendations

Initiatives

To work toward infrastructure maturity that gives you control and flexibility in a hybrid cloud model, pursue initiatives that will realize these outcomes:

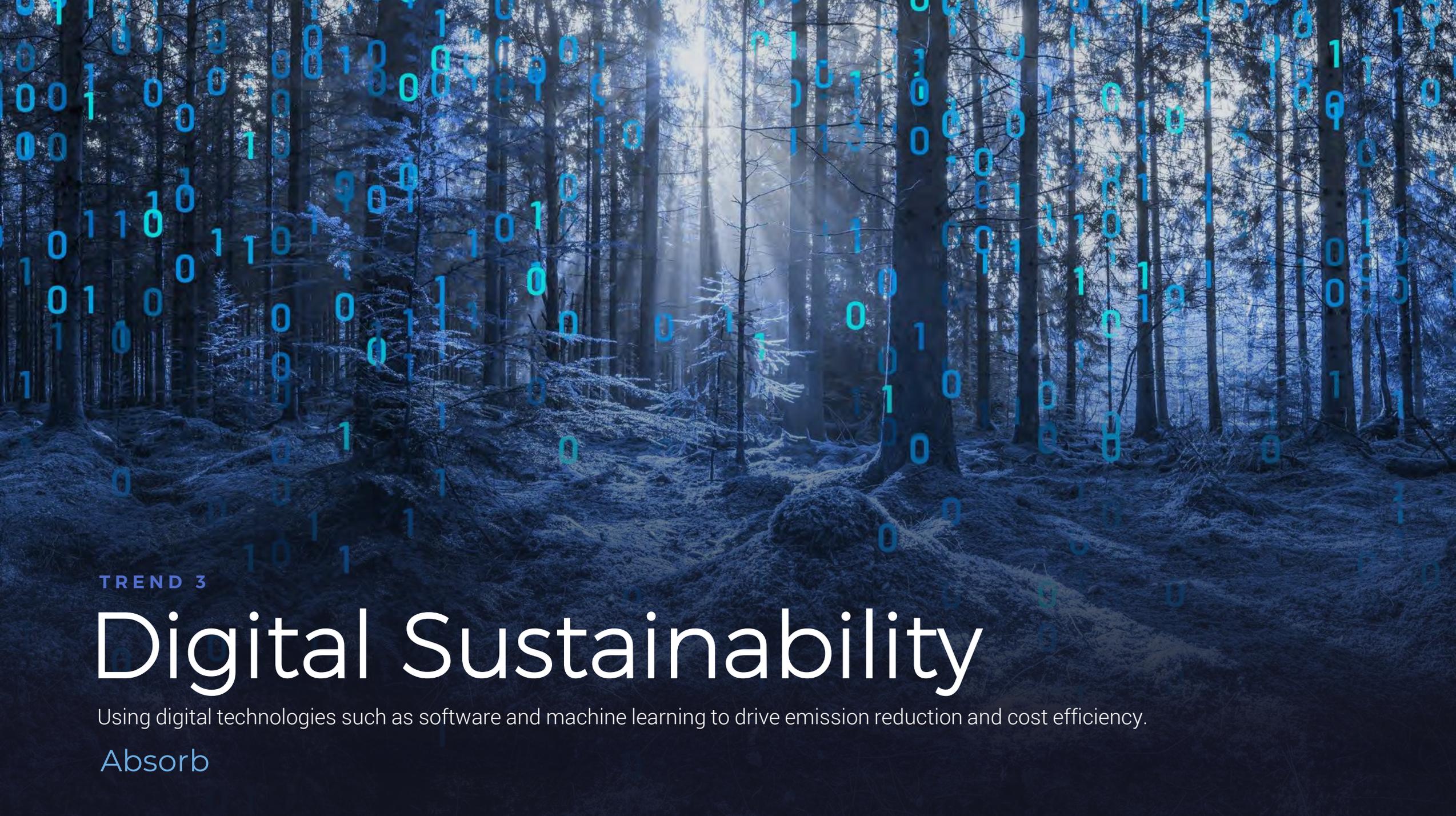
- Transparency in where your data is stored from a geographic and infrastructure perspective.
- Automated recommendations on how to best optimize workloads across several variables including performance, cost, security, and policy.
- True end-to-end encryption that includes encryption of data at rest, in transit, and while being used.

Info-Tech Resources

[Modernize the Data Center with Software-Defined Infrastructure](#)

[Take Control of Cloud Costs on AWS](#)

[Master the Public Cloud IaaS Acquisition Models](#)



TREND 3

Digital Sustainability

Using digital technologies such as software and machine learning to drive emission reduction and cost efficiency.

Absorb

“It creates a virtuous cycle if we’re all moving together; it reduces the impact on everybody else’s businesses so we can all become more effective and more efficient and also be more nimble in the face of changing climates and changing regulation.”



Michelle Lancaster
Director of Sustainability Partnerships,
Microsoft



Listen to the Tech Insights podcast:
Digital sustainability with
Microsoft's Michelle Lancaster

Digital Sustainability

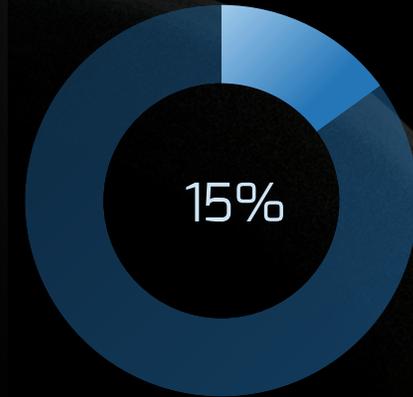
Using digital technologies such as software and machine learning to drive emission reduction and cost efficiency.

COVID-19 isn't the only crisis gripping the world in 2020. The climate crisis still looms, and curbing the carbon emissions causing global warming will take decades of consistent effort and good policy making.

In the past, one barrier to curbing global warming has been that reducing emissions was seen as contrary to business goals. Less emissions meant less energy use and slowing growth. But with catastrophic effects of climate change now looming unless the world can achieve net-zero carbon emissions in just 30 years' time, the tide is turning.

More businesses are embracing reductions in carbon emissions and making them a prominent part of their business strategies. Measures to reduce carbon emissions also result in cost savings on energy bills and a more resilient energy infrastructure. Large firms from various industries are committing to making their operations carbon neutral, including Amazon, Google, Nike, HSBC, Swiss Re, and Vancity (David Suzuki Foundation).

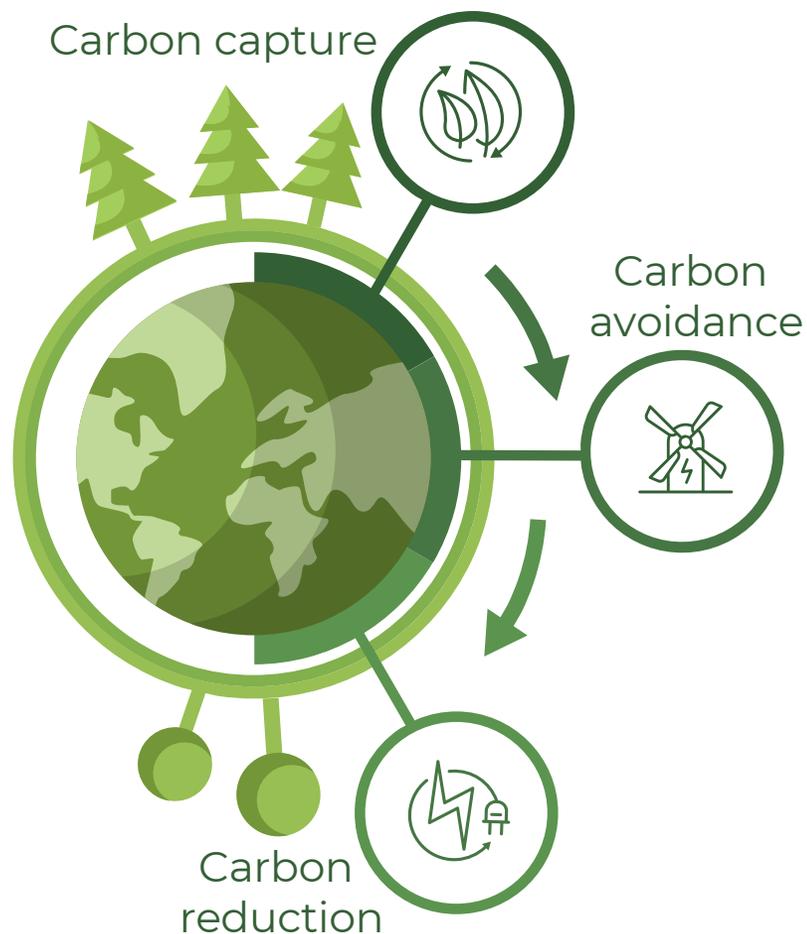
Information and communications technology is often viewed as a contributor to global warming because of its required electricity use. But advances in carbon-free energy sources can reduce that impact. More importantly, digital technologies can have a major impact by helping organizations reduce their carbon emissions in other ways, with several technologies playing key roles (see next slide).



