Voices on 2030

Digitalizing government

Voices on 2030: Digitalizing government

Digitalization is transforming the public sector and how governments deliver services. But what will it look like in 2030?

To find out, we asked 'Voices' from around the world, across both the public and private sectors. Their knowledge covers many facets of government. Taken together, they create a valuable chorus of insights and expertise.

The participating Voices in this report shared perspectives and ideas from around the world, including Argentina, Australia, Bolivia, Brazil, Canada, Denmark, Estonia, Germany, Guyana, Haiti, Honduras, Hong Kong (SAR), China, Israel, India, Indonesia, Kenya, Nigeria, Saudi Arabia, Singapore, South Africa, the UK, the US and Uruguay.

Many of the views expressed in this report may be aspirational and personal and may not necessarily represent the organizations of those individuals interviewed or that of KPMG.

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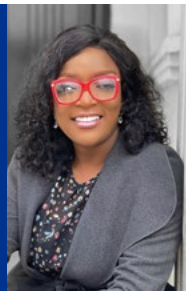
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Foreword

It is less than eight years away, but expectations for 2030 are already sky high. Across most spheres — technological, social, political, economic and others — transformation is underway and huge goals are being set. So what will the world look like in 2030? And what can public sector organizations do to help ensure they can meet these expectations? This report explores the answers to these questions and many more related to government services in 2030.

Some transformative pressures are already at play. Digitalization is radically transforming the way people interact with the world around them. Governments are under intense pressure to improve service delivery to citizens — particularly following the disruption of the COVID-19 pandemic. And new concepts and technologies are becoming enablers to deliver on these expectations.

Today, private sector players are both illustrating what will be possible in 2030 and forcing governments to accelerate their response. They are showing that digitalization can lead to enhanced growth, prosperity, social cohesion and sustainability. They are demonstrating the transformative power of emerging technologies and platforms, such as Web 3.0 and the metaverse. For better or for worse, they are pushing the boundaries of individual data ownership, blockchain and virtual engagement. Governments should be involved if they hope to

be one of the forces that shape this transformation.

Yet it is difficult to plan a journey if you can't picture the destination. What will citizens expect from governments in 2030? What will leading governments look like? What will be the impact on service delivery, assets and systems? How will policy and regulation need to change in response? These are the types of questions governments should answer if they want to transform for the future. But you can't answer them if you can't imagine the future.

This report offers a view of 2030, from 2030. We asked public sector leaders and visionaries around the world to describe what the world might look like in 2030, how it got there and what the big challenges were along the way.

Based on these Voices and our experience and insights working with governments around the world, we have also developed our own predictions.

> " Digitalization is radically transforming the way people interact with the world around them. "

Some of our collective predictions may not come to pass, but the trends we identify are worth noting and following.

Ultimately, this report identifies five key areas of transformation for public sector leaders:

- A new relationship: Cognitive capabilities enable machines to interact with humans more seamlessly

- The transformation journey: Governments rethink models for a decentralized world

- The decentralization of data: The power shifts to the individual

- The citizen developer: Coding is democratized

- Sustainable growth enabled: Digitalization helps achieve ESG goals

On behalf of KPMG, we would like to thank all of the leaders who participated in the development of this report. Your vision, passion and ideas will be instrumental in shaping the future to 2030.

To the reader, we hope this report provides you with the inspiration and ideas you need to take action today to help deliver on the promise of tomorrow.

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Predictions summary

01

A new relationship: Cognitive capabilities enable machines to interact with humans more seamlessly

Cognitive technologies enable natural and intuitive human interactions.

Government services are seamless and intuitive.

Web 3.0 has unlocked the metaverse.

02

The transformation journey: Governments rethink models for a decentralized world

Web 3.0 and the metaverse have forced governments to rethink their role in a decentralized world.

Government operating models have become more agile, cooperative and resilient.

The shift to Web 3.0 is pushing transformation into new domains.

03

The decentralization of data: The power shifts to the individual

Consumers have moved quickly to adopt the decentralized and self-sovereign data aspects of Web 3.0.

Trust and data security have been completely redefined as new technologies like quantum computing become more accessible.

Governments have been forced to adapt in response.

04

The citizen developer: Coding is democratized

Low-code/no-code solutions and automation tools are commonplace for governments.

Citizen developers are transforming their lives and organizations.

An infusion of digital natives and new capabilities are changing the nature of work.

05

Sustainable growth enabled: Digitalization helps achieve ESG goals

Progress on environmental, social and governance (ESG) agendas are accurately measured through Web 3.0 and the Internet of Things (IoT) devices.

Digital twins and virtual worlds allow people to understand the impact of decisions.

Government investment into new technologies and models has sparked sustainable growth.

Predictions for 2030

The year is 2030. People and technology live in harmony. Trust is embedded into digital infrastructure. Interactions are cognitive. And government services are seamless, customer-centric and invisible.

In 2030, government is organized around the customer — designed to predict and meet their needs at different stages of their lives. It is innovative, resilient and responsive. Government is an ally. It is trusted. And it is personalized.

Technological change has certainly been a driver of transformation. In the decade leading up to 2030, there has been a shift from Web 2.0 to Web 3.0; the maturation of artificial intelligence (AI), IoT and quantum computing; the decentralization of data and transactions; and the widespread adoption of cognitive technologies that ease the human-machine interaction, predict citizens' needs and wants, and respond to them.

Yet technological change has not been the only driver of transformation over the past decade. Many things — from social expectations and ways of working through to the ESG agenda and the need for greater trust and security in an uncertain geopolitical environment — have been evolving rapidly.

To everything, there is a yin and a yang. Quantum computing, for example, has unleashed massive computing power and capabilities, but has also allowed hackers to unlock traditional encryption. Digital IDs have unlocked government services, but they have also enabled government surveillance. Automation has allowed governments to pivot to customer-centricity, but it has also disrupted the public sector workforce.

What will this mean for governments in 2030 as they strive to meet citizen expectations? To find out, we asked some of the world's leading public and private sector thinkers to picture the world in 2030 and to explain what they see. We explored the challenges, successes and risks they faced leading up to 2030. We asked them what 'good' looks like in 2030. And we discussed the success factors that will drive the most effective government transformations.

This report shares their insights. Their view from 2030 paints a clear picture of government reimagined, focused around five main themes:

- A new relationship: Cognitive capabilities enable machines to interact with humans more seamlessly

- The transformation journey: Governments rethink models for a decentralized world

- The decentralization of data: The power shifts to the individual

- The citizen developer: Coding is democratized

- Sustainable growth enabled: Digitalization helps achieve ESG goals

Taken together, these Voices suggest that the interaction between public sector, private sector and citizens has become much more collaborative, seamless and data-driven. Emerging technologies and new, highly decentralized Web 3.0 technologies, such as blockchains, non-fungible tokens (NFTs) and smart contracts, have radically transformed the way citizens participate in the economy and how government services are delivered. The metaverse is the new playground for the 'creator economy'.

Digital IDs — underpinned by secure and controlled data — have helped facilitate unprecedented personalization (and prediction) of services. Government is effective, citizen-centric and accessible. And people see government as a value-adding partner.

Change is already within reach. And expectations have already changed. It's time to picture government reimagined.

01

A new relationship: Cognitive capabilities enable machines to interact with humans more seamlessly

Cognitive technologies enable natural and intuitive human interactions.

Government services are seamless and intuitive.

Web 3.0 has unlocked the metaverse.

Imagine that one morning on your way to work you pass a small hole in the bike path. "There's a pothole here," you mutter into your phone mic. The next day the pothole is gone. How? Cognitive and intuitive government. You told your phone that you saw a problem. It used speech-to-text technology and analytics to surmise that this was an infrastructure issue. It captured your exact location and submitted the information. That translated into a work order, a road crew (one human and one automated machine) and a resolution. Simple. Intuitive. Cognitive. This is the world of 2030.

Government in 2030 is largely predictive. And it feels somewhat invisible. Consider this: when you move homes in 2030, you don't notify any government departments as they don't keep a record of your address on file. They are not the verifier of your personal information — you are. When the government needs your address for a specified task, they ping your digital ID and it provides them with your correct address.

There has been an interesting shift in the relationship between government and consumers. Citizens control the data and therefore hold the power. The government's role is to provide services that wrap around the needs and expectations of the citizens.

In this era, the government makes full use of the technologies available to them in order to deliver simple, intuitive and cognitive solutions. Sensor and IoT data are used to predict citizen needs; metaverse service channels provide the interaction; augmented humans and bots deliver on the expectations. Government bots sense your temperament and service you accordingly. These bots have been fully implemented, not only to provide a more accurate level of service, but also to identify emergencies, predict conflicts or mental health requirements and notify the relevant functions to ensure relevant treatment.

Perhaps one of the most noticeable changes in the customer relationship in 2030 is that much of it now happens in virtual reality. Web 3.0 and the metaverse have created spaces where many citizens now interact with government and healthcare professionals, as well as private companies and communities. More and more often, virtual worlds are becoming the channel of choice for both citizen-customers and governments.

02

The transformation journey: Governments rethink models for a decentralized world

Web 3.0 and the metaverse have forced governments to rethink their role in a decentralized world.

Government operating models have become more agile, cooperative and resilient.

The shift to Web 3.0 is pushing transformation into new domains.

For years, governments played around the edges, making small changes in service delivery to achieve incremental improvements in customer satisfaction. But now governments have recognized that their role in a decentralized world is remarkably different from the past. And that is forcing them to rethink everything from the way they regulate industries through to the way they develop and deliver services.

Consider how that has impacted areas like tax. Nobody wastes time filling out complex tax forms in 2030. Instead, the government subscribes to citizen and business data feeds in order to calculate and assess tax liabilities in real time. Now consider what that has meant for tax authority processes and operating models. It calls for a radical change from the status quo — one centered around the citizen.

These drastic changes have required governments to quickly create new technology solutions, enabling their operating models to become much more agile and open. In fact,

many governments now actively 'crowdsource' code development from citizen developers, creating a resilient and agile network of capabilities that drives diversity and enhances trust. In doing so, governments have created a more flexible, resilient and responsive platform upon which they can deliver services.

At the same time as having to rethink their role in a decentralized world, government has also had to rethink their presence. In 2030, trillions of dollars are spent in the metaverse and it is used by billions of users. In the mid-2020s, citizens discovered that Web 3.0 is more secure, flexible and agile — they left Web 2.0 platforms in droves. Governments needed to quickly develop their capabilities in the metaverse in order to properly access data and act on it accordingly.

Transformation, therefore, has taken many different shapes in the public sector. It has reached into the core fundamentals of what government does, how they do it and where it gets done.

03 The decentralization of data: The power shifts to the individual

Not so long ago, NFTs were considered a novelty. By the mid-2020s, however, people had realized they could use NFTs to hold and manage their own personal data. Smart contracts could be created to unlock certain bits of data to certain users for very specific uses. Data started to become decentralized and self-sovereign.

In part, this was driven by the introduction of Web 3.0, which, itself, is based on very decentralized data and management architecture. Web 3.0 architectures gave people the tools they needed to take ownership of their data. Security breaches into the big cloud data lakes raised concerns about how personal data was being managed. And that catalyzed a movement of citizens and businesses eager to take their data back from the centralized and opaque data lakes they had resided in before.

For government, this meant a radical rethink of processes, performance and purpose. Liberated from concerns about data privacy and permissions, governments started to focus on creating innovative solutions and platforms that responded to the demands and expectations of citizens and customers. Governments put their objectives and agendas into decentralized autonomous organizations (DAOs) that allowed citizens unprecedented ability to monitor and contribute to progress. They opened their own data to allow service providers to innovate on top.

They used the decentralization of data to make their processes more agile, reliable and efficient.

For citizens, the change has been dramatic. The shift to a Web 3.0 environment has forced a change in the way people think about security. In the past, they relied on the major institutions that held data to ensure it was properly secured. Now people own their personal data and are given a unique personal encryption tool that secures it. The ownership of every piece of data is documented. That means trust is no longer a question.

New technologies have also forced a rethink in the way security is managed. Over the past decade, quantum computing has become exponentially more sophisticated and prices for quantum computing power have plummeted. In 2030, any professional hacker can rent time on a quantum machine, which means that traditional approaches to authentication and password protection were quickly made redundant.

The evolution from Web 2.0 to Web 3.0 was not only driven by companies or governments — it was also driven by citizens' demand for a different way to organize data. And it took some time for governments to understand the fundamental change this would bring. But once they did, change was rapid.

