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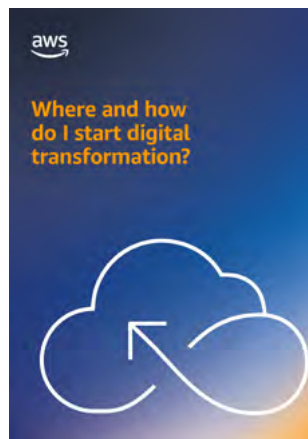
# Accelerate public service transformation with the cloud



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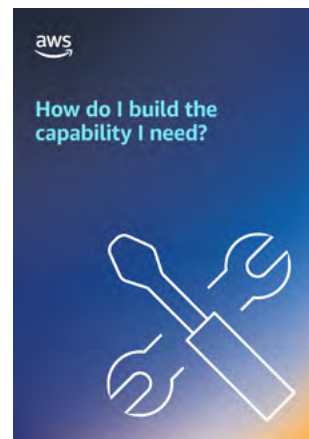


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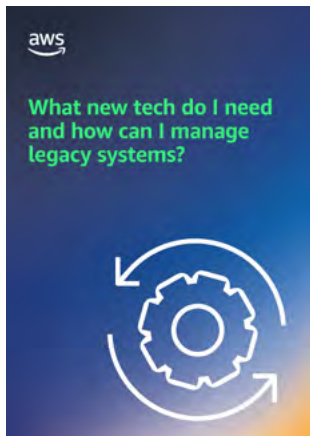


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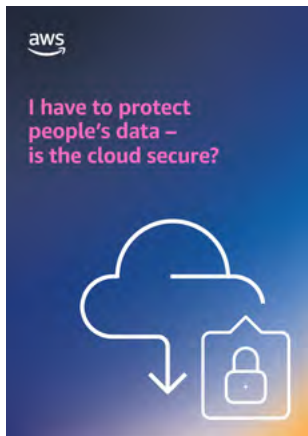
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# FIVE CHALLENGES OF DIGITAL TRANSFORMATION

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WHERE AND HOW  
DO I START?



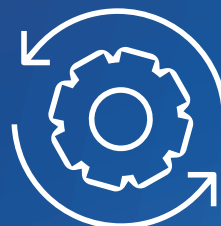
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HOW DO I BUILD  
THE CAPABILITY  
I NEED?



3

WHAT NEW TECH DO  
I NEED AND HOW  
CAN I MANAGE  
LEGACY SYSTEMS?



4

I HAVE TO PROTECT  
PEOPLE'S DATA – IS THE  
CLOUD SECURE?



5

HOW CAN I DESIGN  
DIGITAL SERVICES  
TO BE BETTER  
FOR CITIZENS?



# Introduction



Digital government brings the ability to deliver existing services more efficiently, at lower cost, with greater resilience and better availability

In digital government, services respond faster to the changing needs of citizens and enterprises

The cloud empowers governments to accelerate the transformation of their services. Examples of successful transformation using the cloud, from Singapore to the UK, India to Iceland, Australia to Argentina and many countries in between, show that the public sector can respond to their citizens' changing needs. However, they also show that transformation is about more than modern technology. There are common elements that underpin success. There are also common challenges. Some nations are well advanced, and those who started their transformation journey more recently can benefit from the experience of early adopters.

The Amazon Web Services (AWS) Institute has taught more than 4,000 government leaders in 23 countries through its Executive Education programme, in collaboration with leading academic and international non-governmental institutions. Participants deliver government services of varying types and sizes. They raise five common challenges:

1. Where to start
2. How to build capability
3. How to access and buy new IT, and how to manage legacy systems
4. The security of citizens' data
5. How to design better digital services for citizens.

This guide summarises the answers from the experts, many of whom have themselves had first-hand experience of nation-scale transformation. As the program participants are generally non-technical, this report is created for others like them, who want to grow their understanding and gain confidence. There are links throughout to additional resources and examples, including technical guides where appropriate. Leaders want real examples that they can learn from, so there are case studies throughout this guide. The guide is in five distinct sections that reflect the most common challenges. Find more insight and solutions for other transformation challenges specific to your region or service at [The AWS Institute](#).



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# Where and how do I start digital transformation?



# A note from the expert contributors

Digital transformation is a complex project, especially for government and public services that may have multiple departments or agencies. They are likely to have competing budgetary needs, use different kinds of software, and have their own ways of working.

A big vision for change at the top of an organisation can help secure support at every other level. It is also important to be able to explain the reasons for reform. This section helps you explain why cloud adoption is central to transformation. It summarises the importance of organisational culture. Finally, it explains a useful technique that we have seen used in successful transformations, which you might consider using to support your programmes.

## Expert contributors

**Mike Beaven**  
Government Transformation  
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Leading Edge

# The power of a strong vision

Successful digital transformations in national governments have a common characteristic: they express their aim clearly and they also have support from the most senior political leaders. For example, in the UK in 2011, the Chancellor of the Exchequer, George Osborne, made transformation a priority as he addressed the impact that the 2008 global financial crisis had on tax revenues and public spending. The UK government promised to cut total spending as a proportion of GDP and leaders looked to technology as a possible route to better, more efficient services.

In another example, Singapore's Prime Minister Lee Hsien Loong announced in 2000 that the state would become a world-leading digital nation. As Singapore's digital journey progresses, the [government's vision](#) has crystallized to become:

"A Singapore where people are more empowered to live meaningful and fulfilled lives, enabled seamlessly by technology, offering exciting opportunities for all".

Size is no barrier to success if the vision for transformation is big enough, as Iceland illustrates. This country with a population of about 370,000 has become one of the world's leading digital nations (measured by European and International league tables). Though the government has invested in modern technology infrastructure and education over three decades, the transformation accelerated since 2018 through Digital Iceland, a government agency within the Ministry of Finance that leverages open source solutions and external capabilities. Its vision is "[to make digital services the main means of communication between its agencies and the Icelandic people, as it can simplify processes for all](#)". As of 2023, Digital Iceland has achieved near-universal take up of its App and citizens are adopting digital services ranging from registering for parental leave to digital driving licences.

Japan's experience illustrates why high-level political vision matters. In a country famous for technological innovation, from the automotive industry to toy manufacture, government remains paper-based and analogue. Taro Kono was appointed as Minister of Digital Affairs in August 2022, the third in one year. His mission is to address issues such as 9,000 regulations that rely on fax, floppy disks and even a hand-carved stamp. He has said this impacted Japan's response to the COVID-19 pandemic, adding months to how long citizens waited for welfare payments, and complicating its handling of the vaccine programme.

When Mauricio Macri was elected in 2015 as Argentina's president, he faced similar bureaucratic challenges. Macri had seen the impact of digital transformation on services as mayor of Buenos Aires. He set up a digital government team to transform central government, from a single 'whole-of-government' portal and by 2018 Argentina had built [Mi Argentina](#).

**Right at the start, it's important to communicate a strong vision of what's possible through digital transformation and to engender faith that the vision can be made a reality**

## Show the benefits

To help address natural concerns about the changes that modernising services involves, show the benefits. There can be a lack of understanding about the role that technology can play, especially when political and operational leaders are unlikely to be technology experts. Therefore, the benefits of digital transformation for public services must be simple and clear. These include:

- 1 Delivering existing services more efficiently, with more ability to withstand failures and continue service (resilience) and with better availability
- 2 Responding faster to the changing needs of citizens and enterprises
- 3 Increasing transparency
- 4 Increasing security

## How to explain cloud computing

It can also be a challenge to explain the cloud to stakeholders, such as an organisation's board members or to teams that deliver the services. Cloud computing is the on-demand delivery of IT resources via the internet with pay-as-you-go pricing. Instead of buying, owning and maintaining your own data centres and servers, organisations can acquire technology such as compute power, storage, databases and other services on an as-needed basis. It is similar to how consumers flip a switch to turn on the lights in their homes, and the power company sends electricity.