Digital technologies could already help reduce global carbon emissions by up to 15% through solutions in energy, manufacturing, agriculture, buildings, services, transportation, and traffic management.

Source: World Economic Forum

Digital sustainability applies technology to the goal of net-neutral carbon emissions by 2050



AI

Accelerated search for catalyst that converts carbon dioxide into ethylene, a useful commodity, helping to create a market for captured carbon waste.

(University of Toronto Engineering News)

Used to optimize and forecast electricity use in data centers to plan for required renewable energy to be produced.

Used in digital twins to simulate different retrofit scenarios and assess environmental impacts, helping planners choose sustainable options.

(“Digital Twin Aided Sustainability and Vulnerability Audit for Subway Stations,” Sustainability, 2020)

IoT

Carbon dioxide sensors and VOC sensors connected to the cloud used in proof-of-concept Household Cryogenic Carbon Capture device entered in Keysight IoT Innovation challenge.

(Keysight Technologies)

Sensors deployed in smart grids help marry local energy demand to supply of renewable energy from nearby sources.

Help automate the HVAC and lighting systems of large buildings to avoid energy waste when people are not present.

5G

5G networks have potential to connect carbon sensors across a wide area to measure the effects of capture efforts.

Reduces operating costs of renewable energy producers and facilitates a network monitoring energy demand and supply from renewable sources.

5G base stations can be put into “sleep mode” when there are no active users, which is one advantage of this technology over previous 4G networks.

(IEEE Spectrum)

Case Study

Situation

Microsoft is committed to becoming a carbon negative company, which means that it will not only cease creating carbon emissions based on its own business, but it will also erase its historical emissions by offsetting more carbon emissions than it creates by the year 2050.

Microsoft's Azure cloud services consume a lot of energy and are expanding in scope and scale every year. Future growth is anticipated to continue accelerating with more regional data centers launched and more customers onboarded. To operate the data centers as carbon neutral, Microsoft is shifting to a 100% renewable energy supply by 2025.

In 2018, Microsoft commissioned a study to compare the energy consumption and carbon emissions of four applications in the Microsoft Cloud with their on-premises equivalents. It found that the cloud was between 22 and 93% more efficient than traditional data centers based on the efficiency of operations, equipment, and infrastructure as well as the use of renewable electricity.

Complication

Microsoft wanted to easily communicate the carbon reduction benefits to its customers. Its customers wanted transparency into the commitments Microsoft made with its Azure cloud services, such as where the investments it makes in renewable energy go.

Customers adhering to global accounting standards are also challenged in tracking the emissions they are accountable for in using Azure cloud services. A complete picture must include the carbon costs of anything manufactured or expended, directly or indirectly, by your organization. Organizations often feel they have little control over this category of emissions.

Sources: Michelle Lancaster interview; "The carbon benefits of cloud computing," Microsoft, 2020

Resolution

Microsoft launched a Power BI tool called the Microsoft Sustainability Calculator. Based on previous research Microsoft conducted with the help of an environment verification body, the calculator captures carbon emissions information such as the energy requirements of Azure cloud computing. It also considers the source of energy and the electric grid serving the data centers.

Customers can compare how workloads in their own data center stack up against transmitting data to Azure and running it in the cloud. The calculator estimates the greenhouse gas emissions in metric tons, with helpful analogies to understand the impact, such as comparing the emissions to miles traveled in a car.

This tool can help customers save costs when operating in a jurisdiction that enforces a carbon tax.

Human Benefits

Carbon reductions yield other business benefits

Microsoft's collaboration with Shell to move toward carbon-neutral operations includes using AI to find operational efficiencies. Shell is also working on a new business opportunity by offering digital tools to customers and suppliers trying reduce their carbon footprints ("Shell and Microsoft Form Alliance to Help Address Carbon Emissions," Microsoft, 2020).

Google's use of its DeepMind AI algorithms to manage the energy efficiency of cooling its data centers achieved a 40% reduction in the amount of energy needed for cooling, cutting its cooling bill while working toward its goal of operating carbon-neutral data centers by 2030 (DeepMind).

Trust

Digital tools tracking carbon emissions create transparency into an organization's operations and demonstrate that it is accountable to its carbon emissions reduction goals.

Experience

People are more interested than ever in patronizing businesses that reflect their values. With customers interested in sustainable products, digital tools can help companies achieve carbon reduction goals and communicate them to customers, building the values-based relationship with them.

Resilience

Reducing carbon emissions and moving toward a carbon-neutral future will help avert disruptive climate change that would negatively affect many people. Also, reduced energy usage often comes with cost savings, allowing people to reinvest and create value elsewhere.

Uncertainties

Government commitments. The Paris Accord, which is motivating companies' move to be carbon neutral, doesn't include every country. There's also no guarantee that signatories will remain committed. Recent years have demonstrated that a change in government can change a country's commitment to the accord. If countries don't cooperate, there will be less incentives for organizations to pursue the outlined goals.

Market for captured carbon. Extracting carbon from the atmosphere could help in achieving net-zero emissions, but at present the only model to do so is a costs-only model that would have to be funded by governments or charity. If a use can be determined for captured carbon and if a market can be created, organizations would have more incentives to pursue this highly technical activity.

5G's true efficiency. While the 5G base stations have a new capability to turn off their power consumption while not in use, many will also operate on higher-spectrum frequencies that will require much more power output compared to 4G base stations. 5G will also require a greater density of nodes to operate on higher frequencies. There is no consensus on the true overall energy costs of operating 5G networks compared to 4G.

Source: IEEE Spectrum

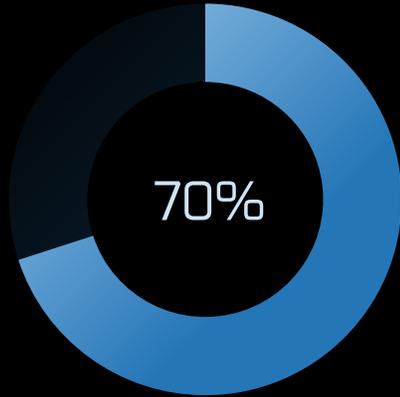
What's Next

Digital twins will be used to reduce carbon emissions in several ways.

One way is by modeling the carbon-capture capabilities of new power generation techniques that burn hydrocarbon fuels without emitting carbon into the atmosphere. Durham, N.C.–based NET Power is using digital twin technology at its test facility in La Porte, Texas, to develop a power plant that converts natural and renewable gas into zero emissions power. It plans to launch a commercial plant in 2022 (Energy Procedia).

Digital twins could be combined with geospatial technology (GIS) and machine learning to evaluate carbon emissions. In South Korea, researchers demonstrated that digital twins of a region can visualize a detailed view of carbon emissions and simulate how urban planning adjustments would impact them ("GIS-Enabled Digital Twin System for Sustainable Evaluation of Carbon Emissions," Sustainability, 2020).