Consumers have moved quickly to adopt the decentralized and self-sovereign data aspects of Web 3.0.

Trust and data security have been completely redefined as new technologies like quantum computing become more accessible.

Governments have been forced to adapt in response.

04

The citizen developer: Coding is democratized

Low-code/no-code solutions and automation tools are commonplace for governments.

Citizen developers are transforming their lives and organizations.

An infusion of digital natives and new capabilities are changing the nature of work.

In 2030, when an individual is tasked with something boring and mundane, they are likely to just automate it. And it's easy. With low-code/no-code platforms, almost every citizen has the tools and capabilities they need to create or customize an app. Drag-and-drop user interfaces and pre-built components have almost eliminated line-by-line coding. Citizen developers are everywhere.

It started in the financial sector. Banks, insurers and asset managers were some of the first to solve the data availability and security challenges using new platforms and infrastructure. That allowed the leaders to embed new ways of working by allowing employees to create purpose-built applications over top of their data. Insurance brokers could whip up an app to serve a small portion of their book of business. Retail bankers would put together a quick app to answer a common customer query. Stockbrokers would create custom apps to give them unique insights into companies and trends.

The adoption of low-code/no-code has generated value in many ways. It has allowed a much broader, non-technical audience to start rapidly building solutions. That, in turn, has helped reduce the skills gap that had been slowing the pace of digital transformation. It has given workers the power to customize solutions to meet their actual needs and realities, thereby driving enhanced productivity and efficiency. It has allowed organizations, both public and private, to become much more agile and customer-centric.

In the public sector, low-code/no-code allows employees to design, test and fully deliver bespoke apps in days. Many government employees use their skills to customize massive enterprise solutions to suit their unique needs or circumstances – adding automations to enterprise resource planning (ERP) systems in order to speed up a process, for example, or to update an accounting tool to reflect a new local reporting requirement.

What has been remarkable about the shift to low-code/no-code is its rate of adoption. As many expected, the influx of digitally native employees has changed the culture and capabilities in the public sector. At first, newer generations of public sector employees were very comfortable using a wide range of tools and solutions in their day-to-day jobs. But they didn't want to just use them — they wanted to help create them, be a part of their evolution and guide their future use. Low-code/no-code has given them the ability to do that.

05

Sustainable growth enabled: Digitalization helps achieve ESG goals

During the early 2020s, governments around the world set some pretty lofty environmental goals for 2030. Then they set about creating tools to help measure whether they were achieving them. Digitalization enabled them to measure their progress at a very granular level. Web 3.0 architecture has allowed sensors and IoT devices to be linked together in unprecedented ways, providing citizens and decision makers with detailed data on their actions and activities.

Today, individuals and organizations get an alert if their carbon footprint exceeds the limits they set for themselves. Companies can see exactly where carbon emissions are being produced at every step of their supply chain. Governments are able to track emissions by entity, location and time. Everyone is very clear about their personal and collective progress to achieve net zero.

Future planning and development have also become much more sustainable thanks to digitalization and new technologies. Today, city planners and asset developers use digital twins and virtual worlds to simulate everything from

the development of new transit systems through to the design of tiny individual components. As a result, government investments are much more efficient, effective and environmentally sustainable.

The collective ability to measure, simulate and predict environmental change has also been greatly enhanced by the introduction of new sources of data. There have been heavy investments into space infrastructure as a way to help measure and manage environmental change on earth. And there's a combination of different sources of data to help understand human impacts and risks in a much deeper way.

Government investment has also helped spawn a number of growth industries and service areas that are helping contribute to more sustainable economic growth. Governments have helped foster massive AI ecosystems and invested into public sector solutions for the metaverse. In each case, new industries and new innovation have emerged that serve the wider population, create new jobs, attract talent from overseas and drive further investment.

Progress on environmental, social and governance (ESG) agendas is accurately measured through Web 3.0 and the Internet of Things (IoT) devices.

Digital twins and virtual worlds allow people to understand the impact of decisions.

Government investment into new technologies and models has sparked sustainable growth.

Start today. Be ready for tomorrow.

Based on these predictions, what tangible steps can government and public sector organizations start taking today? **Here are six ideas.**

01 **Start fresh with a bold, holistic vision.**
The world of 2030 is not necessarily an incremental change from today. It is a new paradigm that can require fresh thinking and bold, holistic action. Instead of starting with the status quo, try starting with the needs of citizens. And go from there.

02 **Learn about Web 3.0 technologies and trends.**
Web 3.0 is very different from the internet of the past. It is founded on different technologies and controlled in different ways. It can change the way you think about your business or area of focus. It's worth learning about it now.

03 **Prepare your future talent and workforce models.**
Think about how you are going to encourage digital natives to join and stay with your organization. And consider how you will develop your current employees to thrive and innovate in a Web 3.0 customer-centric world.

04 **Reassess your governance models.**
New governance practices are being introduced that can require significant changes in the way regulations are created and enforced. At the same time, the decentralization of data can require new concepts around data protection and consumer security.

05 **Picture yourself in the metaverse.**
There is little doubt that the metaverse is becoming a key channel and technology for connecting people with governments and service providers. Act now on pilot projects to explore what your presence in a metaverse might look like and how you could serve your customers there.

06 **Form your ecosystem.**
In a decentralized world, government is part of an ecosystem of players and enablers that work together to meet the needs of citizens. Now is the time to start forming those relationships and engaging in pilot projects to help build experience and define new models.

"In 2030, everything has a digital twin — buildings, systems, even people. Building and system digital twins are used to improve designs, identify efficiencies and test new innovations."

Khoong Hock Yun
Partner, Tembusu Blockchain Fund

" In 2030, society lives and thrives in harmony with the latest technologies and innovations. "

HE. Ahmed Mohammed Alsuwaiyan

Governor and Board Member, Digital Government Authority, Kingdom of Saudi Arabia*

*His Excellency

What does government look like in the Kingdom of Saudi Arabia in 2030?

Digital Government Authority (DGA) was established in March 2021 as the national regulator of the digital government in line with Vision 2030. The aim of DGA is to regulate digital government activities, expedite digital transformation and achieve integration amongst government entities to become a proactive digital government, capable of providing highly efficient digital services.

In 2030, the Kingdom of Saudi Arabia has become a pioneering government for an enabled and vibrant society, placing the Kingdom among the leading digital governments globally. This was achieved by providing an integrated and interconnected digital government ecosystem while placing beneficiaries' needs and expectations at the heart of digital government decision making.

In addition, in 2030 the government has leveraged the power of data to deliver proactive and automated services that anticipate the needs of citizens. Data is fundamental to the delivery of public services as it informs and drives public policy. The focus here is on improving the quality of data and developing a better understanding of how data can be translated into insights to enhance future digital public services, while keeping in mind individual's right to privacy and data protection policies.

This has helped to create a system of public trust in government as a result of secure, reliable and high-quality digital services and open government data, including a public performance dashboard that has helped detect problems and gradually improved the quality of services and the way they are delivered.

What does that mean for citizens of the Kingdom of Saudi Arabia?

One of the main key pillars of our National Digital Government Strategy (NDGS) is the satisfaction of citizens, it is critical to provide beneficiaries with seamless and impactful services. The government focuses on developing a citizen-led and centric experience by understanding users' needs, rather than adopting assumptions about their needs and preferences. The provision of digital government services has increased to reach 97 percent. The percentage of beneficiary satisfaction with digital government services is expected to reach 90 percent by 2025. Additionally, in 2020 the Kingdom has jumped nine positions in the United Nations E-Government Development Index (EGDI) revealing a continuous rise in the rankings of the Kingdom's EGDI over the years.

Government services are designed using citizen-centric design through the concept of 'life events' to bring together end-to-end processes and services across multiple government entities to reduce complexity for the beneficiary, process design for the beneficiary journey across multiple agencies, and adopt a zero-touch service delivery using AI to predict beneficiary needs and provide services proactively. As well as, to enhance the government as a platform by providing tools for shared knowledge and experience, and reuse of government-held data so that the beneficiary does not need to constantly provide the same information to multiple government entities.

What technologies helped propel the Kingdom of Saudi Arabia forward on its digital government journey?

In 2030, society lives and thrives in harmony with the latest technologies and innovations. From artificial intelligence to mixed reality, new technologies are normalized, scaled and integrated into our daily lives. AI was a game changer in the way the Kingdom creates innovative new services and business models. And it has driven transformation across multiple dimensions such as healthcare, financial services, entertainment, transportation, energy, manufacturing and many more.

However, with new technologies often come new risks. So, as more individuals put their trust into technologies, government stepped up to build the necessary controls and policies to protect citizens while also enabling innovation.

What do you attribute your success to?

A lot of different factors came together to achieve our success in 2030. A sustainable vision supported by clear objectives was launched for the future of the Kingdom of Saudi Arabia with sustainability at the heart of everything the Kingdom does, from policy development and investment to planning and infrastructure.

On a leadership level, the strong leadership of HRH Prince Mohammad Bin Salman, who launched Vision 2030, unlocked the potential of the country. At the same time, we also saw strong leadership come from across ministries and senior officials serving the Kingdom's vision with effective governance.

In Digital Government Authority, our strong common values around participation, collaboration, innovation and compliance allowed us to build communities across the digital government ecosystem, bringing together government entities, private sector organizations and civil society while focusing on the intensive involvement and engagement of the public at every step.

Based on your predictions for 2030, what advice would you give governments and public sector organizations today to best prepare themselves for success in 2030?

We believe in starting with a clear vision which is supported by all ministers, and then engaging all government entities in realizing that vision. At the same time, governments need to build digital skills and capabilities across the ecosystem, while also involving the private sector and civil society in the journey.

Ahmed Mohammed Alsuwaiyan is the Governor and board member of Digital Government Authority since May 2021. Alsuwaiyan contributed to the establishment of Etihad Etisalat Company (Mobily) and launching its commercial operations where more than one million clients were reached in less than three months. In addition, Alsuwaiyan contributed boosting customer satisfaction by enhancing the strategy of application and services.

Alsuwaiyan worked on developing the digital strategy of the Saudi Industrial development fund by expanding the provision of financial products and services, enhanced credit policies, re-engineered and designed financing procedures.

At the Ministry of Finance, Alsuwaiyan led the digital transformation by expansion of infrastructure and development of financial systems and automating business process between the public and private sector through the launch of a financial services platform (Etimad).

"The cyber security risk has not magically disappeared by 2030."

Andrew Dinsley

**Head of Program,
Cyber Security at the
Foreign, Commonwealth &
Development Office (FCDO),
UK Government**

Andrew Dinsley became Deputy Head (Programs), Cyber Policy Department, in 2018. He started his career in the Foreign & Commonwealth Office (now FCDO) in 1989. Throughout his career, he has served in a number of countries, such as Ukraine, Kuwait, Kazakhstan and India. His recent UK roles include Head of Information, Communication and Technology (ICT), Commercial Procurement Group, and Head of Programs, Multilateral Policy Department.

In 2030, government is more digital. It is more automated. It is more sustainable. But we have not yet banished the malicious actors from the internet. And that, in turn, continues to create significant barriers to adoption and a full-scale digital transformation of government services.

Just as government has become more sophisticated, so too have the malicious actors. The war in Ukraine in 2022 demonstrated that state actors wield cyber capabilities at a time of conflict. Attacks by non-state actors continue to grow. Newer and smarter hacking tools continue to be offered 'as-a-service'. The cyber security risk has not magically disappeared by 2030; although, at the same time, our cyber security and resilience has also increased.

Taking steps to mitigate the risk

Government has been working diligently to improve resilience and reduce harm. We have much better education about cyber risk starting in school and stretching right out to retirement. People have a better understanding of what they should do if they are subject to a malicious action. Government has been investing heavily into research and development on cyber security. They have increased the level of legislation in the cyber arena. Yet, at the same time, they are trying not to stifle innovation and transparency.

What we have seen is a much better level of awareness and education — not only of the risks, but also of the options for resilience and future technology opportunities. More recently, in addition to its efforts to protect the population from harm, government has increased its activities to help the population protect itself, by building technology in a secure-by-design manner. They are talking to companies about what situations may warrant insurance and/or additional and higher levels of resilience. They are paying particular attention to the vast majority of critical infrastructure that relies on public-private partnerships.