With cloud computing, a hyperscale cloud services provider (CSP) such as AWS manages and maintains the technology infrastructure in a secure environment and businesses access these resources via the internet to develop and run their applications. Capacity can grow or shrink instantly and organisations only pay for what they use.

**Some nations are well advanced, and those who started their transformation journey more recently can benefit from the experience of early adopters**



## Culture change

Though modern technology is critical, you also need new approaches and processes to unlock the potential of the technology. The term digital can be interpreted by some leaders as being the sole responsibility of information technology (IT) departments to solve. "Transformation is not only about technology, it is about a change in mindset," says Liam Maxwell, who was the UK government's first chief technology officer.

Traditional organisational structures feature departments, or even teams within departments, that work in silos. They replicate tasks and are not set up to share systems or data. The best results come when processes are standardised, automated and built on systems of reusable digital capabilities that work together, delivered via a central platform, which is the cloud.

**The vision for better public services that put user needs first can most effectively be delivered by leveraging modern technology**

# Make a start

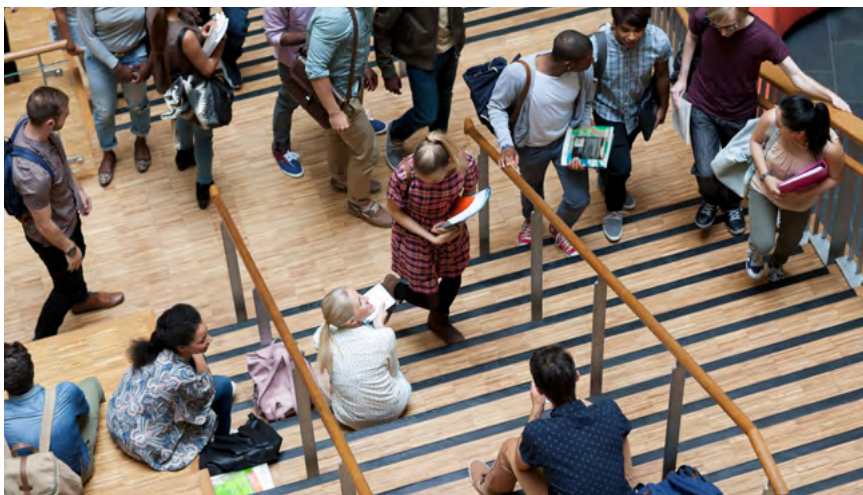
The prospect of change is unnerving for most organisations. Especially when it is a significant change that will impact how everybody works as is the case with digital transformation. This makes it important to demonstrate benefits quickly.

**Choose a service:** When the UK Government Digital Service (GDS) started on the mission to transform services, it reviewed proposals based on strict criteria to determine the first projects. The criteria were:

- 1 Does this service need improvement?
- 2 Should government or the private sector be providing this service?
- 3 Is the proposal for the service user-centric; simple to use and understand; correctly structured in an Agile way; clear about open versus proprietary software; and can the elements be repurposed for other services that can follow this first one?
- 4 Does it have support right at the top of government to give it momentum?

GDS selected two projects that met its criteria – the student loan service and applications for lasting power of attorney. Each had more than 100,000 transactions per year.

Mike Beaven, who led the transformation team, says: “You can work just as hard to change a small service as a big one. It’s very important to pick one that you can use as a showcase, to demonstrate progress and get people used to the idea and direction of travel. Use it to show you understand the problem and are good.”



One of the first UK government services chosen for transformation was the student loan service

**//**  
**You can work just as hard to change a small service as a big one. It’s very important to pick one that you can use as a showcase, to demonstrate progress and get people used to the idea and direction of travel.**

**//**

**Mike Beaven**

Government Transformation  
 Advisor at AWS

**Start from a safe place:** Consider potential challenges and learn what you need to know before you start. Challenges might include lack of skills, so allow time to recruit and fill the gaps.

**Shine a light:** Don't work behind closed doors. Be open about what you're doing. This means that people can raise challenges. You can assess and use feedback.

**Create champions and followers:** Centralising everything seldom works and you cannot win over everyone by yourself, so recruit champions who will generate their own champions and followers.

Beaven's approach worked well for the UK government. The first two projects seeded the Exemplar Programme, which successfully transformed 25 government services and became the springboard for the capability that departments across government have today.

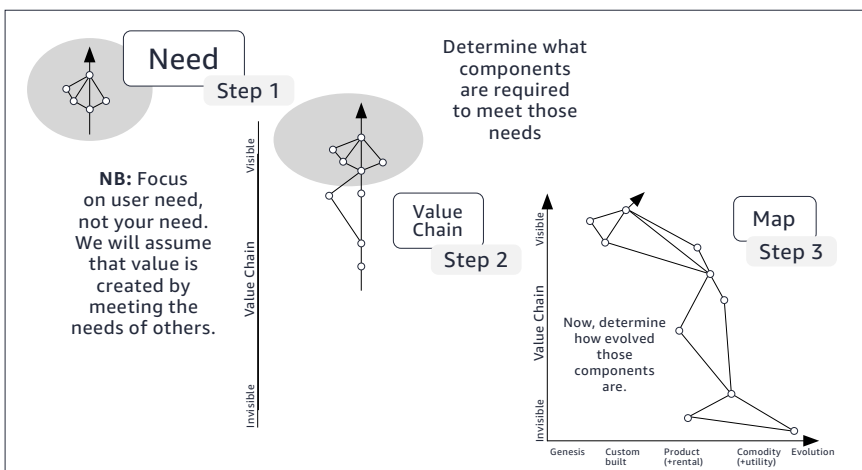
**Work out where you are and what you have:** An audit of what you have, where it is, what it costs and who controls it is a standard element of situational awareness and is part of the getting started process. You can also consider a technique that has supported successful digital transformation called Wardley Mapping.

Simon Wardley, who invented this approach, explains that the maps are based on a combination of US military theory called the OODA loop – observe, orientate, decide, act – and elements from Sun Tzu's *The Art of War*.

Here are the steps to take:

- 1 Start with the end user of the chosen service
- 2 List the user needs
- 3 Map how you deliver the service in terms of business components
- 4 Look for components that are available as commodity services
- 5 Re-evaluate each component and decide whether to build, share with other departments or consume from the cloud

*This map illustrates these steps*



**“**  
**The rigour of Wardley Mapping shifts the focus on decision-making away from policy, special interest or undue influence to give a more concrete direction of where to go to get to the right place**  
**”**

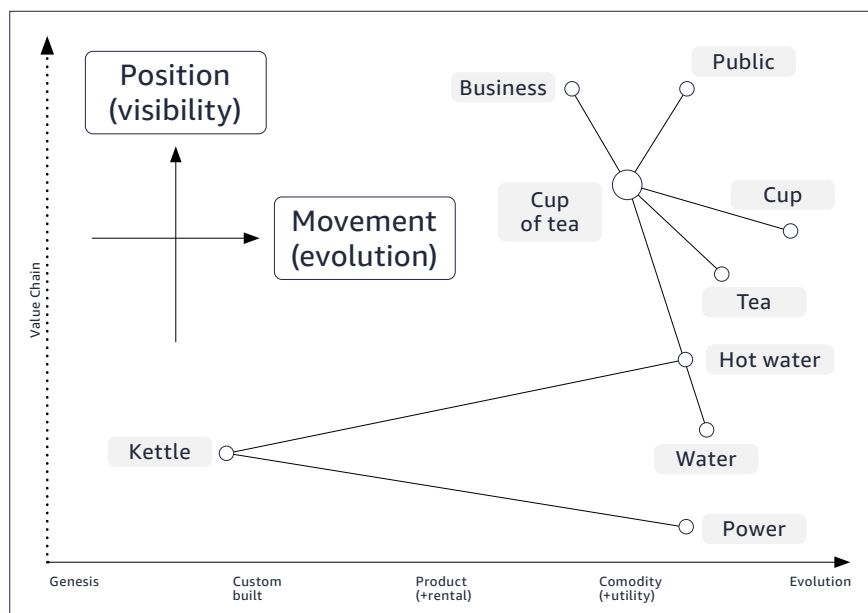
**Simon Wardley**  
 Researcher and Advisor at DXE  
 Leading Edge

“The rigour of Wardley Mapping shifts the focus on decision-making away from policy, special interest or undue influence to give a more concrete direction of where to go to get to the right place,” Wardley explains.