Digital twins can also be used to conduct audits of subway stations, evaluating their carbon emissions impact over their entire lifecycle from construction to operation to demolition. Researchers conducted a case study using the Dadongmen subway station in Hefei, China. The study found that digital twins can help improve construction efficiency and evaluate retrofit options that cost less and emit less carbon ("Digital Twin Aided Sustainability and Vulnerability Audit for Subway Stations," Sustainability, 2020).



The world needs to halve its carbon emissions by 2030, yet 70% of organizations say they aren't able to harness digital technology to reduce carbon emissions until a year or longer. (Info-Tech survey, $n=163$)

DIGITAL SUSTAINABILITY

Recommendations

Initiatives

To improve your organization's digital sustainability, create initiatives that will yield these capabilities:

- Accurately measure and assign accountability for carbon emissions based on energy consumption and materials used by the organization.
- Estimate the carbon emissions created as a result of working with suppliers and other partners.
- Compare current-state IT operations to possible future-state scenarios on an energy consumption basis.

Info-Tech Resources

[*Green IT Is Now a Key Component of Sustainability and Competitiveness*](#)

[*The Future of Energy: Facing the "New Normal"*](#)

[*Sustain and Grow the Maturity of Innovation in Your Enterprise*](#)



TREND 4

Machine Learning by Design

Harnessing machine learning as a core piece of the organization's value proposition.

Adapt

“We might bring back a lot of dead people and see what happens.”



Idris Mootee

CEO and cofounder of Urbancoolab and author of *Design Thinking for Strategic Innovation*



Listen to the Tech Insights podcast:
AI as fashion designer with Idris Mootee

Machine Learning by Design

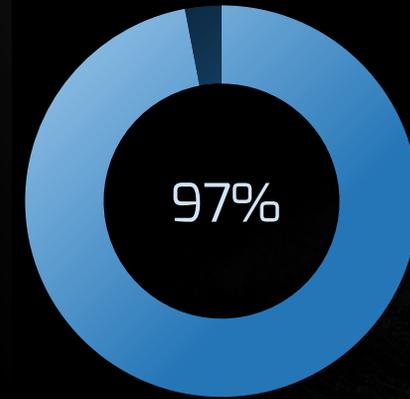
Organizational structure, team, and role design are influenced by machine learning. Harness machine learning as a core piece of the organization's value proposition.

The exponential growth in unstructured data, development of specialized processors, and improvement of algorithms are combining to create tremendous potential for machine learning to be a transformational force. But current organizational structures inhibit it.

Most businesses target processes that are lower in the value chain for improvement with machine learning. For example, many businesses now augment their customer service teams with a chatbot that uses natural language processing to triage incoming requests for help. While use cases like this provide good iterative improvements, they fall short of the transformational potential that's possible.

Disruptive businesses are integrating machine learning into the very top of their value streams. Using a platform structure, these organizations can build processes to operationalize AI effectively enough to tap its full potential. Designing for machine learning allows businesses to consider many more hypothetical solutions to the problems they are working to solve than people alone could muster. It can also accelerate proving out solutions (Mootee).

To build machine learning into the top of their value streams, organizations require sufficient data sources, effective quality review, and agile functional capabilities (Management Solutions).

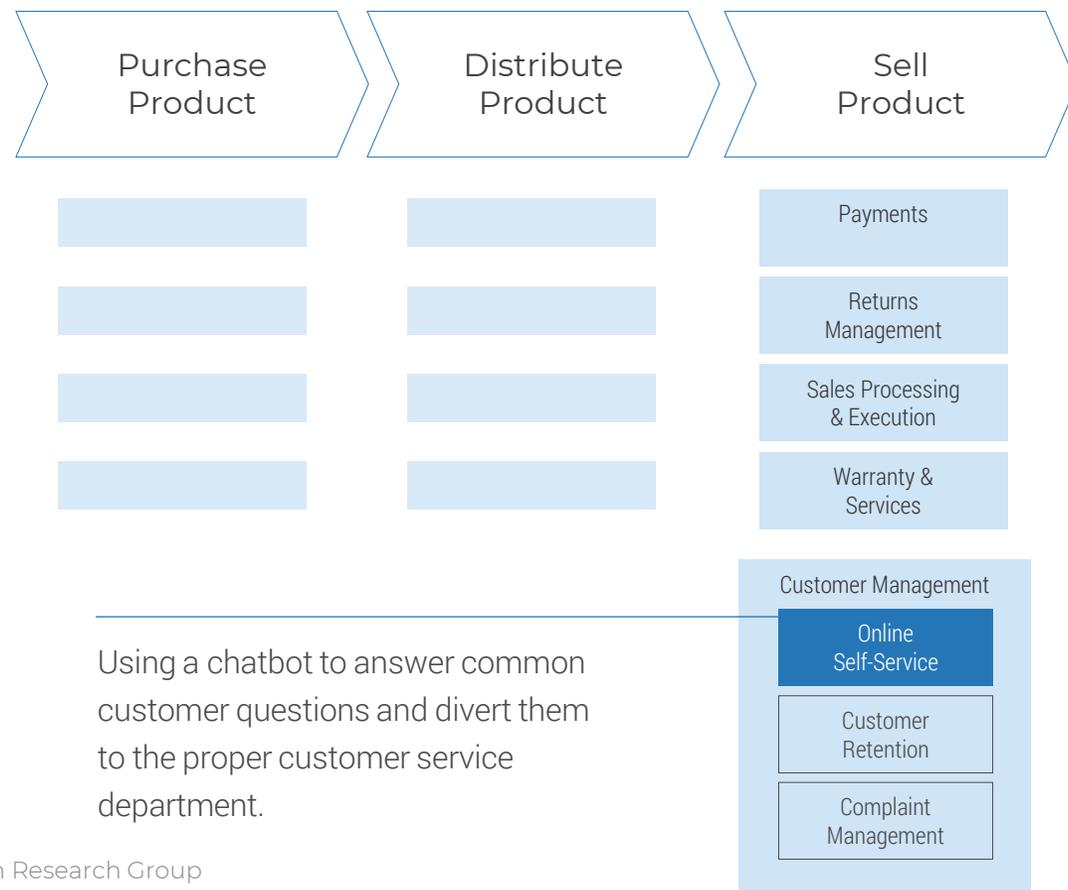


97% of enterprises say that having mature processes to deploy and operationalize machine learning at speed and at scale is essential to success.

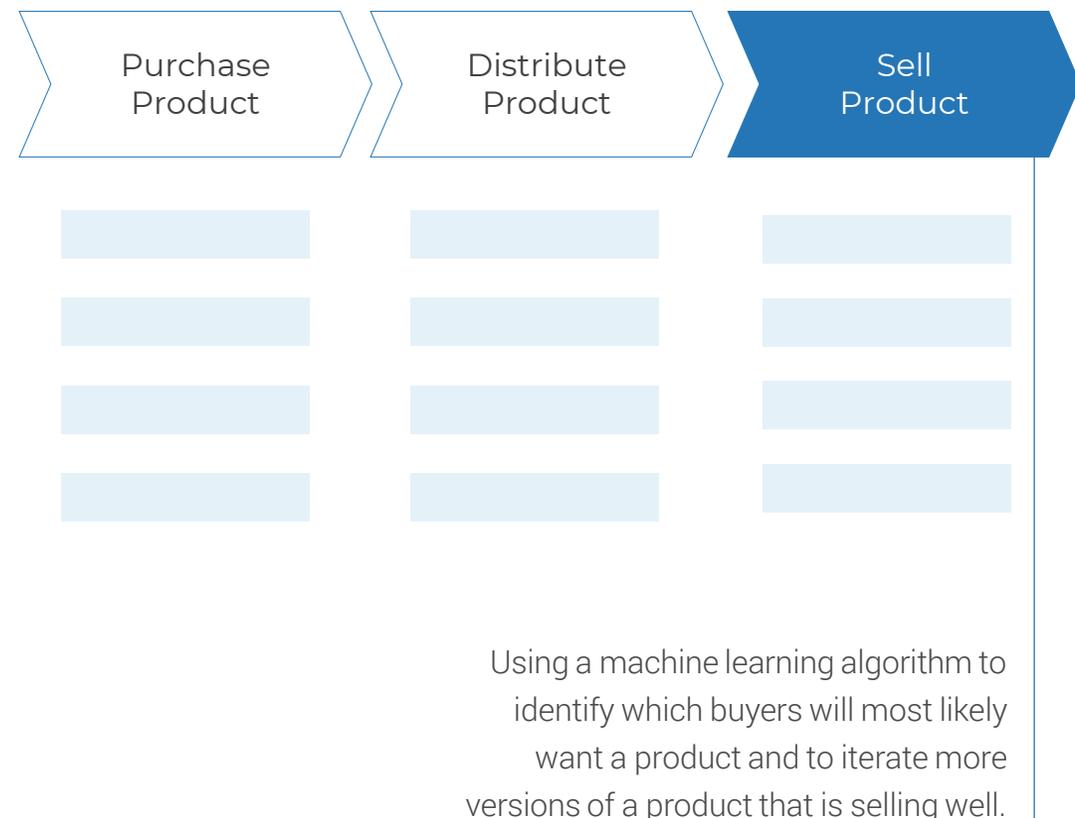
Source: HPE/Intel

Machine learning by design makes machine learning part of your core value proposition