Unlocking adoption and value

The impact of the ongoing cyber risk on rates of digital government service adoption has been interesting. There are still many countries where more than half of voters show up to the physical polling booth on election day preferring to use a paper and pencil to log their vote. There are many people across society who have been subject to a malicious cyber attack in the past and are now extraordinarily cautious about what they do online. Other services simply haven't captured the public's imagination as a digital service.

This ongoing cyber risk has frequently meant that adoption rates have been somewhat lower than

anticipated. Simply put, the great benefits of having all of these new public services online have been somewhat countered by a more sophisticated and widespread cyber threat.

Security for all

It is not all doom and gloom. Indeed, there have been a number of significant advances in the global cyber security stance since the early 2020s. One has been the widespread adoption and utilization of automated and active cyber defense. That provided businesses and individuals with much better baseline defense. At the same time, increasing levels of awareness, education and capabilities have greatly enhanced local and national resilience. And there has been a better understanding of how the development and deployment of technology must include marginalized and vulnerable groups so that they do not become victims of cyber crime.

Perhaps most encouragingly, we've also seen significant efforts to share best practices, threat intelligence and solutions across organizations and borders. It's not good enough that the UK is protected from a threat — we need to make sure other countries are protected as well. And today, in 2030, we are taking steps to ensure the broad benefits of cyber security are enjoyed by all.

"The Internet of Things has become the internet of capabilities — human and machine."

Ashwini Bakshi

Former Managing Director, Europe & Sub-Saharan Africa, Project Management Institute

How did public sector productivity evolve over the past decade to 2030?

There were many factors that worked together. On the tech side, we saw an early push into cloud enablement and digital transformation. But it was the entry of intelligence into the infrastructure ecosystem that really drove a step change. It took some time for the digital capabilities and computing power to catch up. But once it did, everything became ultra-connected with the Internet of Things (IoT). Now the IoT has become the internet of capabilities — human and machine.

At the same time, public sector productivity was also driven by changes in the population itself. People have become increasingly digitally savvy, economically savvy and politically savvy. The population demanded more and more information, more capabilities, more performance and more accountability. That, in turn, drove further digitalization and a transformation of governmental institutions.

The nature of the work has also changed dramatically over the past decade, leading to more efficient productivity gains. The public sector started to follow the lead of the private sector by breaking projects down into more discrete, measurable, time-bound and value-oriented outcomes that had to be delivered by individuals, teams and institutions. That created a very strong productivity dynamic.

How did government capabilities and skills evolve as a result?

In the 2020s, governments really caught on to continuous learning. Study after study has shown that the more you educate the population, the better off and the happier they are. Population growth slows. Gross domestic product (GDP) rises. Innovation becomes more common. But it's not just continuous learning — we needed to connect it to continuous performance. And achieving that connection has given government the right capabilities to be much more flexible in an uncertain world.

I think the social dividend really helped governments in Africa and Asia here. Over the past decade, some 60 million young people from these regions have graduated and they've been transforming business and government in all sorts of ways. They've been helping the public sector create entirely new skill sets and capabilities as a result.

We also saw public sector institutions start to really leverage the learnings of the private sector. People with deep experience in digital technologies and transformation entered the public sector workforce laterally. And that injected a culture of value, lean, productivity and efficiency. All the characteristics of private sector project management started to become mantras in the public sector too.

How has the notion of value changed?

It took some time for people to really understand the balances between short- and long-term value. At the start of the decade, for example, we knew environmental risk was a long-term challenge, but we didn't make the short-term changes we needed to address the long-term issue. Now, we recognize that we only have a finite amount of time to achieve certain outcomes.

We also recognize that value is a collaborative concept. You can't just base your view of value on what you need as an individual or an organization. You need to recognize that you are connected to the community, to other organizations, to your service windows, to other governments and so on. If we wanted to achieve value and manage our long- and short-term risk, it was imperative to find that balance.

Ashwini Bakshi led the Project Management Institute's (a not-for-profit professional association of project managers and strategic changemakers) growth and organizational development in the Sub-Saharan Africa and Europe regions. Ashwini has over 25 years in sales, business development, M&A and alliances across diverse geographies of Europe and the Asia Pacific. He has worked in organizations like Nokia and Ericsson. He aims to create value through resolving customers' needs and challenges quickly and prides himself in building trusted relationships.

"Today, we create processes that are digitally native."

Daljit Rehal

Chief Digital and Information Officer (CDIO), HM Revenue & Customs (HMRC), UK Government

The change in the relationship between tax authorities like HMRC and taxpayers has changed dramatically over the decade to 2030. And the journey has been somewhat spectacular.

In the early 2020s, we still had a complex system of unintegrated processes. By the mid-2020s, we had made great progress in digitalizing and simplifying those processes. Today, in 2030, however, we are at a stage where we create processes that are digitally native — built to take full advantage of digitally-led front-, middle- and back-office capabilities.

Taxpayers and customers interact with us through whatever channel they choose — they can reach us on everything from the HMRC portal through to social media apps. They can speak to us by clicking the microphone icon on our website and describing what they're trying to do. Users can also use our chat bot by typing in free-form English and a digital cognitive assistant will have a conversation with the customer about their needs. If the digital cognitive assistant cannot help, we always have human beings on hand to take that call. Or, if pressed for time, we can organize a time to have a call. The goal is always to deliver services in the most convenient way for our taxpayers.

In 2030, interacting with the tax authority is much simpler and much more assisted than it was in the early 2020s. It involves one login and a seamless set of artificial intelligence (AI)-driven digital assistants that help customers with whatever they came to accomplish. When interacting with HMRC, all customer information is in one place. As a customer, you have your own cloud space where you can access all correspondence, past tax returns, personal data and more. And we use AI and machine learning to help taxpayers uncover value from that data.

For example, we use open banking software to integrate tax data and financial data into one place so taxpayers can see their charitable donations or how much tax credit or debt they have. If they have credit, we tell them about their options for using that credit to pay a different tax bill or move the balance to another tax regime. The entire focus is on helping taxpayers access their information and make decisions seamlessly and without friction.

Indeed, there is now a massive ecosystem of tools and apps available to help taxpayers get more value from their tax data and interactions. By opening up our application programming interfaces (APIs), we collaborated with entire industry groups — financial services firms, accounting firms, tech firms and others — to start creating innovative applications that made it a lot easier for taxpayers to interact with their data. By focusing on the world of zero-code and low-code technology, we have given businesses amazing latitude to create their own sophisticated applications.

Of course, data privacy remains a key concern for everyone. But, thankfully, we have made great progress in understanding the permissions we have been given by the customer and defining the boundaries of how we can use data. Today, we have a strong ethics framework that supports us in that space. But in 2020, it could sometimes be a confusing picture.

I would argue that our journey to digitalization at HMRC between 2020 and 2030 picked up massive speed as we moved from digital to augmented — using base technologies like AI, machine learning and natural language processing to drive an entirely different interaction between taxpayers and tax authorities.

Daljit Rehal is a leader who has several years of experience in creating business value through culture, people, process and technology in the utility and telecommunications sectors, covering multiple markets, including the UK, the Republic of Ireland, and the US. Prior to his role as CDIO for HMRC, Daljit was the Senior Vice President of Digital and Data and Chief Data Officer at Centrica. Daljit has led the modernization of digital and data capabilities, earning himself internal and external recognition as one of the top 100 Global IT leaders. He has pioneered the adoption of big data, artificial intelligence/machine learning technologies and Agile methods alongside other commercialized innovations.

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" Government found the strength to come into negotiations with private sector companies on an equal footing. "

Prof. Dr. Gerhard Hammerschmid

**Professor of Public and Financial Management
and Director, Centre for Digital Governance,
Hertie School**

Gerhard Hammerschmid is Professor of Public Management and Director of the Centre for Digital Governance at the Hertie School of Governance in Berlin. His research focuses on public management reform, comparative public administration and government digitalization. He contributed to key European Union-funded research projects on public sector innovation and government transformation, and his research has been published in leading international public administration journals. Gerhard has 25 years of experience in communicating research findings to high-level government decision makers and in 2021 was included in Apolitical's list of the 100 most influential academics in government.

Digital government is quickly becoming a reality in Germany. It pains me to admit it, but Germany's governments struggled to digitalize through the 2020s. We did not make the same progress as other highly industrialized states. Nor have we kept up with developing nation governments who used their lack of legacy infrastructure and regulation to their advantage. The good news is that today, in 2030, we seem to have finally turned the corner.

A decade of detours

In part, the lack of progress resulted from Germany's rather complicated system of tiered government. Achieving consensus among the various federal ministries, state ministries and local authorities took much longer than our counterparts. Public sector thinking remained in silos with very little sharing of best practices or technologies between departments. Procurement tended to be laborious and inflexible. The private sector — often led by big tech firms eager to sell a solution — held significant influence over the path that the digitalization journey would take.

Other challenges also slowed progress. Citizens did not have the level of trust needed to fully drive digital adoption. Public sector organizations lacked the capacity and capabilities required to plan and execute a technology-based transformation. Regulation was focused on mitigating risks rather than supporting solutions. Labor practices made it difficult to share skills. Data privacy laws complicated matters at every turn. For the better part of the 2020s, little real progress was made.

Back on the autobahn

The 2030s will be very different. Indeed, this will be the decade when Germany not only catches up to its digital government peers, but also starts to move past them. And there is lots of evidence to suggest this is more than wishful thinking.

What changed? Analyzing other governments and their digitalization journeys — pulling from their best practices and determining Germany's identity in the modern digital world were some of the key factors. Some were more subtle changes, like when we realized that we needed to focus on a handful of priority services rather than trying to pull the whole of government along the journey at once. We could focus on what had the highest impact for citizens and society. And that gave government the strength to come into negotiations with private sector companies on an equal footing. Procurement became more flexible and solutions-driven.

At the same time, attitudes towards labor practices and talent models evolved to become much more flexible. That allowed skilled private sector workers to come into the government on short-term assignments, bringing with them their ideas and capabilities. Public sector workers started to identify themselves as representing the whole of government and serving citizens rather than just their function or department.

Less subtle was the change in public attitude towards government and technology. Digitalization forced governments to become more transparent very quickly, particularly with relation to citizen data. Governments started to engage in marketing campaigns aimed at raising digital and data ownership literacy and engagement. Opening more channels of proactive communication created space for trust to build between citizens and government.

Off to the races

I think the most obvious sign of Germany's government digitalization journey is in policymaking. Policy makers and analysts have now become highly data-driven, and all policy functions have a strong understanding of the value that digitalization can deliver to their service areas. That, in itself, is a big driver. The more data, efficiency and insights policy makers demand, the more urgency and resources will be put towards the digitalization journey.

Germany may have gotten off to a slow start, but in 2030, we seem to have finally turned the corner. Digital government is now a priority in Germany.

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"People thought technology alone would flatten governmental silos. It did not."

Greg Wells

Government Chief Information and Digital Officer (GCIDO), New South Wales (NSW) Government

Greg Wells became the GCIDO in July 2018, making him the NSW Government's most senior technology executive. Greg advocates for technology that enables the NSW Government's objectives and fosters sector-wide collaboration on a digital agenda to continue to transform the state into a global technology leader. Greg's extensive career in government technology has included leading the delivery of a multi-agency platform to help protect children at risk with the NSW Department of Family and Community Services and running NSW Health's ICT strategy, policy governance and operations as the Chief Information Officer, where he was recognized with the Australian Healthcare CIO of the Year award in 2014.

Back in the early 2020s, people thought technology alone would flatten governmental silos. It did not. What a contemporary approach to technology did do, however, was allow us to integrate those silos and hand the control over to customers. And that empowered us to deliver the seamless, controlled and personalized experience our citizens wanted.

The fallacy of flat government

Even now, in 2030, it seems fairly clear that government is never going to fully conceptually 'flatten'. Politics will always require ministers to take responsibility for portfolios. Complexity and the need for localization means there will always be different levels of government. The reality of democracy means that decisions will continue to be shaped in political cycles.

What we realized in the early 2020s was that government didn't need to flatten in order to deliver the type of controlled, seamless and personalized experiences that citizens were demanding of it. But it did need to be designed around them. And it needed to be controlled by them.

Improving life journeys and events

That realization progressively cemented customer-centric service design, data ownership and a focus on security, privacy and ethics as 'the' way government needed to approach service delivery.

Government started to refocus all resources around the needs of the customer. More and more, we didn't have time for the debate about policy versus service design. Instead, we focused on life journeys and what would make life easier and better for our customers. It unlocked a very customer-centric approach to service delivery.