“When you produce a map, you get down to the nitty-gritty of all the components of a decision. It’s a different form of storytelling and shifts the power from the most convincing to the best option. It allows everyone to challenge each other, challenge assumptions and build consensus.”

“The map uses a compass with north to south described through the chain of components behind the system we’re building. The more visible the components to end users, the more north they are. East to west is described by how evolved those components are.”

Each map should only take a few hours to build and it’s important to remember that no single map is perfect or complete. The scrutiny in the discussion phase helps to create more robust maps. There is a Wardley map used to explain the approach that uses a simple service – making a cup of tea. The kettle is placed by Custom Built, rather than the Product area, to prompt discussion to illustrate the importance of challenging assumptions.



“The act of creating a map with a mixed team and in context is one of the most valuable parts of the process,” explains Beaven, who uses the technique in transformation workshops. “Connections are made, perspectives realised, potential visualised.”

Finally, it’s crucial to assess the success of the map at the end of the project as learnings can often be shared.

## Conclusion

Transformation that uses the most modern technology needs a powerful vision and buy-in is essential to make sure that the changes you propose get the support needed to overcome natural resistance from established organisational cultures. Genuine gaps in understanding can be addressed using simple language for non-technical people. You can strengthen buy-in at all levels of your organisation if you show early successes. This builds support and momentum by proving investment in change makes services better not only for end users but also easier for teams to deliver. Do this by selecting projects that may be small relative to some others, but that have potential to scale through impact. Develop 'change champions' with a positive approach to transformation with the skills they need to effect transformation in more parts of the organisation. Take the time to map your service so that it is clear what it does and how it does it before you commit resources and time to the change. Digital transformation is not only about technology: it is about a change in mindset.

## Additional Resources

[UK Government Digital Service Blog](#)

[Learn Wardley Mapping](#)

The AWS Institute Master Class in Wardley Mapping:

[Part 1: How and why to map your business](#)

[Part 2: How to spot patterns](#)

[Part 3: How to anticipate change](#)

[Part 4: How to use doctrine and gamplay](#)

[AWS Institute Transformation Essentials:](#)

[Think big for digital transformation](#)

[Digital Iceland: How central governments can transform public services](#)



**The act of creating a map with a mixed team and in context is one of the most valuable parts of the process. Connections are made, perspectives realised, potential visualised**



**Mike Beaven**

Government Transformation

Advisor at AWS

# Singapore

## How to build a government-defining digital strategy from the start



Singapore Parliament is the official seat of the Singapore government

### Challenge

The Singapore government set itself a challenge in 2000 to become the world's leading user of digital technology. The vision, set out in the [e-Government Action Plan](#), was to transform service delivery to individual citizens and to businesses so that it was relevant and responsive to their needs. Prime Minister Lee Hsien Loong championed the vision, and this support at the top emphasised the scale of the ambition as well as providing a powerful mandate for transformation.

### Solution

With the vision set, the government invested in information technology infrastructure and in building digital skills. In 2006, [digital immigration checks began](#). The following year, citizens could file tax returns online. In 2011, the government expanded

In 2000, Singapore's leaders took the decision to go straight to the most modern approaches and technologies to deliver government services efficiently

its ambition with the [eGov 2015 Masterplan](#), which included an aim to send information to citizens via mobile services. The plan has been updated in subsequent years. In 2013, Singapore's government unveiled its National Cyber Security Masterplan 2018. The Smart National Platform followed the next year, as GovTech, a statutory board of the government of Singapore under the Prime Minister's office, evolved to deliver these plans. While the early stages of Singapore's digital transformation relied on on-premises databases, by October 2018 the government said that the cloud could offer what the country needed to optimise the relevance and responsiveness of its services, and [Prime Minister Lee Hsien Loong announced that the government would be moving a part of its IT systems onto commercial clouds](#).

He said: "Putting systems and services in the cloud brings many benefits. Developers have access to more toolkits and better software services, and can upgrade and improve your systems more easily. Operating and maintenance costs can be much lower – sometimes by orders of magnitude. We can scale services up or down easily and quickly by sharing computing resources. We can run systems 24/7, without having to provide for expensive dedicated backups and hot standbys. Today, nearly all government IT systems are located on premises. We are this way because when we built these systems, cloud technology did not exist but for many government systems, cloud technology is now a viable and often will be, an attractive option."

Though cost was a consideration it "was not the [primary motive](#)", said Chan Cheow Hoe, Government Chief Digital Technology Officer and Deputy Chief Executive of GovTech. Other factors included the ability to leverage innovative services and solutions such as application programming interfaces (APIs) and software as a service (SaaS). Singapore needed to reform its procurement processes so that agencies could buy cloud services from commercial providers and access these innovations. GovTech set up the Government on Commercial Cloud (GCC) IT system.

[Another breakthrough](#) was the realisation that services had to be designed for the citizen, rather than the user in the government organisation. One example of this is the [Moments of Life](#) app, which simplified the process of birth registration and immunisation records, cutting the time users typically need to spend from 60 minutes to 15 minutes. This [evolved to become LifeSG](#), offering users access to more than 40 services, personalised and available on mobile phones. Other initiatives include [Singpass](#), each resident's digital identity, which allows easy and secure access to more than 2,000 government and private sector services online and in person. According to GovTech, 95% of government transactions are digital from end to end (March 2023).

// **Putting systems and services in the cloud brings many benefits...Operating and maintenance costs can be much lower...We can scale services up or down easily and quickly by sharing computing resource**



**Lee Hsien Loong**  
Prime Minister of Singapore

# United Kingdom

## A vision for modern services becomes real

### Challenge

In 2010, the UK's newly-elected administration faced challenges after the 2007/8 global financial crisis. Incoming Chancellor of the Exchequer George Osborne prepared a significant cut to public spending. Separately, the UK's Digital Champion, Martha Lane Fox, reviewed the government's main website. What happened next illustrates how digital transformation can impact more than the way in which a website performs, as well as the elements that lie behind measurable public-sector improvements.

**In 2010, the UK's Digital Champion, Martha Lane Fox, calls for "revolution not evolution" after reviewing the government's main website**

### Lane Fox to become UK's first digital champion



Martha Lane Fox. Photograph: Martin Godwin

The government has chosen one of the country's least-excluded individuals to lead its drive to get all Britons online. Dotcom pioneer Martha Lane Fox will next week take up a two-year assignment as "champion for digital inclusion".

In 2010, Martha Lane Fox was appointed UK Digital Champion by Prime Minister David Cameron

Lane Fox and her team had experience in private-sector, digital retail enterprise. Her published letter to the minister for the Cabinet Office, Francis Maude, at the end of the review called for more than a better website. She asked for "revolution not evolution" and identified the opportunity for government to use the internet to "communicate and interact better with citizens and to deliver significant efficiency savings from channel shift". Maude embraced the proposal and created a new executive director for the digital and information role and a ministerial working group reporting to the Cabinet Office to begin work on the vision.