Retail capability map with machine learning in **supporting role**



Retail capability map with machine learning in **core role**





Case Study

Situation

The global streetwear market makes \$185 billion in sales annually, about 10% of the overall global apparel and footwear market (Strategy&, PwC). It is growing in many regions but faces three key challenges:

1. **Mass consumerism.** The branding in the market is dominated by a handful of A-list celebrities that have mass appeal. Variety of voices is lacking and there's little opportunity for consumers to express more niche identities.
2. **Right-sized inventory.** Clothing retailers choose designs they are confident can sell at least one million units of apparel before they commercialize the designs. That further limits the designs available, and if a retailer overestimates the demand for a particular design, it is wasteful.
3. **Long product cycle.** It typically takes five months to go from design to sale, and so-called "fast fashion" retailers can do it in 20 to 25 days.

Complication

Many large companies lag behind disruptive first movers because they adhere to legacy processes and technology stacks. That organizational structure was created long before AI's emergence, so applying AI in a meaningful way is difficult. There's also a scarcity of true AI talent available on the market.

AI could be applied at each stage of the design process, but it requires the right criteria. Enough data must be available to train the model. The data must also be meaningful to inform good design, and the knowledge extracted by AI must be actionable. Urbancoolab is a 25-person startup that has put two and a half years of development into AI algorithms capable of turning an influencer's brand into a salable clothing design. It launched its platform in summer 2020.

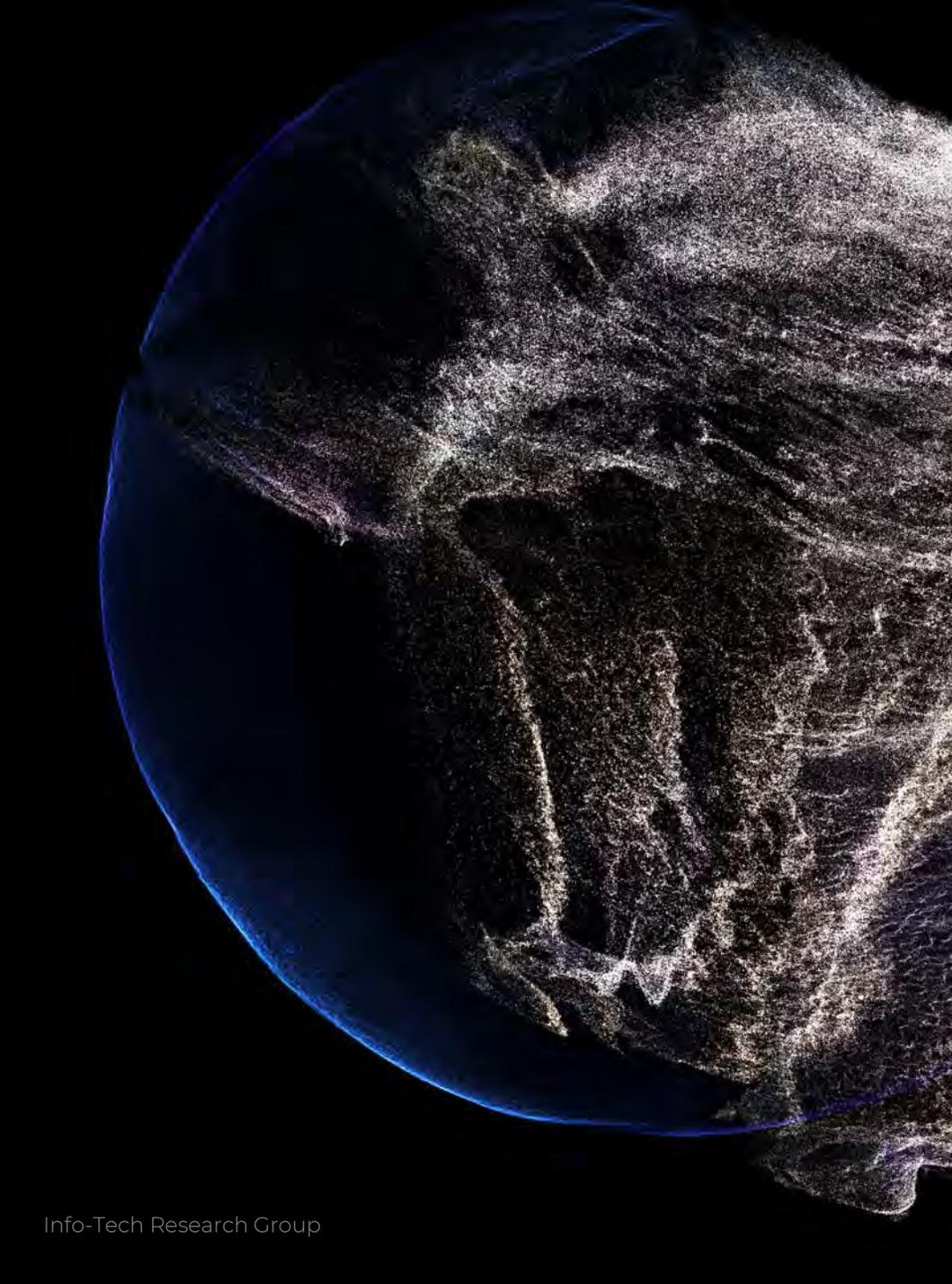
Resolution

The ambition of Urbancoolab's Idris Mootee is to give famous dead artists new life through AI-executed designs and to eventually scale to be a \$5-billion company. To start, Urbancoolab has a centralized team of AI scientists that develop algorithms and one line of streetwear, "Fear of What," that's dedicated to using AI designs. As it onboards more influencers to create designs and more customers to buy clothing, it will refine its ability to make successful designs and find other ways to use AI to augment its business.

By placing machine learning at the top of the value stream, Mootee is reinventing a business category. AI can find patterns in unstructured data in ways that humans can't, providing new designs at a rapid pace. It can also be used to help confirm which designs will find the most market success.

Urbancoolab has worked with 30 celebrity artists to date to launch commercial designs. It's able to take a new design to market on its e-commerce site within 24 hours, and it makes the clothing to order, ensuring nothing is wasted. Where designs are successful, they can quickly be iterated to provide more variety.





MACHINE LEARNING

Human Benefits

Trust

Humans don't trust algorithms, so transparency is required. People expect to know when AI is involved in a system and to understand how it works.

Experience

Machine learning has the potential to unlock creative capabilities. It can quickly scan data sets to determine a range of hypotheses, and it can reinforce which theories are being proven in practice.

Resilience

Humans often don't see flaws in a system until it's too late and a major error causes a disruption. Machine learning can quickly detect when a system is outside the normal range and can counteract it before it's a problem.

Uncertainties

Bias. Machine learning algorithms are only as good as the data used to train them. A company that's relying on machine learning for a crucial process could be vulnerable if it is training algorithms with datasets that are limited or flawed.