Accepting that government structures and systems would never reach a utopian 'flat' allowed us to pivot our data management approach too. In the early 2020s, common wisdom, or our default approach, meant governments essentially owned and controlled citizen data. The shift to customer-centricity allowed governments to hand customers control of their own data and facilitate access to services using their digital identification. With control and their consent, citizens were able to open up their data across government departments, allowing service designers and policy-makers to organize around life journeys and events.

It also enabled us to think about service delivery more holistically. In particular, we've made great progress in integrating the priorities of the physical and the digital to drive our investment strategies. We're not bound by the models of the past. We no longer believe that every child must attend a physical school for all subjects, nor that every patient needs to visit a clinic or hospital for all phases of their care. Citizens move seamlessly across the physical and digital channels to get the services they require.

Citizens in control

In 2030, all aspects of government service delivery are hyper-personalized, controlled and efficient — to the point of being invisible. They are also integrated across the various levels of government. Since consumers control their data, they are able to give governments permission to work together, within their silos, but coordinating to seamlessly deliver services to the customer.

Investment strategies are also integrated — across physical and digital, between short-term and the long-term needs, among departments and levels of government, and across the life journey. Analytics and real customer insights have provided agility and flexibility to constantly adjust our approach to meet requirements. And focus has shifted from building assets to delivering services.

Different path to the right destination

Government may not have flattened much in the past decade. But, here in 2030, citizens are receiving the kind of seamless, controlled and personalized experience they expect from their public sector organizations. How government is organized was always less important than the outcomes it delivered — and we're so glad that's what has driven our approach for more than 10 years now.

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In 2030, the concept of cities is changing. Time and space are becoming blurred and the urban/rural divide is falling away. "

Dr. Julia Glidden
Corporate Vice President,
Worldwide Public Sector, Microsoft

" We drove digital adoption at a very grassroots level. "

Jayesh Ranjan is the Principal Secretary of the Industries & Commerce (I&C) and Information Technology (IT) Departments of the Government of Telangana in India. His assignment involves developing policy frameworks, attracting new investments, identifying opportunities for utilizing IT in various government processes, and promoting the digital empowerment of citizens. His last few assignments have been in the Industrial Promotion sector as Commissioner and Managing Director of the Industries Department, Secretary in the Tourism Promotion Department, and Vice-Chairman of the Hyderabad Urban Development Authority (HUDA), and various rural assignments in different parts of the state, working in diverse sectors like Tribal Development, Natural Resources Management, Poverty Alleviation and other related Social Development Sectors.

Jayesh Ranjan
Secretary, Information Technology, Government of Telangana, India

In 2030, lots of governments are looking at the State of Telangana to understand how you drove digital transformation across government, private sector and community. Can you tell us where the innovation came from?

There were a number of factors that came together to spark that innovation. We started with a strong base — Hyderabad was already well known as a center of innovation and entrepreneurship. And then the government created a robust web of progressive policies to help grow and scale that investment into innovation, attracting a number of global R&D hubs and start-ups.

To reduce the risk of innovation and to make Hyderabad a more attractive place to invest, we offered bilateral procurement on any homegrown technologies that could address an important need for local people. Those with good ideas would essentially be assured a contract and a clear route to market.

The other factor was a simultaneous improvement in citizen skills and capabilities. We have seen great innovation by government and others to leverage new technologies like virtual reality and the metaverse to conduct training, skills upgrading and development. And, again, that has attracted companies focused on developing tools for digital and virtual training and education to come to our jurisdiction.

Ultimately, it was a combination of an innovative culture, a clear route to market for start-ups and an increasingly skilled population that allowed Telangana to leap ahead on the digital journey.

How did you get people to actually adopt and use these new technologies?

Again, it was a combination of things — in this case, technology, culture and demonstration. In the early 2020s, Telangana completed its flagship T-Fiber program that brought high-speed fiber to every household across the state. So the infrastructure to drive digital transformation was already at the doorstep of every citizen. The problem was convincing them that digital tools and digital literacy could improve their lives.

In part, we solved that at a very grassroots level. In every community, we set up Digital Telangana Centers within kiosks operated by local female entrepreneurs from the same background as the communities they serve, making them more relatable. These people served as a conduit for introducing the community to digital services. The kiosks served as connectivity points. Together, they helped people with things like online bill payments and license renewals, saving people time and helping them become more familiar with digital.

The ability to demonstrate benefit was massive. We found the best

way to convince people to change their behavior was by showing them how digital could impact their daily lives. It was by getting down to the pain points that local citizens were struggling with and demonstrating how digital tools could solve these problems that really drove adoption.

What types of use cases did you demonstrate and how have they impacted people's lives in 2030?

One of our earliest focus areas was in the agricultural sector. We had a national goal to double incomes in the agricultural sector and we believed technology could help. We started with a catalogue of about 100 different tools and technologies that we could demonstrate to farmers at every stage in the production cycle. We showed them how to use these tools and how they could make their lives better. I'm proud to report that Telangana was the first state to achieve the goal of doubling incomes in the agricultural sector — and we have technology to thank.

Another important use case was in healthcare. In the early 2020s, good healthcare was only accessible to those in major cities. We used digital to bring good healthcare out to rural areas. And now we are using technologies like virtual reality and the metaverse to make those experiences more valuable. Being able to bring good healthcare to a farmer's doorstep has been a wonderful achievement.

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"Digital infrastructure changed the way we build physical infrastructure."

John Kwong

Head of Project Strategy & Governance Office, Development Bureau, Government of Hong Kong Special Administrative Region

John Kwong was appointed Head of Project Strategy and Governance Office for the Hong Kong Special Administrative Region Development Bureau in April 2019. In his role, he formulates strategic initiatives to strengthen governance and uplift performance of public projects by reinforcing the existing gateway process for cost management, enhancing project delivery capability, leading strategic developments to enhance cost-effectiveness and enhancing collaboration with international counterparts and local industry stakeholders. John is a civil engineer by training. He graduated from the University of Hong Kong and obtained several postgraduate degrees in engineering and law. Before joining the Development Bureau, he worked in the Drainage Services Department and the Commerce and Economic Development Bureau.

Ten years ago, construction site activity represented over 60 percent of the time involved in delivering projects. Today in 2030, less than 30 percent happens on-site and the overall planning-design-build cycle time has been reduced by over 50 percent. Why? Because digital technologies have transformed the way we design, build assemble and manage our assets.

Data to design to development

In 2030, we have a comprehensive Hong Kong SAR territory-wide digital twin for development. It contains all the design and baseline data — things like ground investigation data, utilities, topographic records and so on — that we need in order to allow artificial intelligence (AI) to design new infrastructure and facilities. We input the basic requirements and parameters. The system then creates the design options for checking and consideration, with building information modeling (BIM) technology and photomontages generated for easy visualization on the final products. Once the design is agreed upon, the system sends the specs to the factory.

At the factory, automated technology sets about manufacturing the units and parts needed to deliver the design. Everything is connected. The data on each piece and activity moves through the system without friction and without human interference.

Adjustments are made in real time. Everything is timed to perfection. There is no waste.

On the construction site, workers partner with intelligent machines to assemble the final asset. At night, machinery moves automatically to prepare for the next day's activities — the ground is re-graded and units are moved into place. Robots are used in any risky areas such as confined spaces or at great heights. Drones undertake regular inspections for quality and safety control.

Today in 2030, onsite construction makes up just a small proportion of the overall development lifecycle. Modular integrated construction (MiC) is the norm. In Hong Kong SAR, deep partnerships with factories in the Greater Bay Area created an amazingly dynamic hub of innovation and activity. BIM models are sent to factories in mainland China; ready-to-assemble pieces are sent back in return.

A stronger and more sustainable future

The impact on the construction and infrastructure sectors has been incredible. MiC approaches and digital tools have optimized people's time and driven unprecedented efficiency across planning, design, development and operations. Construction times have been slashed, further reducing costs, improving efficiency and leading to better relationships with local communities. The economy around construction has also changed as a result — we are no longer limited by the resources available in any given location.

There were two big factors that really drove the digitalization of the construction industry through the 2020s. The first was the rising awareness of the need for greater sustainability in the construction industry. Digitalization means less waste, a lower carbon footprint and greater productivity per input used. Social awareness of environmental sustainability really pushed the industry towards becoming more digitally enabled.

Government helped to play a key role. In Hong Kong SAR, we started by advocating for the digitalization of public works projects. We also provided funding and subsidies to industry players who invested into digital approaches and technologies — the adoption of things like BIM and digital works supervision systems were rewarded. At the same time, we created policies that encouraged greater digitalization in the industry, particularly through procurement levers. Government proved to be a strong catalyst for the digitalization of the industry.

Ultimately, it took digitalization and data to change the way we shape the built environment. And our construction and infrastructure industries are stronger as a result.

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"We came together globally to assert human agency over technology."

Dr. Julia Glidden

**Corporate Vice President,
Worldwide Public Sector,
Microsoft**

Dr. Julia Glidden is Corporate Vice President, Worldwide Public Sector, at Microsoft. An internationally recognized expert on digital government, Dr. Glidden specializes in identifying and piloting emerging technologies such as artificial intelligence (AI), cloud and blockchain. Julia pioneered the concept of "cognitive government" and has delivered many of Europe's leading innovation projects. She is an expert advisor to the United Nations, the World Economic Forum and the European Commission. Julia is named in Apolitical's inaugural list of the Top 100 most influential people in digital government.

What do cities look like in 2030?

In 2030, the concept of cities is changing. Time and space are becoming blurred and the urban/rural divide is falling away. The ubiquity of technology and the introduction of 6G in the late 2020s means we can now be anywhere, at any time, living together, experiencing together, working together. You can experience the New York Metropolitan Opera from a rural village in India; you can experience rural India from a condo in New York City.

Has that undermined the sense of community in cities?

Not at all — it has enhanced it. What's been beautiful is that, as we embraced an era where we can be together without physically meeting, we recognized we still need human touch. We still need communities. It's our sense of what community means that has changed. Your community isn't just the people within physical proximity — it includes people around the world and in different environments.

How did the turmoil of the early 2020s influence government technology today?

First, there was the COVID-19 pandemic, then the serious conflict in Ukraine. Those were indeed dark days. And much changed because of those events. Take data, for example. The pandemic forced governments to digitize almost overnight. Then the rise of cyber warfare made them rethink what data they collected, who controlled it and where it was kept. In 2030, we've arrived at a place where governments and citizens have self-sovereign control over their data, regardless of its location. Trust has increased as a result. But the journey to where we are today was not easy.

How did that period impact the relationship between citizens and their governments?

There was a lot of geopolitical upheaval and some backlash against the controls governments had put in place to keep us safe. And that really opened up governments' eyes. They realized they need to do a better job listening, learning, collaborating and co-creating with everyone — not just the loudest or more powerful voices. And they harnessed technology to enable them to do that. Communities everywhere were strengthened.

I think the most beautiful thing has been how technology has allowed us to appreciate, respect, value and adhere to social diversity while, at the same time, delivering public services that meet the needs of people at a community, regional, national and international level.

Was there ever a risk of technology overtaking humans?

I remember back in the early 2020s, as we were entering the cyber wars, people were worried about things like singularity. There were concerns that AI would start self-replicating and developing its own governance. But, of course, that didn't happen because we came together globally to assert human agency over technology. We made very conscious decisions that we were going to put technology in the service of humans. We saw that nothing in technology can take away the beauty and vibrancy of the human spirit.

Has technology solved most of the world's problems?

I wouldn't say we are in a technological utopia yet. But we have achieved a good balance — a balance between local and global, between technology and human agency, between personalized service and surveillance. And that balance has allowed us to control technology and use it in a positive way. So technology hasn't solved all our problems. But it has made it possible to deal with them.

"Since consumers control their data in 2030, they are able to give governments permission to work together, within their silos, but coordinating to seamlessly deliver services to the customer."

Greg Wells
Government Chief Information and Digital Officer,
New South Wales (NSW) Government

"We seek out ways to improve people's probability of success."

Dr. Kate Cordell is a Behavioral Health Data Scientist and Researcher. As Co-Founder and President at Opeeka, Dr. Cordell leads the development of artificial intelligence (AI) statistical models, many published in peer-reviewed journals. Opeeka builds solutions to enable improved efficiency and quality in care. Opeeka's products support person-centered care using success-focused AI that learns over time what works for whom. Dr. Cordell holds a Bachelor's degree from Rutgers University, a Masters in Public Health (MPH) in Biometry from the Graduate School of Public Health at San Diego State University and a PhD from the School of Social Welfare at the University of California, Berkeley.