## Solution

In 2011 the team, soon known as the Government Digital Service (GDS) team, produced a minimum viable product of the website for a reported £261k in 12 weeks. By mid-2011, the team had grown to more than 100 roles. The range of skills also expanded to include user experience and content design specialists. The group had an open ethos and so it provided comprehensive updates about the project on a public blog. In July 2011, it created its first service with an [Agile](#) approach: the [petitions service](#). It considered security (the identity assurance project, later known as GOV.UK Verify) and capability. Procurement transformation (later known as GOV.UK Digital Marketplace) opened up government's ability to access the best technology. In one year, the UK had assembled the ingredients for digital transformation: a big vision with top-level support; a small starter team with digital skills and an open ethos; access to modern technology; data security; and a focus on service design that put the user first. As 2012 dawned, the beta version of GOV.UK was ready to launch.

## Result

By the end of the first year (2013), GDS was able to announce that it had contributed £500 million savings as part of the UK government's £10bn reported efficiencies. Procurement of IT through G-Cloud (Digital Marketplace) was [£53 million in one year](#). GOV.UK has had more than [half a billion unique visits](#). The concept of [government as a platform](#) that can deliver better services for less was established.

### The achievements behind the headline numbers were:

- 1 A government-wide network of digital leaders to embed the transformation mission
- 2 Fine-tuned design principles
- 3 The first chief technology officer had delivered spend controls to support radical reform of IT governance
- 4 All 24 government departments and services such as revenue collection were on GOV.UK
- 5 The Exemplar programme to improve 25 services including welfare payments and student loans and admissions was underway
- 6 The UK had begun exporting its products, with [New Zealand's government](#) being an early adopter

Digital transformation had become a continuous movement. Each of the measures above had grown (savings, procurement of SME technology and services, government services on GOV.UK and GDS itself). The UK took an open source approach to share its innovations and other governments, from New Zealand to Canada via Estonia and Singapore, rapidly implemented solutions that took months or even years to deliver fully in the UK.

Acknowledgement: [A GDS Story](#)

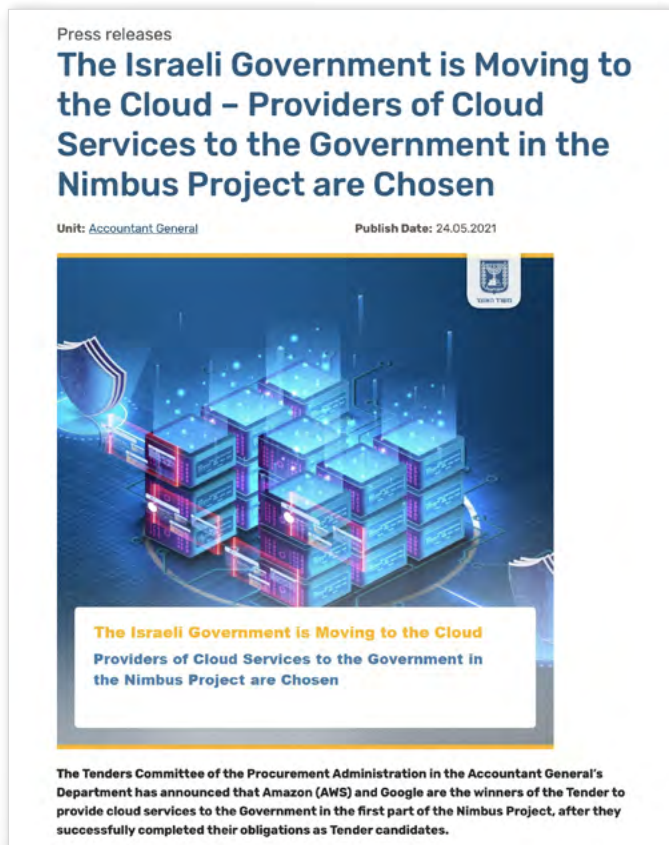
**In one year, the UK had assembled the ingredients for digital transformation**

**By the end of 2013, the Government Digital Service was able to announce that it had contributed £500 million savings of the UK government's £10 billion reported efficiencies**



# Israel

## Delivering cloud vision through Nimbus



In 2016, Israel's government set the vision for a digital nation. After a three-year review of options, Israel decided to take a primarily cloud-based approach

The Israeli government announces its decision to move to the cloud as part of the Nimbus project

### Challenge

In 2016, Israel's government set the vision for a digital nation. The benefits would include more social and economic opportunity for all its citizens and deliver public services more efficiently. The strategy initially envisaged a hybrid model of on-premises and cloud technology, with a balance of approximately 80 percent on the former. However, after a three-year review of options, Israel decided to take a primarily cloud-based approach. This digital modernisation project is known as [Nimbus](#).

### Solution

The Ministry of Finance's Government Procurement Administration (GPA) set up a core team, known as the Nimbus Committee, to oversee the project. As well as the GPA leader, the core team included senior leaders from a range of relevant functions, as well as drawing on external expertise as needed. For example, the team included the head of the government ICT authority, a representative

of the legal bureau in the Ministry of Finance, the department of budgets in the Ministry of Finance and the National Cyber Formation.

In the first phase, they conducted research in order to write the tender document. They issued this in February 2019. The GPA designed the [project](#) as a multi-layer tender. The first layer is the provision of cloud services. Layer two provides Cloud Center of Excellence (CCoE) services. Layer three delivers modernisation and migration services through 50 suppliers. At a later date, layer four will provide monitoring and optimisation services and layer five will add third-party services, which will be offered via a private AWS marketplace.

It took six iterations and involved talks with cloud providers, whose offers were evaluated on the basis of infrastructure, services, physical, virtual and operational security, quality, training provision, support levels and pricing, among other factors. In May 2021, [the government announced it had selected AWS, amongst its cloud providers.](#)

## Result

The Israeli government accelerated and simplified the procurement process through this initiative. Instead of operational teams investing time and resources in negotiating terms and conditions for each digital project, they can focus on their core activities where they deliver most value.

Departments have access to more than 185 digital services at pre-negotiated rates. These include analytics, application integration, blockchain, business applications, customer engagement, databases, development tools, front-end web and mobile, game tech, the Internet of Things, artificial intelligence, management and governance, media services, migration, networking, content delivery, quantum technology, robotics, satellite, security and virtual reality. The fifth layer of Nimbus will include additional third-party services, offered on a central private marketplace designed for the Israeli government.

[The Israeli government has predicted](#) that its move to the cloud will boost its economy, improve citizen services and promote financial efficiency. Head of the GPA, Gal Amir, referenced the importance that clear vision had in achieving the result. [Amir's official statement](#) noted, "This project is the result of a vision, a high standard of professional capabilities, commitment and investment, with the emphasis on cross-governmental cooperation led by the Nimbus team – an integrative inter-ministerial team that has turned this vision into a reality."

**The Nimbus project took six iterations and involved talks with cloud providers, whose offers were evaluated on the basis of infrastructure, services, physical, virtual and operational security, quality, training provision, support levels and pricing, among other factors**

# Expert contributors

## Mike Beaven

Government Transformation  
Advisor at AWS

Mike Beaven has a combination of public and private-sector digital transformation experience spanning 20 years.

He led the UK Government's Digital Transformation programmes from 2011 to 2015 as part of the Government Digital Service (GDS) team within the Cabinet Office. This involved establishing new Agile ways of working, setting up new commercial frameworks and establishing a national cross-government programme that delivered 20 new digital services in 400 days.

He worked in consultancy on strategic projects in the public sector and on large-scale software delivery programmes in the commercial sector.

## Liam Maxwell

Government Transformation  
Director at AWS

Liam Maxwell is director of government transformation at AWS. He leads the global AWS team that helps senior government leaders accelerate their modernisation and reform programmes.

He was a civil servant from 2012 to 2018. As the UK Government's first chief technology officer, he led the reforms that enabled the modernisation of government technology and digital services. He was subsequently national technology advisor, responsible for accelerating growth in the digital economy, inward investment and creating intergovernmental and international trade partnerships post-Brexit.

He was twice elected (in 2007 and 2011) as a councillor and served as a cabinet member for policy at the Royal Borough of Windsor and Maidenhead. Between 2004 and 2011, he was head of computing at Eton College, Windsor. Prior to these roles, he was an IT director in FTSE 100 and Fortune 500 business service companies. He has a strong interest in education and is a founder of [Holyport College](#), a Free School near Maidenhead, Berkshire, UK.