Talent. Skilled AI scientists are a scarce commodity on the hiring market. Most that are in the field either work in academia or for large technology firms in Silicon Valley. As a result, it's difficult to hire talent capable of developing intellectual property in AI (Mootee).

Privacy. Where machine learning algorithms meet any customer or employee data, privacy laws in various regions regulate what data can be collected and for what purpose.

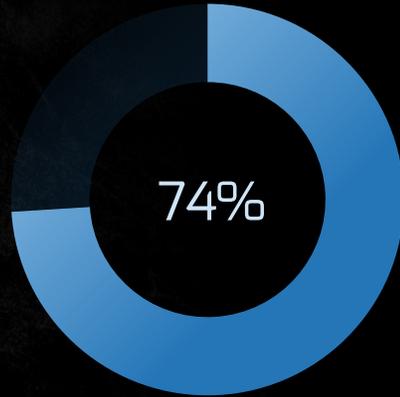
What's Next

Machine learning is beginning to influence how research robots are designed and is democratizing robotic research through open-source projects and accessible components. Robotics researchers building legged robots are coming to a consensus that machine learning is the best approach to achieve movement that's reliable and resilient.

Because teaching a legged robot to walk, run, or jump with machine learning is unpredictable in its early stages, it's important that the test robot be small and lightweight to avoid damage (and injury!). The research also benefits from having as many different motion algorithms created as possible so researchers can determine the techniques that are most efficient and lead to the best range of motion.

Examples of open-source robotics projects that are designed to enable researchers to test machine learning algorithms on physical systems include the Open Dynamic Robot Initiative and the Stanford Robotics Club.

Sources: IEEE Robotics and Automation Letters; Stanford Robotics Club



Organizations that are able to make machine learning a core part of their value propositions stand to thrive in the near term. But 74% of organizations say they won't be able to harness strategic machine learning for at least another year or more.
(Info-Tech survey, n=169)

MACHINE LEARNING BY DESIGN

Recommendations

Initiatives

Improve your maturity in using machine learning as a strategic differentiator with initiatives that deliver these outcomes:

- Identify existing processes that could be rethought and improved upon by using machine learning.
- Collect and store unstructured data in a way that's accessible and manageable.
- Create a central function for machine learning in your organization and have it collaborate with other lines of business as required.

Info-Tech Resources

[Adopt Design Thinking in Your Organization](#)

[Get Started With Artificial Intelligence](#)

[Mitigate Machine Bias](#)



TREND 5

Citizen Development 2.0

Enabling nontechnical contributors to use and create AI combined with low-code and no-code environments.

Adapt



“I wouldn’t define myself as a technologist or a developer. It’s really about focusing on the issues and determining how can tech help solve the problem? It’s really about refining the problem and thinking through how tech can help.”



Skaidra Puodziunas
Co-organizer, Civic Tech Toronto



Listen to the Tech Insights podcast:
How the Citizen Developer helps
solve local community problems

Citizen Development 2.0

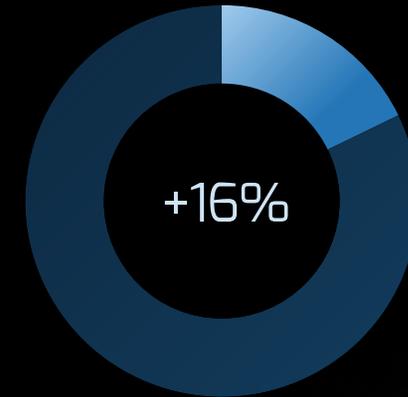
Enabling nontechnical contributors to use and create AI combined with low-code and no-code environments.

Low-code and no-code platforms enable nontechnical users to create custom business applications. Cloud platforms such as Microsoft Power Apps and Salesforce Lightning allow citizen developers to create process-specific solutions.

Common apps developed in this category include reporting and administration tools such as calendar planning, quote generation, performance appraisal and reporting, and payment calculators (Betty Blocks).

Popular citizen development platforms have recently extended their capabilities into AI. Since these platforms are backed by scalable infrastructure, it's possible to support the training of new learning models and execute them on demand for end users. Capabilities added to these platforms allow no-code training of machine learning models, including cognitive vision models that can be trained with as few as 15 images. Users can also leverage machine learning for complete custom solutions such as chatbots.

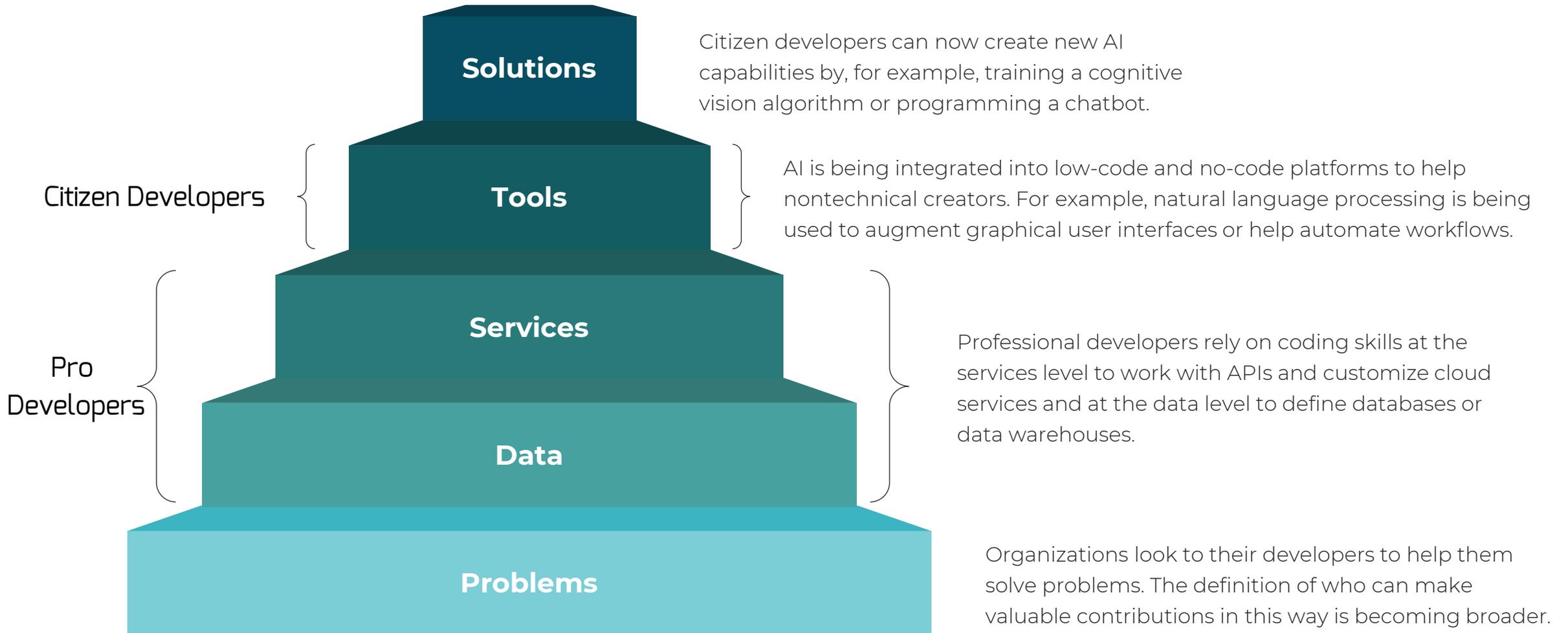
In Citizen Development 2.0 we'll see the evolution and expansion of low-code and no-code platforms. Platform vendors have built the common data structures and user interfaces that enable business users to take their workflows and automate them across multiple applications. Now those capabilities will be surfaced at touchpoints even more accessible to users and will enable new AI capabilities (Verdict).



Low-code users had a 16% higher self-assessment score for digital transformation maturity than those not using low-code tools.

Source: OutSystems

Citizen development 2.0 is defined by nontechnical workers using and producing AI



Citizen developers can now create new AI capabilities by, for example, training a cognitive vision algorithm or programming a chatbot.