Dr. Kate Cordell

CEO, Chief Scientific Officer and Co-Founder, Opeeka Inc.

In the 2020s, we flipped the way we talked about mental health, which catalyzed a massive change in the way we help patients in 2030.

A decade ago, in the early 2020s, we talked about patients as risks. We used words like 'compliance' and 'adherence failure'. We assessed patients based on the risk they posed to themselves, their livelihoods and their productivity. We incentivized the management of risk, thereby keeping patients in care longer than necessary. We thought linearly, we worked with cases and we operated in silos around a patient.

In the 2020s, clinicians were islands unto themselves. Every clinician had their own unique process for identifying how best to treat their patients. Data wasn't just siloed in disparate electronic systems. It was siloed within the minds of individual clinicians.

In 2030, we talk about patient success. We seek out ways to improve people's probability of success. We work with them to achieve their care goals. We graduate them out of care, helping them become self-sufficient and supporting them with ongoing services when needed.

Rather than being islands, clinicians now act as pools, sharing their insights through an electronic brain trust to recognize opportunities for patient success. Care recommendations are driven by AI. Data informs our decisions and care pathways. We think holistically, we work with people and we work as care teams to help people achieve goals.

The robot will see you now

This shift in mindset allowed us to think differently about the way we apply AI and technology. Today, we use AI to help us unlock patterns of success — regardless of whether they're linear or not. AI allows us to look across thousands of indicators in billions of people's lives. Our focus on finding patterns of success removes the stigmas and barriers that used to hold people back from seeking care because the experience is more positive. We have moved our line of questioning from "what's wrong with you that you're seeking care today?" to "what does success look like to you after you receive care today?"

In 2030, the first interaction most patients have with a mental healthcare professional happens through a bot. Patients engage with it however they want. They tell it what they want to tell it. They share their problems, circumstances and history with non-judgmental AI.

The AI then uses the information the patient shared to build out a visual story map — everything from childhood traumas through to recent events. It finds patients with similar situations and identifies what led to their successes, helping the clinician see what might work well. And it provides the clinician and the patient with a set of recommendations and options that could lead to them achieving their particular goals.

That means clinicians can now focus on building relationships and helping patients instead of transactionally collecting data. And they can focus on the challenges that matter most, rather than trying to address everything at once. Patients achieve better outcomes faster. Healthcare payers have slashed their cost to treat patients. The societal benefits are immeasurable. And the irony is that AI has allowed us to become more human in the way we treat patients.

Linear no more

Of course, there were some challenges along the way. Data privacy and data sharing were hurdles at first: healthcare professionals were reluctant to share data even though patients wanted their care teams to work together. It became increasingly clear that better sharing led to better outcomes, and patients advocated for greater integration of data across the healthcare continuum. Today's healthcare teams work together and share information to help the patient succeed — patients don't need to tell and retell their story because care teams can work together to support a patient's goals.

It also took some time to stop thinking so linearly about mental healthcare. Back in the early 2020s, before we began applying AI, we used linear statistical models. There was a real limitation in the simplistic linear models that prevented us from understanding the complexities of people, their goals and their care plans. Now we know that we can recognize non-linear patterns across hundreds of thousands of predictors, allowing us to look at patients from a psychological, environmental, biological and cultural perspective. We see the whole person. And we look at change over time, not just at a point in time.

Flip the perspective, flip the model

Data sharing and AI have allowed us to flip the model for mental health. It has made patient care more science-based, more accessible, more holistic and more patient-focused. Technology has enabled the humans in the care continuum to focus on the success of the patient, which has made all the difference.

"In 2030, government oversees a marketplace of service providers, technologies and ecosystems."

Katrin Reinhold

Former Director, Health and Welfare Information Systems Center, Ministry of Social Affairs of Estonia

Government in 2030 is collaborative by design — it collaborates within departments, across departments and with the private sector. In fact, the role of government has largely shifted from being a direct procurer of services to instead being the keeper of the rules and standards by which services are provided.

In 2030, government oversees a marketplace of service providers, technologies and ecosystems — a library of government services that citizens can access. Start-ups and service providers have built their solutions on top of the platform. Citizens provide permissions for their data to be pulled from appropriate registries when required. Government's key role is to verify those solutions and ensure the security of the data.

That means government is hugely interactive and user-friendly. For example, if you have the misfortune of experiencing an accident, the Ministry of Social Affairs pulls all the levers needed to get you rehabilitation services, healthcare support, perhaps even work training if a new job is required. That's in the background. At the front end, citizens can go online to see all of the different providers they could select to access those services based on measures like cost, proximity and ratings. Once selected, citizens can then give permission for the appropriate data to flow across that ecosystem.

Interestingly, one of the keys to unlocking this reality for 2030 was a fairly straightforward technology solution — automating the release of metadata into open registries. Estonia has always been one of the most advanced digital governments. E-Estonia's X-Road interoperability

platform set the stage for data integration at the time. But back in the early 2020s, data was still siloed in departmental registries. It was reported into open registries only after a time delay. So while records and processes were digital, the data wasn't always actionable.

By automatically generating the metadata in real time, government made it easier for innovators to access the data they needed to create new solutions using anonymized data. It allowed service providers to better triage and target their services. It let government departments talk to each other more efficiently and effectively.

More importantly, perhaps, it allowed new technologies like artificial intelligence (AI) and machine learning to be introduced into processes. For example, in the healthcare sector, patients are being triaged and referrals are being written based on data from a handful of questions analyzed by an algorithm. Access to automated real-time metadata also allows doctors and care providers to monitor progress and build a library of scientific knowledge around care outcomes and patient pathways.

Of course, creating this marketplace of government services was not easy. It took interoperability. It took standards and rules. It took key enablers like electronic identity standards, consent and protocols for data exchange. And it took the automation of metadata generation. It also required government to navigate a constantly changing range of cyber threats and risks.

Estonia was perhaps best placed to take advantage of new technologies as they became available. Early

efforts on the e-Estonia initiative and investments into X-Road created the platform that was needed for adoption. By lacking these enablers, other markets have struggled to move as quickly.

The average citizen may tell you their interactions with government have become more seamless, more efficient and more personalized. My view of the decade to 2030 suggests we owe this to the government's shift away from procurement and towards overseeing a marketplace of verified, secure services.

Katrin Reinhold was the Director of Health and Welfare Information Systems Center in Estonia from 2017 to 2021. The Health and Welfare Information Systems Center is an information and communication technology (ICT) competence center in the field of health, social security and labor in the administrative area of the Ministry of Social Affairs of Estonia. Katrin has a wide range of ICT expertise as a result of her technology and business background. She has extensive experience in different management positions in the ICT area within the private and public sectors.

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The cyber security risk has not magically disappeared by 2030; although, at the same time, our cyber security and resilience has increased. "

Andrew Dinsley
Head of Program,
Cyber Security at the Foreign,
Commonwealth & Development Office (FCDO),
UK Government

"In 2030, everything has a digital twin — buildings, systems, and even people."

Khoong Hock Yun, a Harvard Business School alumnus, is Managing Partner (Blockchain Fund 1 and 2) at Tembusu Partners, a Founding Board Member of the Klaytn Foundation, and Senior Advisor with the Aedge Group Limited. He has more than 30 years of experience in both public and private sector organizations. He was the Chief Digital Evangelist and led the development portfolio at the Infocomm Media Development Authority (IMDA) of Singapore. He helped Singapore more than triple its info-communications industrial revenue from US$15 billion in 2000 to US$52 billion in 2015.

Khoong Hock Yun

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Fund Founding Board Member,
Klaytn Foundation**

In 2030, the world is highly digitized. The concept of 'work' has evolved dramatically. And people interact with each other — and with their public services — in very different ways. None of it would be possible without the trust delivered by blockchain technologies.

Here are five use cases where blockchain is empowering the future in 2030:

Identity authentication

Whether you're buying something in the metaverse or exercising your right to vote, the parties you interact with need to know that you are a real person and that you have the credentials you say you have. Blockchain allows identity authentication providers to safely record and store key identity elements and preferences that can be released by individuals to companies and service providers as needed. In the real world, identity authentication services have been particularly useful in managing refugee crises, for example.

Currency supervision

Cash went out in the late 2020s. In 2030, tokens can pay for everything. The question of which credit cards are accepted is replaced with which tokens are accepted for payment. Governments have set up regulated exchanges where various tokens can be exchanged under the supervision of regulators. That has led to a much more efficient, flexible and resilient banking and payment system where customer transaction fees are extraordinarily low and monetary system liquidity is high. It has also allowed supervisors to cut funding to terrorist organizations and hunt down organized crime.

Real asset transfers

In 2030, we use blockchain technologies to track the ownership and providence of all sorts of real assets — from items moving in the supply chain through to property sales and investment transactions. Blockchain not only provides an immutable record of ownership over time and place, but it also allows government agencies to deliver greater value by, for instance, conducting customs checks and reviewing documentation on imports as they arrive at a port (versus waiting until all the paperwork arrives from various sources). The tokenization of assets enables wider participation in significant investment opportunities such as ownership of companies and real estate.

Digital twins

In 2030, everything has a digital twin — buildings, systems, and even people. Building and system digital twins are used to improve designs, identify efficiencies and test new innovations. Personal digital twins are most often used in virtual interactions — in the metaverse, for example, or in interactions with government services. Underpinning all these twins is data that's stored, accessed and verified using blockchain technologies. That provides individuals and decision makers with the trust they need to be confident in their decisions.

Carbon tracking

We haven't yet reversed the impacts of climate change. But we do have a very sophisticated system of verifiable carbon offsets and credits that interact around the world. And blockchain technologies make it all work seamlessly. Airlines in Europe, for example, use smart contracts to automatically purchase carbon credits in Asia — from, say, a tree farm in Indonesia — to offset every flight mile. The transaction is triggered and the assets underpinning those credits are verified and audited on blockchains.

While I'm clearly a strong advocate for blockchain technologies, my view of the past decade suggests the most successful public and private sector leaders were those that took the time to understand and evaluate the use cases of a variety of different technologies. History has proven that if you don't understand the technologies, you cannot take the right risks to bring new and real value to the world.

"
In 2030, government oversees a marketplace of service providers, technologies and ecosystems — a library of government services that citizens can access. "

Katrin Reinhold
Former Director,
Health and Welfare Information Systems Center,
Ministry of Social Affairs of Estonia

"In 2030, cities are where the action is."

Lawrence Eta
Chief Technology Officer, City of Toronto

What role did cities play in the transformation of government in the 2020s?

Cities have been the powerhouses of government transformation. Cities are where the action is. It's at the municipal level that citizens, residents and businesses tend to really see and interact with their government on a day-to-day basis. So as governments started to modernize and transform, cities were at the forefront. They needed to really understand and anticipate the experience from citizens, residents and businesses and their needs and ability to serve them. Today, in 2030, cities are more intelligent, responsive and cognitive. And their digital DNA allows them to respond much faster to the ever-changing pressures facing cities and their citizens.

Was the transformation of government policy-led or technology-led?

Throughout history, policy has struggled to keep up with innovation. In the 2020s, we saw the equation get flipped. In a wide range of areas, technology took the lead and forced policy to catch up. Take the use of digital IDs, for example — it wasn't until they were commonplace and trusted by stakeholders that government finally revised their policies to accept them. Eventually, government developed and sourced the skills and expertise they needed to create policy that encouraged innovation rather than controlling it. But it took time and a lot of collaboration.

How did Toronto bridge the digital divide?

As I said, cities have been at the core of the digital transformation. So, we

need to take the lead on ensuring our services and channels are equitable, accessible and inclusive. Early in the 2020s, Toronto implemented a strategic framework to guide our digital infrastructure planning and investments. The framework was based around principles of equity and inclusion; a well-run city, society, economy and environment; privacy and security; and digital autonomy. And that has enabled us to make smart decisions that really helped us start to close that digital divide in 2030.

Few people in 2022 would have expected municipal governments to be significant champions of advocating at all levels of government for affordable and accessible innovative broadband delivery models, for example. But that's what has allowed us to achieve some public trust and confidence aligned to digital infrastructure principles while implementing solutions to advance bridging the digital divide. It's these

kinds of ideas and public-private partnerships that really made a big difference in our underserved communities.