## Simon Wardley

Researcher and Advisor at DXE  
Leading Edge

Simon Wardley is a former CEO, advisor to start-ups, and the inventor of Wardley Mapping. A geneticist with a love of mathematics and a fascination for economics, he works with complex systems, whether behavioural patterns, environmental risks, developing novel computer systems, or managing companies.

He's an advocate and researcher in the fields of open source, commoditisation, innovation, organisational structure and cybernetics.



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# How do I build the capability I need?



**When it comes to the capabilities required for digital transformation, you'll need to identify your people who have a drive to change public services for the better, new hires with experience in how to deliver digital services, and possibly external partners.**

**In this section, you'll gain valuable insight on how to find, attract and retain the best talent, as well as why open code and open standards help you move faster, and how to use them.**

**Capability to deliver digital transformation comes from people and technology. There's a need for new experts with the right digital transformation skills who can work with the public sector experts already within a department or organisation. You also need consistent leadership support for the change you're making.**

**For the technology element, the good news is that because other governments have already put in place successful digital services, there are open source code and service standards available. Use these as the basis for your transformation to save time and money that you would otherwise spend on research and development.**

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Programme (EMEA) at AWS**

# Capability: What skills do I have and which must I add?



The ideal multi-disciplinary team will comprise existing talent and new hires with specialist skills

## Don't overlook what's in front of you

People who already work in the public sector have a lot to offer. Mike Beaven says it's important that leaders know where to look.

"In government organisations of all sizes, you will almost always find someone who has already tried to solve the problem, working away in a cupboard under the stairs to come up with a digital solution," he says. "If you're a leader, and you're either coming into the organisation or are already there but want to make a change, find the person or people on the inside who are willing to embrace it. They know the organisation and they'll have a real appetite and passion to try to do things in a different way."

The disciplines that are useful to have in your team include procurement, regulation and data science expertise.

Working collaboratively with outside experts is also a vital part of complementing and building capability. These may be tech companies but may include those with expertise in specific communities and disciplines such as social anthropology. This is because it is important to understand stakeholder motivations and

// To successfully drive transformation, you need to bring in fresh eyes or the people who are there will use the new tools and technologies to do what they always did

// **Claire Spiller**

Senior Manager re/Start Programme (EMEA) at AWS

customer behaviour for optimal service design, which will improve the user experience and support the intended policy outcome.

### **How to get new skills**

The next step is to hire people who know how to implement the cloud-based applications that high-quality digital services require.

“Your priority should be to bring in people who have had their hands on the technology and know how to build and deliver it. That’s a vital skillset,” says Beaven. Specifically, these are “people who know how to build websites, how to build online transactional services, the types of technology you need and the working methods and project delivery tools you use in that space.”

A proven track record in being able to deliver successful digital transformation programmes is at least as important as their technology expertise, Beaven adds. “You’re going to run out of credibility quite quickly if you don’t start to show real progress,” he explains. This is why your first showcase project or service is so important. For the UK’s Exemplar programme, the mix was roughly one-third each of internal people, new contractors and external partners. Iceland is another example of a government that looked to independent technology partners to expand capability.

Claire Spiller, who works with organisations’ hiring managers to build digital transformation capability, is also a firm believer that new people are essential. “To successfully drive transformation, you need to bring in fresh eyes or the people who are there will use the new tools and technologies to do what they always did,” she says. “People resist, they feel really uncomfortable about change. New hires cannot revert to type, they only know the new way and they follow it from day one.” This is true whatever the hire’s level of seniority, she adds.

Transformation leaders may find that some of their existing team will not want to develop the new service or feel comfortable with different ways of working. They will move roles or departments – or leave altogether.

**For the UK’s Exemplar programme, the mix was roughly one-third each of internal people, new contractors and external partners**



This AWS Institute [video](#) shows how, with the right solutions, digital transformation can be simpler, faster and cost less

### Transparency is helpful

As with lots of elements of any change programme, transparency is important and this is true of the hiring process for the digital transformation team.

“Sometimes people get the impression that in the digital space, with an Agile approach, decisions are made quickly without enough consideration,” says Beaven. “A formal selection process is important because it shows people that you haven’t just picked your favourites.”

In the early digital transformation projects he worked on with the UK government as part of the Exemplar programme, each project in each department followed a formal three-month HR change programme to appoint the right team. They identified the skillsets and organisational structure they needed, then wrote job descriptions to match those.

Being “open, transparent and above board” in how you add capability is an important part of building positive sentiment towards the transformation, Beaven adds.

//

**You’re going to run out of credibility quite quickly if you don’t start to show real progress**

//

**Mike Beaven**

Government Transformation  
Advisor at Amazon Web Services  
(AWS)

## Write smart job ads

When they recruit new, highly qualified hires, public-sector managers consider how they can compete with tech or financial services companies with regard to pay. Spiller says government can offer two things that people with tech skills value highly: flexible working and an innovative working environment, where experimentation is encouraged.

“Rather than being prescriptive about a particular coding language, job ads could prioritise these things, which are what people want,” she says.

Liam Maxwell adds: “Communicate the whole package. Government is for everybody. In government jobs, you deliver for every citizen and there is a powerful sense of purpose that motivates people. Public sector leaders say that three years in a government role is the equivalent of ten years of experience in similar private sector roles because of the scale of the challenges and level of exposure.”

## Continued communication and support from the top

Digital transformation only succeeds with buy-in from the very top of an organisation, as experienced reformers know. But a commitment to start the work is not enough: continuous and visible support is one of the essential capabilities that a government organisation needs.

Maxwell says it’s essential that leaders in charge of digital transformation communicate often and clearly while the work is taking place. One effective way to achieve this is through a series of blog posts that set out the progress of the transformation. Regular and accessible blogs posts help build a sense of momentum around the transformation.

“It becomes more effective to help people understand what’s going on when information is drip-fed,” he says. “You need to actually show the delivery and what will follow in the next stage. It also makes it much more intimate. The UK [Government Digital Service \(GDS\) Blog](#) is a good example.”

The Singapore government also does this effectively, he adds. “They regularly say what has happened and how it will change things, and it becomes a normal state of affairs that things are changing.” There are two blogs that serve different audiences. One, the [LifeSG blog](#), provides updates on citizen services. [The other](#), on the Singapore Government Developer Portal, is for the technology community.

This type of open communication is also a great recruiting tool, adds Beaven, alerting people to interesting projects that are going on in government, which attract them to work there.

// **Government can offer two things that people with tech skills value highly: flexible working and an innovative working environment**

// **Claire Spiller**

Senior Manager re/Start Programme (EMEA) at AWS

# Code and standards: Do I need to create them all?

Simply, no. When it comes to the technology element of capability, there's a growing movement, for example among European governments, and in Brazil and India, that projects should use open source code. For example, in October 2020 the European Commission [committed to the use of open source](#) in practical areas, such as IT, and also in areas where it can be strategic. Using coding languages and frameworks that people want to work with and where skills are available makes adding the capability to build the service simpler.

Open source code is found in online repositories and can be freely accessed and reused under open source licences. Caroline Mulligan, who worked with the UK Government Digital Service (GDS), says: "Why reinvent the wheel? Why not use something that works and then focus on the bits that are relevant to your unique problems or legislation?"

One such example was the UK government's Digital Marketplace, set up to help public sector procurement bodies buy and deliver cloud-based services. It took around two years for the UK team to build it. The Australian government reused the UK government's open source code and was able to launch its own digital marketplace in just six weeks from start to finish. This approach meant there was no need to spend the time and money on development that the UK government needed to find.

"The development savings run into hundreds of thousands of dollars when you consider that the UK evolved their service over several years," says Mulligan. The service has evolved substantially since this time and is now called [Buy ICT](#).