AI is being integrated into low-code and no-code platforms to help nontechnical creators. For example, natural language processing is being used to augment graphical user interfaces or help automate workflows.

Professional developers rely on coding skills at the services level to work with APIs and customize cloud services and at the data level to define databases or data warehouses.

Organizations look to their developers to help them solve problems. The definition of who can make valuable contributions in this way is becoming broader.

CITIZEN DEVELOPMENT 2.0

Case Study

Situation

The City of Toronto faced a bicycle parking problem. Parking was hard to find, lacked security, and took a long time to repair. Cyclists were frustrated by the situation and felt that it limited their mobility around the city. Businesses also suffered because cyclists who were unable to park couldn't come into their stores. The problem also became a pedestrian issue as cyclists improvised by locking bikes up to any street furniture available.

Complication

Toronto kicked off a ten-year Cycling Network Plan in June 2016. It wanted to collaborate with cyclists enthusiastic about improving their experience in the city and to find a solution for parking quickly, but it didn't have a defined mechanism to accomplish that. Volunteer group Civic Tech Toronto got involved by bringing together designers and developers to create a crowd-sourced data solution. Meeting weekly during the group's hack nights, the volunteers built a system that allowed cyclists to report on parking options or problems using a mobile app or website. Users of the system, dubbed BikeSpace, could easily find parking near their location using a map.

Source: Skaidra Puodziunas interview; CBC News

Resolution

The City of Toronto partially funded a product manager to collaborate with BikeSpace volunteers to further develop the solution. The City began supporting the crowd-sourced data effort by releasing a machine-readable open data set to its open data portal every week. In its first year of operation, between June 2018 and June 2019, the network received 205 relevant reports. BikeSpace was incorporated into Toronto's cycling strategy and will be supported through 2025.

Human Benefits

A growing dictionary

While no-code platforms are enabling more people to harness AI capabilities, AI will also be used to augment what citizen developers can achieve. Natural language models are improving at an exponential rate, with model sizes doubling every 3.4 months. If that growth rate continues, within the next five years we'll see a language model with more parameters than there are synapses in the human brain. Just as we didn't see all the potential uses for computers when Moore's law was first posited, we're very likely underestimating the impact of exponential growth for machine learning models (Debuild).

Trust

Open or accessible data used for citizen development creates better transparency within an organization and among various stakeholders.

Experience

Nontechnical users are empowered to create their own technology solutions and automate tedious aspects of their workflow, freeing them up to apply themselves to higher value tasks.

Resilience

Creating tools that widen the available pool of contributors to technology solutions enables an organization to get the most value out of its entire workforce. Individuals can build on their existing skill sets to stay relevant in a modernizing economy.

Uncertainties

Artificial, but not intelligent. Hastily trained machine learning algorithms may appear sufficient to business users when tested in small samples but then be exposed as flawed or biased when used with a higher volume of data. Algorithms trained by nontechnical users are recommended for non-mission-critical tasks, and safeguards should be put in place.

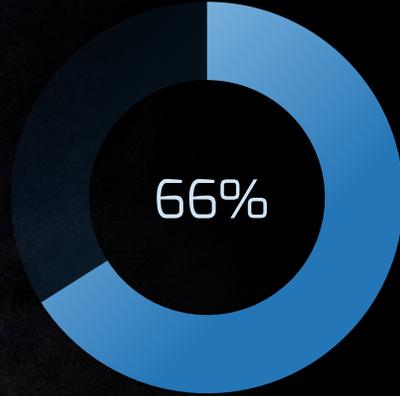
Documentation lamentation. IT teams in enterprises are familiar with the pain involved in creating too many customizations for applications. What's built differently from the mainstream must be maintained through internal resources. When business users start bolting on custom-built aspects to their applications, they may do so without proper documentation and create a challenge for others who need to do the same job in future or who otherwise interact with the workflow.

Shadow IT by another name. As no-code and low-code customization options enhanced by AI are integrated into popular business productivity software, such as Microsoft Teams, they will enter organizations that lack a plan to support them. In some instances, that will lead to IT barring users from these new features, and in others it will see business users creating new solutions that are redundant and unwieldy.

What's Next

Soon all that's needed to build an app could be to explain it in plain language. Research lab OpenAI, cofounded by Elon Musk, offers the natural language generation tool GPT-3, which has already been used to create games, write job descriptions, and answer fitness questions. In July, developer Sharif Shameem demonstrated a new proof of concept for the neural network on Twitter, showing how a sentence describing Google's home page resulted in GPT-3 generating the code for it. Shameem plans to build out this capability for Debuild, a no-code tool that will build web apps from just a description of what they look like and how they work.

Source: Business Insider



Supporting nontechnical users in creating technology solutions will boost productivity, but two-thirds of organizations won't be able to support users that way for at least another year. Almost one-quarter say it will take them at least 48 months to deliver that support.
(Info-Tech survey, $n=179$)

CITIZEN DEVELOPMENT 2.0

Recommendations

Initiatives

To better support citizen developers in your own organization and take advantage of new AI capabilities for nontechnical users, focus on initiatives that will:

- Identify where new AI capabilities are being added to existing business productivity software used by the organization and adopt these new capabilities quickly.
- Make organizational data as open and as accessible as possible while also respecting security and privacy concerns. Enhance awareness in your organization of what data is available.
- Create a governance structure that guides what should and should not be done by line-of-business users when building new software. Make IT resources available for coaching and support.

Info-Tech Resources

[*Position IT to Support and Be a Leader in Open Data Initiatives*](#)

[*Government as a Platform: Reinventing the Municipal Service Model*](#)



TREND 6

Venture Architecture

Developing and launching innovative new technology ventures from within.

Adapt

“A very important skill set for a founder or a startup to have is to be responsive to the needs of your customers while holding on to what makes you unique and good.”



Sumit Arora

Senior Director, Strategy & Analytics
Digital Labs, MLSE



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Performance technology for pro
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Venture Architecture

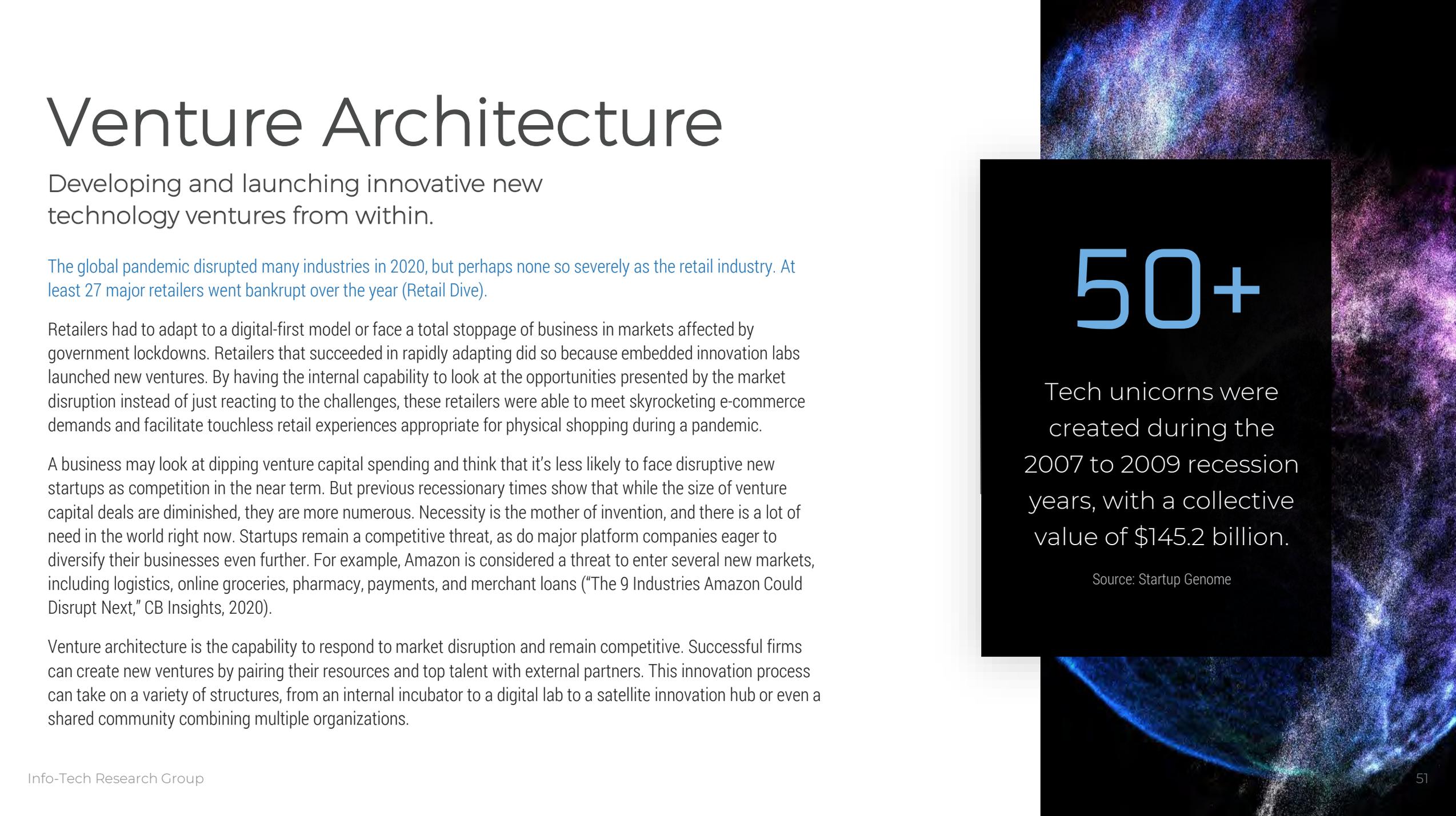
Developing and launching innovative new technology ventures from within.