Toronto was also very active in working with its innovation ecosystem to achieve its goal of making the city more livable and sustainable. Strong partnerships with the innovation ecosystem — including organizations with creative business models, academia and corporates — helped support the city's work to achieve its mandated goals. And it helped reduce health disparity between the richest and poorest citizens, for example.

What role are technology and service providers playing?

The partnerships between technology companies and cities are vital in 2030. I think technology companies and service providers realized early on that they needed to really invest into their clients' success — and that meant reinvesting their profits back into R&D and innovation, creating social impact and helping develop sustainable forms of investment. At the same time, cities also needed to make some investments into driving the digital transformation, particularly in areas of the community where citizens and residents were not able to afford those investments themselves.

In 2030, technology providers play an important role in delivering services, but so does the city.

How has the role of the Chief Technology Officer (CTO) changed in 2030?

Now that we have flipped the equation with technology driving policy, Chief Information Officers (CIOs) and CTOs are at the center of a hybrid system and business models that link together policy, process

improvements, change management and digital. Being a CIO or CTO requires much more than technical know-how. It takes a cross-functional skill set that includes business skills, financial skills, people skills and a deep understanding of macro- and micro-economics and — perhaps most importantly — the ability to motivate people around a purpose.

Did you struggle to find the talent you needed to transform through the 2020s?

Interestingly, government identified talent internally and focused on the purposeful recruitment of external talent and leaders with a lens on diversity and inclusion. After the challenges of the early 2020s, we found a greater sense of public service within the community. People wanted to spend a few years of their lives working in the public sector as a way to gain experience and serve their communities. Governments started to package their capability requirements into projects, sprints and workflows. Whether it is a two- to three-year assignment, or a different timeline, once complete, talent could return to the private sector after making

meaningful contributions. Private companies now encourage their talent to go spend some time working in the public sector. Government and public sector organizations encourage talent to serve the community and take their experience back to the private sector. The exchange of ideas and opportunities has been tremendous while also leaving communities in a better place.

How did you build trust with citizens, residents and private sector providers?

After years of abdicating control to technology companies, governments leaned in further to hold companies to account for the way they managed and utilized citizens' and residents' data. We worked together — government, tech companies, private providers, citizens and residents — to ensure everyone understood how data was to be used. I think that allowed us to achieve unprecedented collaboration and build strong levels of trust from citizens and residents looking to government and companies. We all knew we were working together to create a better future for our communities.

Lawrence Eta is the Chief Technology Officer for the City of Toronto. As a transformative business and technology executive, he provides vision and strategy, enabling innovative technology solutions that modernize and enhance the customer service experience. Over the span of his 20 plus years career, Lawrence has been involved in a wide range of technology industries, holding various senior leadership positions. Lawrence is a TEDx speaker and member of the Coalition of Innovation Leaders against Racism (CILAR). He is a passionate advocate of diversity and inclusion, creating equity and prosperity for underserved communities and an advocate for BIPOC participation in Science, Technology, Engineering, Arts and Math (STEAM).

"Patients are happier, healthier and more empowered."

Lisa Hollins

Former Director of Innovation, NHSX

Lisa Hollins has been the Executive Director of UK Operations for the British Red Cross since April 2022. She previously held the role of Director of Innovation Delivery at NHSX (which is the joint unit of National Health Service England and the Department of Health and Social Care). Lisa has extensive leadership experience in the health and social care sector. She is passionate about improving services and has published articles in the British Medical Journal and Health Service Journal.

In 2030, the last place you go for healthcare is the hospital. Indeed, the big difference between 2020 and 2030 is how little time people actually spend in doctors' offices and healthcare facilities.

In 2030, the vast majority of patients are at home, supported by a range of different monitoring devices and virtual care channels. New care pathways have emerged and transformed the way care is delivered. And amazing technologies like artificial intelligence (AI) and natural language processing (NLP) have allowed us to share and fully utilize data so we can deliver targeted care and curated services.

That means fewer visits to healthcare facilities and earlier identification of patient conditions — in other words, patients are happier, healthier and more empowered.

Infrastructure, innovation and information

There were three factors that led to this radical transformation of healthcare as we knew it in 2020. The first was that we started to update the infrastructure to take it out of the organizational level and into a system and regional level. Technology procurement is now based on the needs of population health rather than the needs of a particular service. That unlocked all sorts of new possibilities in the way we captured and shared patient data. And it led to unprecedented interoperability between providers in the healthcare system.

The second factor was our willingness to innovate on top of that patient data. We partnered with a wide range of small-to-medium businesses, start-

ups and innovators that were doing very interesting pathway work with new and emerging technologies like AI and NLP. We started to understand, and then predict, where the patient risks may occur. And that allowed us to provide patients with more bespoke and curated care options.

The third catalytic factor was the adoption and integration of digital pathways into the care continuum. The introduction of small-scale, mobile and remote monitoring devices, such as pulse oximeters and home blood pressure monitors, enabled patients to monitor their own vital signs. The data was also immediately shared across their clinical teams who were monitoring the patient remotely. This led to fewer patient visits to the hospital, reduced pressure on the existing hospital workforce, and patients being monitored and, where required (and appropriate), treated in the comfort of their own home.

Combined, these three changes have led to radical transformations across the healthcare sector. Primary care and acute services have been shifted out of clinics and hospitals. Patient data is integrated at a regional level. Healthcare professionals spend their time working with patients, not inputting data and running down results. Resources are free to focus on the most urgent cases. That has led to tremendous improvements in health outcomes across the healthcare system.

And a healthy dose of inspiration

Of course, there have also been challenges to overcome since 2022. Hospital CEOs, for example, had

to quickly reassess their operating models and structures as the quantity, channel and type of service demand changed.

A range of new skills were required — for example, new technology skills were needed to manage the infrastructure, new healthcare skills were used to maximize the digital channels and new leadership skills were required to spot changes on the horizon and quickly respond.

Trust in digital service delivery had been a problem until the COVID-19 pandemic. That global experience demonstrated to populations that data could be exchanged digitally and securely without putting patients at risk. In fact, patients were the biggest advocates for the digitization of care pathways and the greater sharing of data across care teams. The number of patients who prefer face-to-face interaction over a digital channel has dropped dramatically. With greater experience has come trust.

Get out of the building

Ultimately, the most notable change of the decade from 2020 to 2030 is that we stopped centering care delivery around buildings and organizations and started centering it around patients, which has unlocked a radically different approach to health and social care. More than anything, patients are happier, healthier and more empowered.

> ## "The internet, as we knew it in 2022, is gone."

Mark Paul
Founder & CEO, Iteum

Mark Paul is the Founder and CEO of Itheum. Mark has over 20 years of experience building large-scale data, artificial intelligence (AI), blockchain and distributed software initiatives for the government, enterprise and tech startup sectors. He founded Itheum two years ago to build technology that empowers personal data sovereignty with a focus now on making Itheum the core personal data protocol for the metaverse era.

The internet, as we knew it in 2022, is gone. In 2030, the world operates on a decentralized net powered by blockchain technology, which has enabled a fundamental transformation in the way people live.

Decentralize the net, decentralize trust

The seeds of this transformation to a decentralized net were sown in the early 2020s with the rise of digital twins. In short order, pretty much everything in the physical world was mirrored in the virtual — objects, locations, even humans. Data flows off everything. And there are multiple interoperable blockchains capturing it all at scale.

In this world, everything is credited to an owner. As a human, we emit data that's captured by sensors and input devices that are plugged into the metaverse. As that data is created, its origin is cryptographically proven. It is added to a non-fungible token (NFT), which is a sort of digital filing cabinet of all your personal data, and securely stored on blockchains. That means that individuals own and control their data — and they can trade it or sell it as they see fit.

In doing so, we essentially decentralized trust. In the past, people relied on central organizations to tell us who we could trust and who we should not trust. Governments issued passports. Companies issued IDs. Social media giants verified identities. But now, with all data ownership cryptographically proven, trust is a non-issue. It's a 'trustless' environment.

A smarter world

This shift to a decentralized net spawned a tidal wave of new ideas and innovations. Since individuals now own their own data, they can trade or sell it to third parties for various uses. People sell their data directly to their service providers in order to improve their service or receive greater value. Many allow their data to be used by research organizations — anonymized and in aggregate — to help discover or improve medical treatments. In each case, some consideration is given to the owner, more often than not as a payment via token. In fact, many people now make a good living just by selling pieces of their personal data.

The decentralized net also changed the way people work with, assess and select their government. Like most other communities on the decentralized net, government is run by way of decentralized autonomous organizations (DAOs). They're basically a set of rules coded into the digital ledger that serve as smart contracts. When a government department or politician sets an agenda, they create a DAO to oversee it. Citizens can check progress on the agenda at any time using the DAO. It's referred to as a decentralized representative government. And many national entities are already operating in this way.

The Great Data Breach of 2028

What catalyzed this fundamental shift from a centralized web to a decentralized one? It was the Great Data Breach of 2028. For years, governments had been pushing all their data into a handful of public clouds. Then, one day in 2028, hackers managed to crack the key management systems that served as the centralized encryption keys to the data. In a matter of days, the personal data of citizens around the world was compromised. Web 2.0 had been breached. We needed to come up with a 'trustless' system and quickly. A decentralized web seemed the obvious (and most established) alternative.

However, the only reason we were able to switch from Web 2.0 to Web 3.0 so quickly was due to experience. Governments had been running pilot projects using decentralized approaches since the early 2020s. Organizations had been creating the technology and building awareness. And concepts around digital ledgers and decentralized transactions were rapidly maturing.

Had we not embraced digital ledger technology back in the early 2020s, the Great Data Breach of 2028 may have destroyed society as we know it. It didn't. And we have the decentralized net to thank.

"Instead of expecting citizens to chase the government for services, government should chase the citizen offering services."

Dr. Neeraj Mittal IAS

Principal Secretary of Information Technology, Government of Tamil Nadu, India

Dr. Neeraj Mittal is an officer of the 1992 batch of the Indian Administrative Service (IAS) and the Principal Secretary of Information Technology at the Government of Tamil Nadu in India. He has extensive experience in policy formulation and execution in e-Governance, Transport, Industrial Promotion, Petroleum & Natural Gas, Commerce & Industry, Telecommunications and IT. His engagements include PaHal the world's largest cash transfer program in liquefied petroleum gas (LPG) in India, and GiveItUp in the Ministry of Petroleum & Natural Gas, which leveraged technology to simplify processes, improve efficiency, convenience, participation and transparency in governance.

How has India — and the State of Tamil Nadu in particular — moved so quickly in their efforts to digitalize government services by 2030?

India embarked on its digitalization journey with the launch of the Digital India campaign. That brought a fundamental transformation in citizen service delivery. I would say that it was a combination of three initiatives. The first was the national Digital ID program, which allowed every citizen to access government services seamlessly with a single digital identity. The second was the massive adoption of mobile as a channel to government services. That changed the way government interacted with citizens and helped create a participative governance model. The third was the expansion of universal banking. This gave the possibility to unlock a number of use cases for the Digital ID and mobile programs that would not have been possible before. The aim was to move from 'e-Government' to 'e-Governance'.

The combination of Digital ID, mobile adoption and universal banking created a robust platform on which public and private sector players could digitalize and develop all sorts of products and services. And that allowed us to rapidly accelerate and scale up our digital journey.

Were there any specific technologies that helped drive that shift?

I would argue that the biggest change over the past 10 years was when we moved all of our software and hardware onto the cloud and virtual environment that extracted a better performance of any application state with the optimum use of deployed resources with on-demand availability. It took some time. We needed to overcome public sector concerns about the security and resilience of cloud technologies. But today, in 2030, everyone recognizes the value that cloud has given us. There are some misgivings, but these will be resolved over time.

Another 'unsung hero' of the transition has been blockchain, which has allowed government departments to be more predictive by creating smart contracts with a focus on data sanity and integrity. Instead of expecting citizens to chase the government for services, today's government can chase the citizen offering services — and much of that has been due to blockchain and smart contracts.

Finally, I would cite the massive role that data technologies have played. Data, in and of itself, is not a technology. But the intelligent and automated tools — like artificial intelligence and machine learning — that have been applied to the data unlocked all types of changes in the way we function and how we deliver services. Tamil Nadu's cataract detection app e-Parvaai, as just one example, uses a smartphone camera to detect cataracts in the user's eyes with over 90 percent accuracy. It has the potential to eliminate blindness due to cataracts in the national population.