//  
**Why reinvent the wheel? Why not use something that works and then focus on the bits that are relevant to your unique problems or legislation?**

//  
**Caroline Mulligan**  
Government Transformation  
Advisor at (AWS)

In the same way as code, open standards for digital services are invaluable. Mulligan explains: “Things we take for granted, such as seamless mobile phone connections in different countries and international rail services are all possible because common standards have been agreed. The same principle applies to digital transformation. Common standards mean digital services can interoperate with one another. They also provide high quality across security, accessibility, user experience and data exchange. They make sure that suppliers have equal access and opportunity to work with government, which gives governments access to innovative technology at competitive prices.”

#### Additional resources

- [Open Government Solutions on AWS](#) curates resources developed by the public sector that can help government agencies at the local, regional, and national levels find solutions that have worked for others so that they can accelerate their digital transformation. An example of how to build an open source solution quickly is [Performance Dashboard on AWS](#).
- Video: [Use what works](#) (8 minutes)
- Video: [Start small to build big](#) (7 minutes)
- Video: [Bias for Agile action](#) (8 minutes)
- Blog: [Bias for Agile action speeds digital transformation in the public sector](#)
- Blog: [How governments can use open source solutions for faster transformation and more](#)
- [Open Standards principles](#)
- [Open Standards for Government](#)
- [AWS re/Start](#)



**In the same way as code, open standards for digital services are invaluable. Things we take for granted, such as seamless mobile phone connections in different countries and international rail services, are all possible because common standards have been agreed**



**Caroline Mulligan**

Government Transformation  
Advisor at (AWS)

# United Kingdom

## Building capability through the Exemplar programme

### Challenge

The UK Government in 2013 wanted to save money and improve services through digital transformation. But it did not want to outsource the project. Instead it wanted to build and retain the skills in-house.

Its answer was the Exemplar programme.

The Exemplar programme's aim was to transform 25 government services across 12 different departments and ministries — from the Home Office to the Foreign & Commonwealth Office — within two years. In the process, it would create digital champions within the civil service, equipped with the skills to launch, lead and contribute to subsequent digital services projects.

**The Exemplar programme's aim was to transform 25 government services across 12 different departments and ministries**

**GOV.UK** | Topics | Government activity

Government Digital Service

Policy paper  
**Digital transformation exemplar services**  
Published 1 June 2013

This was published under the 2010 to 2015 Conservative and Liberal Democrat coalition government

Contents  
Current status  
Digital services so good people prefer to use them  
Highlights  
The exemplars  
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Government is building digital services that are simpler, clearer and faster to use. We're starting with 25 'exemplar' services.

### Current status

Phase	Number of services in phase	Description of phase
Discovery	0	User needs are researched and identified - <a href="#">learn more about the discovery phase</a>
Alpha	1	A core service is built to meet the main user needs - <a href="#">learn more about the alpha phase</a>
Beta	9	The service is improved, then tested in public - <a href="#">learn more about the beta phase</a>
Live	15	The service is public and works well. It'll be continually improved to meet user needs - <a href="#">learn more about the live phase</a>

### Digital services so good people prefer to use them

The [Government Digital Strategy](#) and [departmental digital strategies](#) commit us to the redesigning and rebuilding of 25 significant 'exemplar' services. We're going to make them simpler, clearer and faster to use. All these are to meet the [Digital By Default Service Standard](#) that was introduced in April 2014 and be accessible to the public by March 2015.

This dashboard shows you which transactions are in the programme, what progress is being made, and the estimated scale of the digital service.

You can read more about the transformation programme on [our blog](#).

A [2013 UK government webpage](#) shows the status of the Exemplar digital transformation services

## Solution

At its peak, the Exemplar team consisted of about 120 people. Roughly a third were civil servants, a third were contractors and a third were external partners. Mike Beaven, who led the team, says: "It's important to recognise you can't always do everything yourself. And you're going to need those core skills that the different groups bring."

The civil servants brought knowledge of what each service had to accomplish, along with insight about culture, politics and how to get things done. The contractors had experience and skills within digital technology such as design, programming and project management. The external partners brought leadership skills.

Each Exemplar programme followed a pattern. First, the Exemplar team showed a group of users in the civil service what to do, so they could learn. The two groups — the Exemplar team and users — worked alongside each other, then the Exemplar team shadowed the users before they left them to work alone. This method embedded the skills that service transformation needed and created champions who could recruit and train followers, building an in-house skills pyramid.

## Result

At the end of the Exemplar programme, in March 2015, it had successfully launched 20 services and five were in beta stage, meaning that each was safe to use, but not finished in terms of user journeys.

The numbers of users demonstrated the Exemplar programme's success. By March 2015, the [Register to Vote service](#) had 4.3 million registrations, the [File your Self Assessment tax return online](#) service had 1.5 million users, more than 70,000 motorists viewed their licence information online every month and 94 percent of patent renewals were online. The increase in people using the digital service meant there was more capacity for the service providers to do other important work, such as identity checks for driving licences. With the exception of Register to Vote, digital teams designed and built all the Exemplars in their respective departments.

Beaven says: "I've watched as the people who worked on Exemplar moved to work on other areas of digital government. It's great because they take all the skills and knowledge and grow more teams. Those team members split off and grow more teams, who continue to improve the services and work on new ones."

**The numbers of users demonstrated Exemplar's success. By March 2015, the Register to Vote service had 4.3 million registrations and the File your Self Assessment tax return online service had 1.5 million users**



# International Australia, Canada, US and Brazil adapt the UK's open source notification service

## Challenge

In 2015, the UK Government Digital Service (GDS) developed the Exemplar programme to transform 25 services. The aim was to show stakeholders what was possible and build up capabilities for larger digital transformation within the government. Staff who worked on the programme identified features common to every project, which included sending notifications, gathering information through online forms and collecting payments. They set out to standardize these elements and provide them centrally, to be used across services and departments.

The UK government initially wanted to make notifications part of a wider tracking system, where citizens could check in and see how all their government interactions were progressing. However, user research as the project developed showed that this made people proactively go online to check their status. The development team realised that text or email notifications – which told people that their passport application was being processed, for example – would be a simpler option for the user and a more effective way to communicate with people. They decided to build an all-of-government notifications system instead.

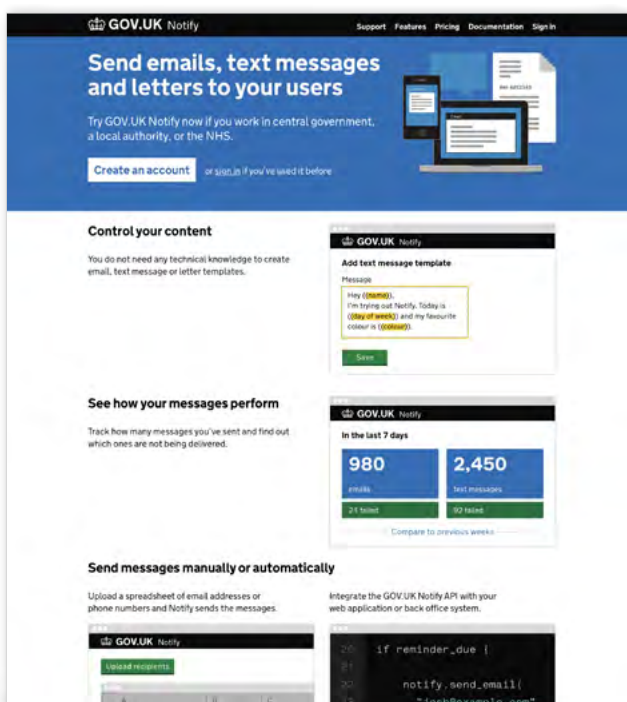


**The principle was self-service. It had to be if it was going to succeed at scale. We said to early adopters, 'try it out and let us know what doesn't work'**



**Pete Herlihy**

Technical Product Manager and Open Source Lead, Government Transformation Team, AWS



Many government services send notifications and the development team standardised this through Gov.UK Notify



## Solution

The development team visited government services across the UK to understand how automatic digital notifications could offer a better experience to citizens and save taxpayers' money. One service on which they tested the notification system was applications for carers' allowances. The volume of emails and calls from people checking to see if their online application had been received dropped by 40 percent, which reduced the workload for service teams.