The global pandemic disrupted many industries in 2020, but perhaps none so severely as the retail industry. At least 27 major retailers went bankrupt over the year (Retail Dive).

Retailers had to adapt to a digital-first model or face a total stoppage of business in markets affected by government lockdowns. Retailers that succeeded in rapidly adapting did so because embedded innovation labs launched new ventures. By having the internal capability to look at the opportunities presented by the market disruption instead of just reacting to the challenges, these retailers were able to meet skyrocketing e-commerce demands and facilitate touchless retail experiences appropriate for physical shopping during a pandemic.

A business may look at dipping venture capital spending and think that it's less likely to face disruptive new startups as competition in the near term. But previous recessionary times show that while the size of venture capital deals are diminished, they are more numerous. Necessity is the mother of invention, and there is a lot of need in the world right now. Startups remain a competitive threat, as do major platform companies eager to diversify their businesses even further. For example, Amazon is considered a threat to enter several new markets, including logistics, online groceries, pharmacy, payments, and merchant loans ("The 9 Industries Amazon Could Disrupt Next," CB Insights, 2020).

Venture architecture is the capability to respond to market disruption and remain competitive. Successful firms can create new ventures by pairing their resources and top talent with external partners. This innovation process can take on a variety of structures, from an internal incubator to a digital lab to a satellite innovation hub or even a shared community combining multiple organizations.

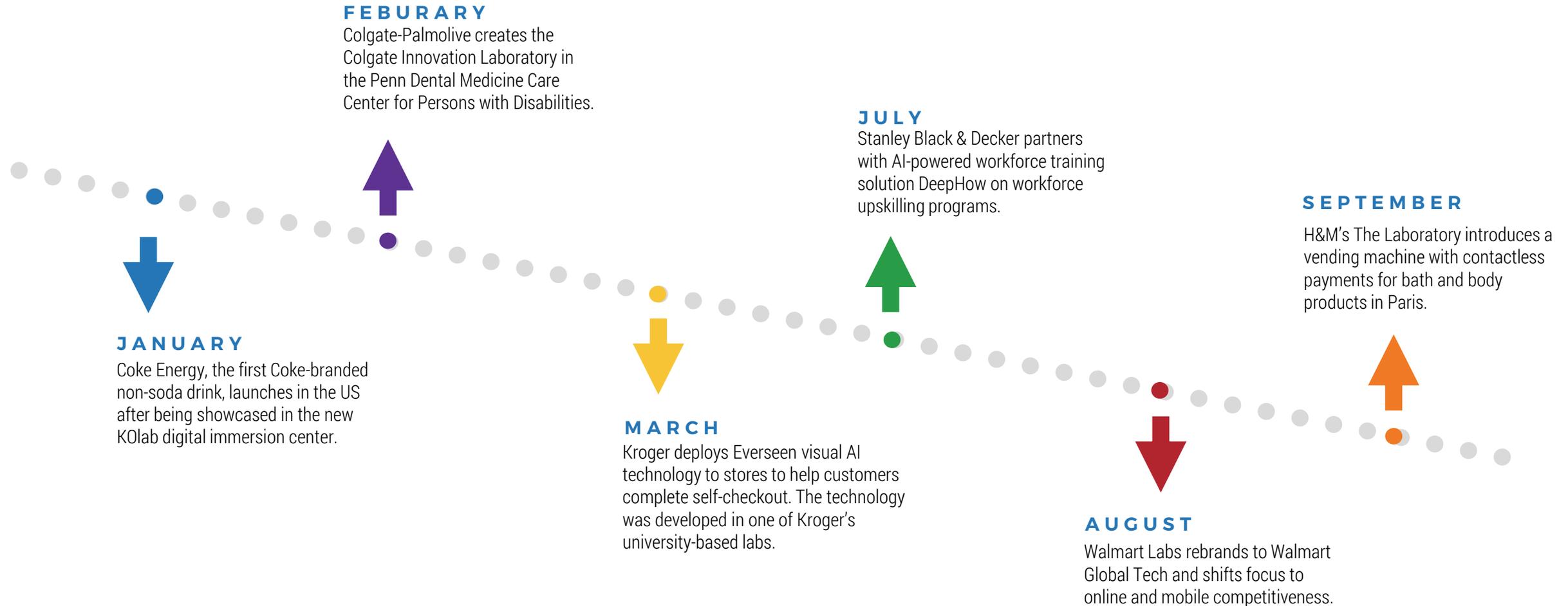


50+

Tech unicorns were created during the 2007 to 2009 recession years, with a collective value of \$145.2 billion.

Source: Startup Genome

Corporate innovation lab milestones in 2020



VENTURE ARCHITECTURE

Case Study

Situation

Identifying and developing talent in pro sports is becoming increasingly competitive. For Maple Leafs Sports & Entertainment (MLSE), identifying the next star player that can win is a challenge for several teams in professional sports leagues, including the Toronto Raptors, Toronto Maple Leafs, and Toronto FC.

The team organizations must navigate a highly structured drafting system in each league to recruit top young talent. Fair contracts must be issued to players to retain them when they enter free agency. The threat of an injury that prevents a player from contributing could cost an organization millions as contract values climb. The rise of e-sports in recent years means MLSE must now learn how to evaluate an entirely new type of talent in playing video games competitively to succeed with its NBA 2K League team, Raptors Uprising GC.

Complication

The overall audience for pro sports continues to grow, but fans are consuming the content in new ways that complicate the revenue structure while also creating new opportunities. Organizations like MLSE continue to leverage lucrative TV contracts, but they are also seeing new ways to engage fans with a two-screen experience during games.