Are you facing any unexpected challenges as you look ahead from 2030?

In the early 2020s, I suspect most people thought that the digital divide would be eliminated by 2030. But the digital divide is still here, and it has become much more complicated. It's not really about access anymore — mobile and internet penetration are nearly universal. The real challenge today is digital literacy. Technology is changing faster than most of us can comprehend. And now, with quantum computing starting to permeate every facet of technology, it's more complicated than ever.

The other challenge still troubling society is the use of personal data. We've come a long way in creating and formalizing charters and regulation around what data companies can use and how they can use it. Again, the technology is changing quickly, which makes it difficult for regulation to keep up. But we're making progress. Tamil Nadu has been a harbinger on regulating the use of data and opening up possibilities to use it as a public good through the TN Data Policy 2021.

As we look ahead from 2030, the thing I'm most excited about is the evolving dynamic gig economy. The pandemic forced companies to adopt a work from home model extensively, which has kick-started the gig economy. Every person is a company that offers goods and services. It's a very different environment and is here to stay.

"Data is now the bread and butter of everything we do."

Shahar Bracha led the Israeli Government's leading technological authority responsible for overseeing the digital technologies divisions across all ministries and agencies. The Government Information and Communications Technology (ICT) Authority is responsible for promoting cross-government methodologies and standards, and developing infrastructures, systems and services to enhance the efficiency of government work and make government information and services accessible and convenient to the public.

Shahar's previous experience ranges from software development and IT infrastructure to business development and strategic planning.

Shahar was also the Vice-Chair of the International Council for Information Technology in Government Administration (ICA).

Shahar Bracha

Former CEO, Israel Government Information and Communications Technology (ICT) Authority

It's 2030. What do government services in Israel look like today?

The Israeli Government is very proactive today. In the past, we used to expect citizens or businesses to come to us when they needed licenses renewed or government approvals. Now, we reach out to them, asking only for the data we are missing in order to deliver the service they require. We have also become very proactive at service delivery. For example, when someone is born or someone dies, we immediately contact the family to ensure they are receiving all of the benefits they are entitled to.

Government is also digital by default. The pandemic of 2019–2022 drove digital adoption across all demographics and business sectors. The vast majority of services and users are now digital.

But that does not mean there are no physical services. There are still civil servants, public employees and service centers. But service centers are now very cross-governmental; citizens go to one service center for all their government needs. There are more kiosks and online stations to provide access to services. And there are still phone lines where citizens and businesses can talk to a person.

The way we design and deliver services has also changed. Take schools, for example. Today in 2030, we are using the data at our disposal to properly evaluate and assess the learning requirements of each individual student. And then we design a special program to help them achieve the most from their abilities.

How did Israel make the transition to digital by default so quickly?

There were a number of factors that allowed us to move very quickly. I think our Nimbus project, which we launched back in 2021, allowed government to really adopt cloud on a massive scale. Top government officials and bodies got behind it, supporting it with the right resolutions to really drive adoption. In less than four years, we were off our old legacy systems, which gave us the ability to deal with change very quickly and adopt new solutions at speed.

Partnerships across government were also critical. From the start of the last decade, there was a growing recognition that we needed to pull down departmental silos. We brought different people from different ministries with different responsibilities to the same table. That allowed us to truly see everyone's needs. And it helped us move quickly when decisions needed to be made.

The adoption of government digital IDs was also a great catalyst. At first, these were only used to access government services. But the resulting transformation into a national digital ID solution was a major advantage to the economy. Once it was open to small businesses, it enabled every business owner to quickly verify who was using their services and allowed them to effectively reduce their transaction risks.

Ultimately, however, I think it was the use of data that really drove this transformation. Data is now the bread and butter of everything we do. Today, in 2030, artificial intelligence and machine learning are allowing us to look at data across new and legacy databases. They're providing our decision makers with deep knowledge and insights. And they're doing it proactively, not just waiting for us to ask the right questions. The data is providing assumptions and suggestions we hadn't previously considered.

What role do you see government playing in driving the next wave of innovation?

In Israel, the government has not been the driver of innovation — it has been the industry and the ecosystem. Our start-ups and entrepreneurs are the locomotion of new technology and new fields of interest. And Israel has done well by its start-up approach and culture over the past decade.

Looking out from 2030, I think our main goal will be to continue to open up government data — both in terms of the data itself and the application programming interfaces (APIs) we deploy to support that interaction — so the private sector can continue to develop valuable government services that Israeli people and businesses need going forward.

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Today, in 2030, artificial intelligence and machine learning are allowing us to look at data across new and legacy databases. They're providing our decision makers with deep knowledge and insights and they're doing it proactively. "

Shahar Bracha
Former CEO, Israel
Government Information
and Communications
Technology (ICT) Authority

KPMG

> **Maintaining a high degree of ethics is key to trust. And trust is foundational to securing the outcomes government hopes to achieve.**

Stine Hegelund Bertelsen

Deputy Director General, Danish Business Authority

It's mid-summer of 2030. And I'm sitting at one of the Danish Business Authority offices in Copenhagen, Denmark. What's on my agenda right now? I see five big themes.

The personalization of digitalization for businesses

The first wave of personalization was targeted towards citizens. But now we are making great progress in personalizing government services to business users. It has not been easy — businesses come in all different types and sizes and they often have different needs and priorities. We needed to spend a lot of time really thinking about the data and how we structure and transport it in ways that actually reach and deliver value to businesses. In 2030, we're continuing our work to make government more accessible to businesses.

The never-ending battle for cyber security

The more we digitalize and the more we rely on technology, the more we need to ensure we are managing the security of the system and data. Denmark's businesses have been fairly lucky to date. We've seen individual attacks, but we've seen strong defenses of our government systems and data and, as a result, we've been able to build significant trust with our businesses. But we must continue to remain vigilant about cyber security. I'm not convinced that cyber security will ever come off our agenda.

The ramping up of environmental reporting

We reached some climate goals for 2030. But we have bigger goals to achieve now. And much depends on businesses' ability to measure, report and manage their carbon and environmental, social and governance (ESG) data. Government and the European Union have set some fairly stringent regulations for how reporting must be managed. Many businesses are ramping up their reporting capabilities as a result — though some clearly see ESG and climate data as an opportunity to define new business models in the circular economy. We made good progress on the decarbonization agenda to 2030, but now the real journey is getting started and reporting will be at the core.

The continuously evolving ethics debate

Government has a lot of data about its citizens. And it has a lot of data about individual businesses. It can be used to make citizens' lives easier. But, in order to drive trust, it must be used transparently. That means helping people and businesses understand what kind of data government has, how they plan to use it, where it is being used, how it is being stored and how it can be changed if needed. Maintaining a high degree of ethics is key to trust. And trust is foundational to securing the outcomes government hopes to achieve.

The application of artificial intelligence (AI) to drive decision-making

In Denmark in particular, the application of AI has been driven by an aging demographic and pressure on the workforce. That wave of AI application drove a lot of efficiency in the public sector and in businesses across Denmark. Now the focus is on applying AI to help the public sector become smarter — using algorithms to identify businesses at high risk of money laundering, for example, or to more accurately allocate tax spend and infrastructure development strategies. From 2030 onwards, the focus is on making AI a tool of decision-making rather than just a tool of automation.

That's what's on my business agenda. But my personal agenda for this afternoon involves using virtual reality (VR) to go skiing with friends. Or perhaps to visit a market in Sri Lanka …

For almost a decade, Stine Hegelund Bertelsen has worked on the digitalization of Danish society. For example, she has previously worked on a national digital post solution, where all citizens and businesses in Denmark had a digital mailbox. Today, Stine's main focus is how to make it easier to be a responsible business in Denmark through digitalization and using new technologies (e.g. machine learning) to secure a level playing field. Stine is currently Deputy Director General at the Danish Business Authority in Denmark and highly engaged and interested in data ethics and data management. Prior to this role, she worked at the Danish Agency for Digitization.

The views and opinions expressed herein are those of the author and do not necessarily represent the views and opinions of KPMG International Limited or any KPMG member firm.

"We made good progress on the decarbonization agenda to 2030, but now the real journey is getting started and reporting will be at the core."

Stine Hegelund Bertelsen
Deputy Director General,
Danish Business Authority

"The journey to digital government doesn't start with technology decisions, it starts with the enabling conditions."

Dr. Susana Cordeiro Guerra

Sector Manager, Institutions for Development, Inter-American Development Bank

Dr. Susana Cordeiro Guerra serves as the Manager of the Institutions for Development Sector at the Inter-American Development Bank. Previously, Dr. Cordeiro Guerra led Brazil's National Statistical Agency from 2019 to 2021. In that capacity, she oversaw production of the country's official statistics and preparation for the decennial census. During her tenure, she spearheaded reforms of the 12,000-person agency to modernize the production of official statistics. Confronted by the COVID-19 pandemic, Susana successfully led the agency's transition to a remote work platform, leveraging partnerships and digital technologies to maintain statistical production and launched key surveys to guide policymaking during the health emergency.

What's the state of digital government in Latin America and the Caribbean in 2030?

It's clear that governments across the region understand the importance of digitalizing their services. And we have seen the enabling conditions for digital government improve substantially over the past decade.

Broadband coverage is nearly universal. We have strong institutions overseeing the digitalization journey. The agencies leading the adoption of digital IDs are robust and well-functioning. And governments are, for the most part, doing well at prioritizing the digitalization of those services most in demand.

Of course, the region is very diverse and market realities are different across countries. Some, like Uruguay, Brazil and Argentina, have entered 2030 with most of their services now online. Others, like Bolivia, Haiti, Honduras and Guyana, are slightly further behind, but making great strides with the help of multilateral organizations.

As a result, most people living in Latin America in 2030 now have access to better quality services, at lower costs, and with greater transparency and accountability from public sector providers.

Did technology catalyze this shift in Latin America and the Caribbean?

Technology has certainly been important. But I would argue that what really allowed Latin American

and Caribbean governments to digitalize has been their enhanced state capacity.

The journey to digital government doesn't start with technology decisions, it starts with the enabling conditions — things like developing and retaining human talent; putting an agency with the right empowerment, resources and talent in charge of the transformation journey; and setting a regulatory framework that enables transformation.

In 2030, leading digital governments are those that solve problems through an inside-out, iterative and adaptive manner. These governments let the challenge drive the solution, rather than approach a challenge with a preconceived notion and toolset.

Have Latin American and Caribbean governments managed to bridge the digital divide?

In terms of access to infrastructure, the digital divide has been dramatically reduced. 5G is nearly universal, 4G reaches remote places, and every home and office is linked to fixed broadband services.

But as much as the region has advanced in creating the right access conditions, there is still a lot of progress to be made in terms of the absorption and use of these tools and technologies within the most vulnerable communities and groups.

What's currently on the agenda for Latin American and Caribbean governments

seeking to further enhance citizen enablement in 2030?

There is lots on the agenda. But we're seeing the main thrusts of activity in four areas.

First, is enhancing digital literacy, particularly among the most vulnerable groups and older population segments. Digital literacy unlocks access to opportunities like digital learning, virtual jobs and healthcare.

Second, is improving access by championing a multi-channel approach to government that includes digital and physical. For those that are already further along the journey, this is more about automating the routine processes and services so citizens and public servants can focus on the value-added technology enablement.

Third is driving adoption of digital IDs — a powerful enabling condition for the full digitalization of government services. But it does take some careful pre-work in terms of setting the regulatory framework and thinking about things like digital identity, data protection and cybersecurity.

And fourth, they are focusing on digital financial inclusion to ensure everyone can participate in the formal economy. This would allow citizens to get things like credit scoring mechanisms, buy insurance or start up new businesses.

In 2030, I believe Latin America and the Caribbean are on the right track to deliver a true digital government experience. The 2030s will be an exciting decade for the region.

> ## "Government is empathetic, proactive and citizen-focused."

Taki Sarantakis

President, Canada School of Public Service

Taki Sarantakis has been President of the Canada School of Public Service since July 2018, having previously served as Associate Secretary of the Treasury Board at the Treasury Board of Canada Secretariat. He spent most of his career at Infrastructure Canada, including as Assistant Deputy Minister of Policy and Communications.

In 2011, he was awarded Canada's Public Service Award of Excellence in Public Policy, and in 2013 he was a recipient of the Queen Elizabeth II Diamond Jubilee Medal.

It's the year 2030 and a lot has changed in the last decade. What's different about the way government serves citizens in 2030?