More than 70 government organisations stepped forward to try out the beta version of the system. It was named [GOV.UK Notify](#).

"We co-designed it with users," says Pete Herlihy, now a senior technical product manager with AWS and formerly product manager for Notify when working for the GDS. "The principle was self-service. It had to be if it was going to succeed at scale. We said to early adopters, 'try it out and let us know what doesn't work.'"

Central government departments adopted Notify first, followed by local government. By late 2018, the NHS introduced the system. The service came into its own in 2020, when the government needed to send out bulk messages in the first days of the COVID-19 pandemic to alert vulnerable people to the need to shield. Subsequently, the government used the platform to issue public health messages to the entire population. Notify became a key part of the country's test and trace system, and then was used to provide vaccine notifications.

**More than 70  
government  
organisations stepped  
forward to try out  
the beta version of  
GOV.UK Notify**

## Result

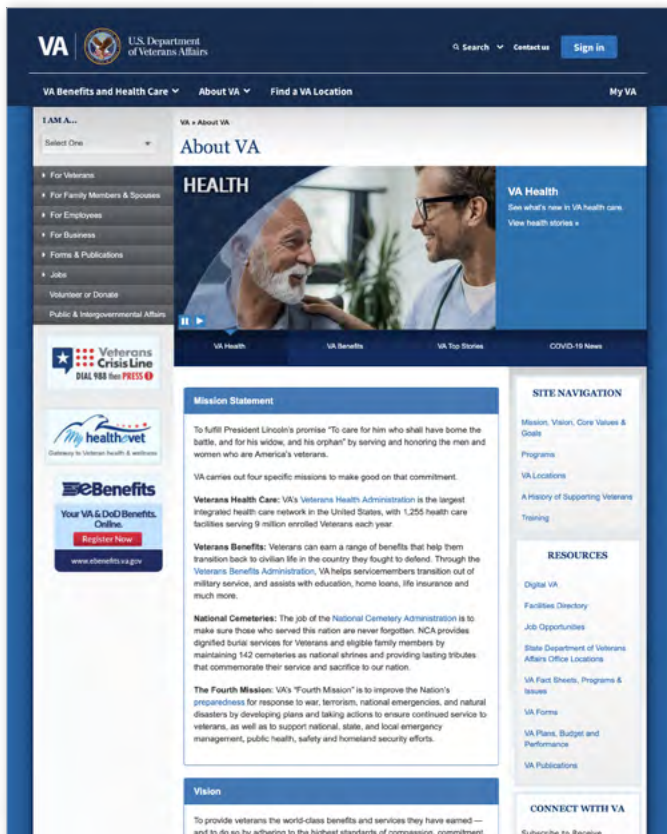
The GDS team published the Notify code to make it available to other developers. The governments in Australia, then Brazil and Canada reused this code to create their own systems. After the pandemic hit, the US Department of Veterans Affairs, which oversees healthcare services for 9 million military veterans each year, also picked the code up.

“It is open source and the same research and refinement that went into the product also went into the accompanying explanatory documents for developers, making it much simpler for others to reuse, which is as important, ” says Herlihy.

The work done with users in the UK to refine the service means other governments can skip that step and move on to adaptations they need, such as adding different time zones (something that did not apply in the UK), and in Canada, adding an interface in French as well as English.

Notify is available on [Open Government Solutions on AWS](#), along with more than a hundred other open source solutions that governments around the world have created.

**The service came into its own in 2020, when the government needed to send out bulk messages in the first days of the COVID-19 pandemic to alert vulnerable people to the need to shield**



After the COVID-19 pandemic hit, the US Department of Veterans Affairs, which oversees healthcare services for nine million military veterans each year, reused the UK's open source code

# Iceland

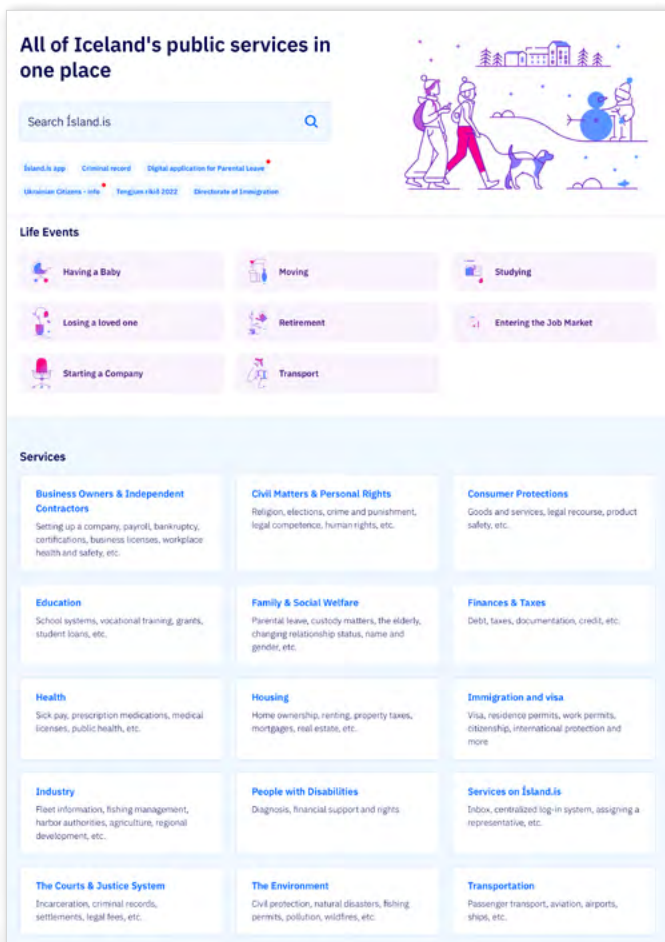
## The open source approach and collaboration accelerate digital capability

### Challenge

In 2019, [Digital Iceland](#), run by the country’s Ministry of Finance and Economic Affairs, started work on a new central government portal: [Ísland.is](#). Iceland already had a web gateway for its citizens to interact with government services, but the government built it 10 years previously. Digital Iceland wanted to improve it and add new features. They also wanted Ísland.is to be in the cloud to make it secure and allow new services to be added quickly and cost effectively.

The overall goal was to make it easier for Icelanders — some of whom live in very remote parts of the island — to securely access information and forms and use online self-service tools to interact with government.

They put in place a complete cloud environment in one month and a government financial support service was available via Ísland.is within six weeks



Translated homepage of the Ísland.is site: The Icelandic government embraced the opportunity to add digital capabilities from open source software via the cloud, rather than spend time on expensive and unnecessary bespoke solutions

## Solution

In late 2019, Digital Iceland put together a group of 18 product teams from 11 different technology vendors to develop the new services. The team included Andes, which worked on security of the infrastructure and DevOps. DevOps means that software development teams and operations teams work in tandem from the first development stages through testing and deployment to get applications in place faster through continuous improvements.

With the outbreak of the COVID-19 pandemic in early 2020, the government kicked the project into high gear. The team accelerated the original timeline, as the government anticipated that online services that let citizens and businesses access financial support would become a priority. They put in place a complete cloud environment in one month and a government financial support service was available via [Ísland.is](#) within six weeks.

## Result

With priority financial support services established, Digital Iceland carried on with its original mission to expand and improve the range of online services. These include drivers' licences, business loan applications, funding for children's sports, mortgage, health insurance and justice system services. In March 2022, Digital Iceland launched [Ísland.is](#) as a mobile app.