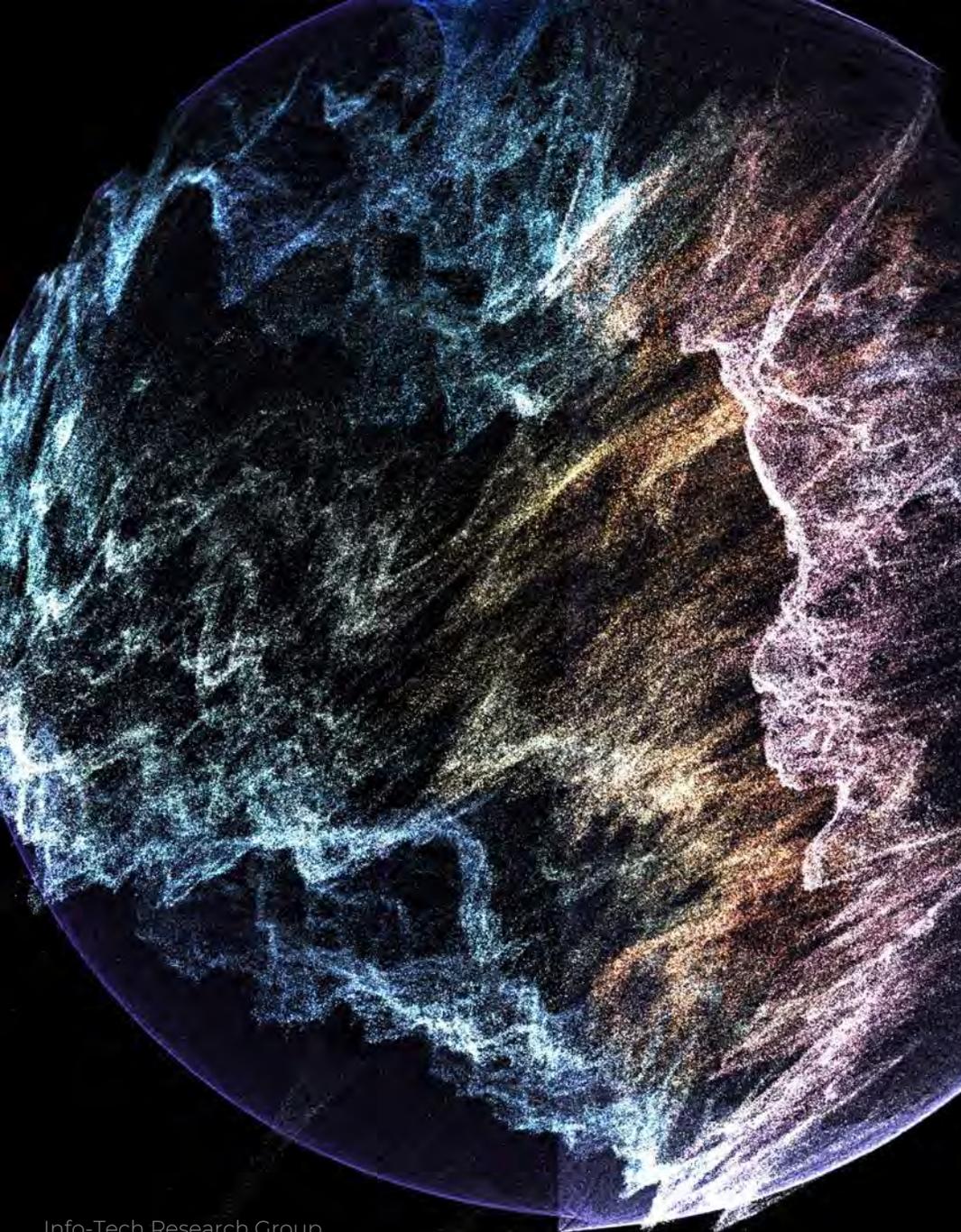
Whether fans are in the arena or watching on TV, they want to be able to complement what they're seeing in the game with additional content delivered to their smartphones. Additional revenue opportunities also lie in an expanded betting integration market driven by fans connected by smartphones ([Eckman](#)). COVID-19 is putting even more pressure on alternative forms of revenue in the short term, as many pro sports leagues are operating without selling tickets for live attendance.

Resolution

To spur innovation and pursue creative digital solutions on both the talent pipeline and audience engagement fronts, MLSE partnered with Toronto-based Ryerson University to create the Future of Sport Lab in 2018.

The incubator operates in a satellite model to MLSE's organizations, helping startups develop promising technology solutions for the pro sports industry and then opening up proof-of-concept opportunities with the professional teams.

MLSE has already seen digital solutions come out of the lab and make a difference on the playing field and in the stands. One example for increasing fan engagement is Stakes, which powers a real-time trivia feature in the Toronto Raptors mobile app. For the talent pipeline, Zone7 worked with Toronto FC and the Toronto Maple Leafs to recommend individual athlete interventions to help avoid injuries.



VENTURE ARCHITECTURE

Human Benefits

Trust

Collaborating with an external community requires more transparency, and more transparency leads to stronger trust between stakeholders. Organizations can further establish trust by creating accountability through inclusive governance structures that involve a defined community.

Experience

By designing from the customer's perspective when creating new products and services, organizations can create more satisfying solutions that make the customer's life easier or less costly. This is balanced against the organization's internal view of its goals and capabilities.

Resilience

Working on new approaches to the market before current business models decline helps an organization avoid a crisis where urgent change is needed to avoid catastrophe. Continuous innovation includes training people with new skill sets and expanding their perspectives, setting them up for success in their careers.

Uncertainties

Three tensions must be navigated for organizations pursuing reinvention through venture architecture.

The tension of disruption. There are no guarantees when it comes to disruptive innovation efforts, and a long-term investment can take years to yield real returns. That's opposed to the need for immediate return on investment and a quick path to revenue. The pressure to show short-term results is the main reason that companies are more comfortable pursuing iterative innovation.

The tension of perspective. An organization has a much different view of itself than customers do. It's difficult for employees to remove themselves from the institutional knowledge of their organization and truly understand the customer perspective. Involving customers and other stakeholders in the innovation process is crucial.

The tension of inclusion. The trick to venture architecture is to have a group that exists inside and outside of the organization at the same time. The contributors must be aware of the organization's culture and strategy while also having enough space to bring in new ideas that wouldn't have been considered otherwise. The right balance has to be maintained to ensure that ideas aren't so wild that they aren't accepted but also aren't so ordinary that they don't bring anything new to the table.

What's Next

Multiple studies demonstrate that organizations able to diversify their business models to include digital-based lines of business are more resilient to economic disruption, experiencing less impact from recessions and rebounding more quickly to growth.

Digital business models can leverage the organization's capabilities but also use unique intellectual property and online communities to enhance their approach to market.

For example, when Indian food delivery company Zomato faced the COVID-19 pandemic, it pivoted to delivering groceries directly to people's homes, allowing people in 80 cities across the country to order online. As a result, its stock rebounded by about 56% between March and May of 2020.

Sources: [Evolve Your Business Through Innovation](#), Info-Tech Research Group, 2020; Strategic News Service

Recommendations

Initiatives

To improve your organization's maturity toward launching new digital products and services, focus on initiatives that will:

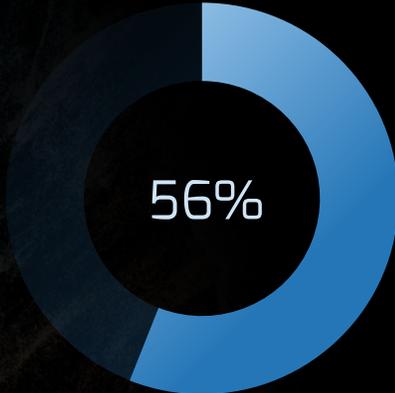
- Bring in fresh ideas from an external community and expose employees to new ways of thinking about their industry.
- Partner with like-minded organizations that will strengthen your effort to maintain relevance to your customers.
- Document the customer journeys of different types of customers that interact with your organization.

Info-Tech Resources

[*Venture Design and Go-to-Market Strategy*](#)

[*Craft a Customer-Driven Market Strategy With Unbiased Data*](#)

[*Accelerate Digital Transformation With a Digital Factory*](#)



56%

Diversifying to new digital business models is crucial to prepare for future disruption, but 56% of businesses say they won't be able to do this for at least 12 months, with 28% not able to do it in less than four years.
(Info-Tech survey, $n=162$)

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Tech Insights interviews

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Michelle Lancaster, Director of Sustainability Partnerships, Microsoft



Craig Tavares, Global Head of Cloud, Aptum



Idris Mootee, CEO and cofounder, Urbancoolab; author of *Design Thinking for Strategic Innovation*



Timothy Minahan, EVP Strategy and CMO, Citrix



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