In 2030, people see government as an ally. It is focused on citizens. And it is incredibly efficient and effective.

Just 10 years ago, citizen interactions with government tended to be overly complex. Back then, when a citizen wanted to change their name due to marriage or other life changes, it would require multiple physical visits to multiple different government departments — motor vehicles, tax, land registries, passport offices and so on.

Now, in 2030, government is much more empathetic, proactive and citizen-focused. When a citizen notifies government about a name change today, government springs into action, making the relevant changes across all departments and updating files and aligning records. Government will even offer to work with your private providers to authenticate the name change.

What catalyzed that change?

I think government realized they had been working in service of the system rather than in service of citizens. In reality, the data they were collecting, the processes they were adhering to and the services they provided all existed to keep the system fed and happy. It wasn't necessarily what was best or most convenient for the citizens.

What changed was the expectations of citizens themselves. Private company service providers were delivering exceptional customer experiences. And government wasn't keeping up. People would stand in line for hours in government offices while, on their phones, private companies were entertaining them with personalized video content. The juxtaposition became increasingly clear. And citizens became increasingly disillusioned with government capabilities and focus.

Did the great digital leap of the early 2020s help?

There were really three big trends that emerged for government in the early part of the decade. The first was the Internet of Things (IoT). Government started to realize they could be collecting much more data automatically, and that data could be allowing them to provide much better services to their citizens. The IoT essentially allowed government to automate data collection.

The second was predictive analytics. It really came of age in the 2020s. And it allowed governments to not only predict the needs of citizens, but to use those predictions in future planning. Predictive analytics allowed governments to become much more citizen-focused and much more proactive in the way they interacted with and served their citizens.

Underpinning all of this was the data revolution of the early 2020s. It wasn't just the amount of data being generated, but the potential

sources of valuable information that kept expanding. Government had a choice of either drowning in it or finding ways to use that data to make society better.

With new service models and technologies, government started to prioritize the use of artificial intelligence (AI) in service delivery. They started to really focus on integrating their data and processes, allowing data-informed decisions to be made. And they moved quickly to create smart, efficient and effective platforms. Those actions really allowed governments to start focusing their resources and their processes on the citizens themselves.

And how did government empower their workforce to move into this citizen-focused world?

Ultimately, I think it was government's focus on their core values that enabled the workforce to transform. Your values are your values — they don't change. And if you are following the right values, you can execute them in a number of different ways.

Government also made sure that employees were given the tools they needed to achieve their goals — not just new technologies, but also new capabilities and skill sets. Once people had the right tools and were focusing on the core values of the organization, becoming more citizen-centric was less of a disruption and more of an opportunity for government workers.

> ## "Space data is giving society a level of control over their day-to-day actions that simply wasn't possible with existing ground-based infrastructure."

Dr. Tanya Harrison

**Director of Strategic
Science Initiatives, Planet Labs PBC**

Dr. Tanya Harrison is the Director of Strategic Science Initiatives at Planet Labs PBC, where she leads strategic partnerships, messaging, and engagement with the global research community. Before Planet Labs, she worked in science and mission operations for multiple NASA missions over the course of the last 13 years. Tanya holds a PhD in Geology with a Specialization in Planetary Science and Exploration from the University of Western Ontario, a Masters in Earth and Environmental Science from Wesleyan University, and a Bachelor of Science degree in Astronomy and Physics from the University of Washington.

The way people interact with our planet has changed significantly in the years leading up to 2030. The way we interact with space has, perhaps, changed even more. What has been the biggest change in our relationship with space?

There's been a lot of technological innovation and many new and exciting missions. But what really made space more interesting and valuable to people in 2030 was when we finally started democratizing space data by hosting it natively in the cloud supported by user-friendly and accessible platforms to analyze it. Two things happened. First, it allowed policy makers to make much more informed and dynamic decisions based on real observations we're making from space. Secondly, it put space data and insights into the hands of everyday people, essentially democratizing the insights that space data provides.

How exactly is that information being used in 2030?

The most obvious application has been in our efforts — collective and individual — to mitigate and adapt to climate change. Municipal governments, for example, use space data to assess air quality in locations that lack other measurement devices. National governments are using space data to monitor forestry and

deforestation rates. Individual farmers are using space data to help adapt their crop allocations based on changing weather patterns. Space data is giving society a level of control over their day-to-day actions that simply wasn't possible with existing ground-based infrastructure. And now, by combining space data with streams of other data, we're seeing all sorts of amazing new use cases emerge.

Have governments become overly reliant on commercial providers and foreign programs?

No. There is certainly a lot of sharing of data and collaboration in all sorts of spheres, but the reality is that the costs and complexities of accessing space have fallen tremendously. It's now quite viable for a country to build their own satellite, launch it on a commercial rocket and start collecting their own earth observation data. Some markets have used this approach as a way to catalyze their own space economy ecosystems that are now generating jobs and innovation within their borders. And space programs remain a matter of national pride for many markets. So, in 2030, most national governments have some sort of space program underway.

You mentioned technological innovation. How has space technology evolved over the past decade?

Space technology has become much more efficient, scaled and powerful. We've innovated

on technologies like optical communications, which allow us to get much more data back from space at much higher speeds. And we've built more ground stations to transmit that data. We've scaled up the development of CubeSats and SmallSats using commercial off-the-shelf components, thereby driving down costs. With this massive increase in volume and speed of data, we've also seen great innovation around the use of artificial intelligence (AI) and machine learning. That's what allows us to focus on the anomalies and the insights which, ultimately, are what really matter.

Does the average citizen understand the relationship between space and their life on earth?

We're still working on that. People have become much more accustomed to viewing satellite imagery as part of their news, weather and entertainment. And with data now more accessible through the cloud and more valuable thanks to easy-to-use analytics platforms, we're seeing the use cases for more sophisticated applications of space data expand — in agriculture and forestry, for example — and that's driving growing rates of literacy and awareness. But, even in 2030, I think we still need to work harder to bring the space domain into schools so that students start to understand the value, and the opportunities, that space represents.

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Dr. Thomas Zacharia, Director of Oak Ridge National Laboratory (ORNL), leads more than 5,800 staff in applying an exceptionally broad set of core capabilities to help solve today's most compelling problems in science and technology. Thomas manages an annual budget of more than US$2.4 billion while guiding ORNL's signature strengths in advanced materials, biology and environmental science, high-performance computing, neutron science, national security, and nuclear science and technology to deliver mission outcomes for the US Department of Energy and other sponsors.

Dr. Thomas Zacharia

Laboratory Director, Oak Ridge National Laboratory

" **Supercomputers allowed us to create a better world.** "

They may not be as 'super' by 2030 standards, but the supercomputers commissioned in 2022 were the catalysts that brought government, society and technology together.

I was leading ORNL when the Frontier exascale supercomputer was commissioned. It was one in a long line of accessible and powerful supercomputers that was part of opening computing to all.

Around the same time as Frontier's arrival, governments started to develop a more clear-eyed view of data integration and availability. Over the next few years, government data and business data were opened up and integrated. A wave of innovation and insights followed.

It was the combination of supercomputing power and integrated data that united government, society and technology. Supercomputers allowed governments and companies to peek into the future. They accelerated edge applications into markets. They enabled the public sector to see important correlations in data, unlocking massive transformational insights.

Supercomputers to super outcomes

Supercomputers led the way as we pushed ourselves to the edge of the intersection of capability and data. Economists unraveled long-standing complexities.

fintech companies revolutionized the financial system. Biotech start-ups cured diseases. Space companies opened new frontiers.

Data quicky became integrated into virtually every government service and process. Regulators used digital twins to quickly review and license building plans and specs on everything from new sewer systems to nuclear reactors. Social services organizations like the US Department of Veterans Affairs used supercomputers to analyze the millions of records at their disposal to provide users with tailored and targeted services. Healthcare providers used them to stamp out fraud and create new patient pathways.

Talent, trust and tech

Perhaps most importantly, we have largely been able to solve the two big enabling challenges of today — the great capability transformation and the issue of trust. The capability gap — particularly for digital skills — was overcome by the development of more user-friendly technologies and a greater recognition that data scientists only need a two-year certificate to create value. It doesn't take a PhD to push the frontier of data science.

At the same time, the integration of artificial intelligence (AI) into everyday consumer products and services drove a wave of capability development among citizens.

Autonomous vehicles needed repairing. AI-driven tractors needed overseeing. Smart appliances, smart homes and smart cities made citizens more comfortable with technology and encouraged greater digital education and broader capabilities.

The issue of trust has been a harder nut to crack. Trust in technology often correlates with how it's being used, how it's developed and how it's consumed. And, as the interplay between advanced technologies and the way human beings live, work and play became more central to people's lives, great opportunities and great risks were discovered. By moving quickly to appropriately understand, manage and mitigate those risks, governments have largely succeeded in building citizen trust in data and technology.

The opportunity of 2030

A new decade is in sight and when I look back at the lessons learned since 2022, I am excited to see government, society and technology come together to create a much better future for society at large.

And I would argue that exascale computing was the catalyst that sparked many of the benefits seen today. Supercomputers allowed us to peek into the future and using this knowledge, create a better world. And that has allowed us to design and influence the future in a very positive way.

> ## "The greatest difference in government across Sub-Saharan Africa is the shift towards inclusivity and consultation."

Tope Ogundipe
**Founder and Director,
Techsocietal Consulting**

Tope Ogundipe is the Founder/Director at Techsocietal Consulting, a social enterprise specializing in technology policy and program management for social good. Tope works with Social Development Direct (SDDirect) as a Regional Specialist for the Digital Access Program, funded by the Foreign, Commonwealth & Development Office (FCDO) of the UK Government to help create more inclusive, safe and secure digital access for excluded and underserved communities in Nigeria, South Africa, Kenya, Indonesia and Brazil. Her work also includes digital inclusion diagnostic and strategy development to bridge the digital divide for underserved communities and people with disabilities in the context of COVID-19, as well as research to understand the digital gender gap and the related economic impacts.

Across Sub-Saharan Africa, the COVID-19 pandemic of the early 2020s accelerated the digitalization of government services. Governments realized they needed to pour greater investment into technology solutions. At first, the focus was on key sectors — health, education and finance, for example — but the focus quickly expanded to include areas like transportation, industry and logistics.

The result was a massive increase in the quality of life for people across the region, particularly in terms of the provision of education, access to healthcare and the enhancement of socioeconomic opportunities. Governments and citizens moved quickly to adapt to, and adopt, emerging technologies that unlocked safer, more efficient solutions that served the needs of their populations. The broad impact has been tremendously positive, although there have been some difficult challenges along the way.

Leveling up

New technologies have improved access to previously marginalized populations. However, in 2030, there is still more to achieve around access and equality. We are allocating more resources towards women-centered activities. We've implemented quotas on government departments and suppliers. We work to ensure gender identity considerations are embedded into all government plans and policies. But more must be done as we look towards 2040.

Digital literacy was also a critical challenge, both in terms of upskilling the public sector and helping the population adopt and adapt the technologies being delivered. Governments quickly recognized that digital literacy was key to economic growth, social cohesion and the promotion of inclusivity. Significant focus and investment have been put into encouraging digital skills across the population.

A safer, more trusted space

As more government services and more of the population moved online, cyber security quickly became an issue that needed to be overcome — not just traditional hacking and ransomware risks, but also things like misinformation and online harassment and violence. Government put lots of effort into working in partnership with technology firms and social media platforms to raise awareness, and they have put significant investment into educating citizens about cyber security.

Related to these efforts, government also had to address the issue of trust. Many countries came into the 2020s with a legacy of distrust and skepticism. Citizens didn't trust their governments with their data, which led to a wave of data protection regulation and legislation across the sub-continent, implemented and monitored by strong, independent institutions.

Inclusive and consultative

Perhaps the greatest difference in government across Sub-Saharan Africa is the shift towards inclusivity and consultation. Take regulation, for example: in 2030, regulation is created collaboratively with all parties involved right from the start. The days of last-minute consultation periods are over. Today, civil society, private sector and policy stakeholders sit down together to draft the policy and the supporting regulation and legislation.

As governments look beyond 2030 and think about the ongoing modernization of their services and technologies, more partnership with key stakeholders will be critical. Governments must avoid the distraction of merely delivering new technologies and instead focus on delivering technologies that actually work for people — technologies that ensure the digital economy remains fair and that support democracies that are open and sustainable.

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