The Icelandic government embraced the opportunity to add digital capabilities from open source software using the cloud, rather than spend time on expensive and unnecessary bespoke solutions. "We could get an overview of what the infrastructure would look like and where concerns might be," says [Vigfús Gíslason](#), project manager at [Digital Iceland](#).

# Expert contributors

## Mike Beaven

Government Transformation  
Advisor at AWS

Mike Beaven has a combination of public and private-sector digital transformation experience spanning 20 years.

He led the UK Government's Digital Transformation programmes from 2011 to 2015 as part of the Government Digital Service (GDS) team within the Cabinet Office. This involved establishing new Agile ways of working, setting up new commercial frameworks and establishing a national cross-government programme that delivered 20 new digital services in 400 days.

He worked in consultancy on strategic projects in the public sector and on large-scale software delivery programmes in the commercial sector.

## Pete Herlihy

Technical Product Manager and  
Open Source Lead at AWS

Pete Herlihy has 20-plus years of experience delivering software products in the finance and public sectors in both the UK and New Zealand. He was one of the founding team of the UK Government Digital Service (GDS), primarily delivering open-source platform services for the wider public sector and international reuse.

## Liam Maxwell

Government Transformation  
Director at AWS

Liam Maxwell is director of government transformation at AWS. He leads the global AWS team that helps senior government leaders accelerate their modernisation and reform programmes.

He was a civil servant from 2012 to 2018. As the UK Government's first chief technology officer, he led the reforms that enabled the modernisation of government technology and digital services. He was subsequently national technology advisor, responsible for accelerating growth in the digital economy, inward investment and creating intergovernmental and international trade partnerships post-Brexit.

He was twice elected (in 2007 and 2011) as a councillor and served as a cabinet member for policy at the Royal Borough of Windsor and Maidenhead. Between 2004 and 2011, he was head of computing at Eton College, Windsor. Prior to these roles, he was an IT director in FTSE 100 and Fortune 500 business service companies. He has a strong interest in education and is a founder of [Holyport College](#), a Free School near Maidenhead, Berkshire, UK.

# Expert contributors

## **Caroline Mulligan**

**Government Transformation  
Advisor at AWS**

Caroline Mulligan is a government transformation lead at AWS who led the launch of the Executive Education Program in Digital Transformation for the Public Sector and Performance Dashboard on AWS, a tool to drive transparency across organisations and rack activity. She supports the continual growth of Open Government Solutions, which showcases open-source solutions and public resources published by public-sector organisations around the world.

She previously worked in the UK Government's Cabinet Office as head of digital (Race Disparity Unit) and as Digital Marketplace service manager in the Government Digital Service (GDS). She has led technology and product teams at Vodafone Global, Sony Pictures and a UK crowdfunding start-up.

## **Claire Spiller**

**re/Start programme (EMEA)  
Senior Manager at AWS**

Claire Spiller is a learning and development specialist with more than 20 years' experience in the technology sector. She now leads a programme that re-skills unemployed people with cloud skills and then connects them with organisations looking to increase capability in this area.

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Editor: **Sarah Ryle** - *AWS Institute Senior Content Manager*



THE AWS INSTITUTE

# What new tech do I need and how can I manage legacy systems?



## Digital transformation is not only about technology. It's a mindset.

This section explains why it's important to define the problem and how to assess the available technology solutions. It covers the need to simplify procurement to allow small and medium enterprises (SMEs) to access the process, with examples of how governments have achieved that. It also offers suggestions about how to deal with legacy technology.

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[CURSHAW](#) and former  
global digital marketplace  
programme director at the  
UK's Government Digital  
Service (GDS)

# Identify the problem to fix

The technology that governments require for successful digital transformation is already available. The real challenges include:

1. Understanding the problem that you need to solve
2. Knowing the technology landscape well enough to identify the right solution
3. Simplifying procurement so SMEs are not excluded and your home-grown talent and national economy benefit
4. Building a technology ecosystem to solve other problems with the same components.

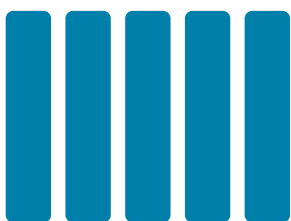
Digitalisation is about transforming the business model of government. New technology is simply the means by which that happens – and plenty of existing tools can accomplish it. Cloud technology offers flexible and scalable computing power and storage, with a vast range of plug-and-play services.

To get the best out of them demands a shift in mindset away from large, expensive systems that are built to deliver only one service, such as immigration, or border control, or tax collection. Instead, break services down into their building blocks, for example a form application component, which you can then use to deliver many services. These can be integrated via an application programming interface (API) to create the precise functions required.

**To get the best out of existing tools demands a shift in mindset away from large, expensive systems that quickly lose their usefulness**

## How to acquire multi-sourced components

Don't buy like this...



Expensive inefficient silos

Buy like this...



Multi-sourced components

Shodhan Sheth explains, "Think in terms of the capabilities you need and then ask what technologies can deliver them." This is the opposite approach to starting with the monolithic system and trying to make it work with all the services you deliver. You can read more about [breaking monolithic systems into microservices here](#).

## Needs – not features

Warren Smith emphasises the need to engage with the marketplace early. You'll find it easier to identify viable solutions if you understand the available tools, their strengths, weaknesses and overall maturity.

Smith recommends you approach vendors at the outset. "Talk about your programme, your organisational vision and contextualise your procurement within a strategic direction, so potential partners understand why you do these things. It's almost warming up the market, so they become excited by the opportunity to collaborate with you."

This time spent mapping the technology landscape is valuable and will help guide your next steps. The purpose is to evaluate how every solution fits your needs. It's not about adoption of the latest technologies, such as blockchain, just because they're new. Nor is it about investment in the tool with the most features – you won't use most of them.

## Justify the cost

Cost is a common concern in digitalisation and costs must be visible and managed. However, Shodhan says investment in new technology must be set against the cost of having to maintain legacy systems, which can account for a significant percentage of IT spend. For example, in the UK the government spends half its annual IT [budget](#) on maintaining legacy technology. Over time, Shodhan explains, money spent on new tools will be a fraction of what was being spent to keep outdated systems in place. You can appraise this through tools such as this [Government Workload Assessment](#).

And it isn't all about cost. Digitalised systems bring additional benefits, such as the ability to scale quickly, roll out additional services and introduce more modern security features.



**The key is to offload capabilities, not applications. Application is the language of technology. Capability is the language of business. If you offload a capability, then you can get rid of legacy tech more quickly**



**Shodhan Sheth**

# Make procurement simple

Innovative technology and traditional public sector processes do not always align. Procurement processes can be complex, expensive and time-consuming, which can be a deterrent to small or medium-sized enterprises. They may also limit participation in tenders to big technology firms and consultancies who have the resources to support the process.

Smith shares an example of this in the UK, and how it was resolved, in more detail in the case study below. “The SME market was saying, ‘your contracts are complex, bureaucratic and create barriers for us to do business with government,’” he says. “They hadn’t got a team of lawyers to read contracts, so either they didn’t read them – and signed them anyway – or they did read them and stepped away because it was just too horrific.”

When the UK government wanted to make procurement more accessible to SMEs, it took these steps:

1. Created a digital marketplace of pre-approved suppliers, including SMEs
2. Rewrote and [simplified contracts](#) to eliminate irrelevant information, make complex language clearer and better meet the user need
3. Required civil servants to use the digital marketplace when procuring services.

The UK government’s Digital Marketplace allowed some departments to get services up and running within days. The new Digital Marketplace replaced a system that ran for four years and 10 months, during which time government spent £178 million through it. In the first four years and 10 months of the Digital Marketplace, that amount rose to £2.8 billion. Around 50 per cent of government-bought services came from SMEs. The simplified process made it much easier for government to buy services from vendors other than the usual big providers.

The UK government experience benefits other governments. The Australian government worked with the UK GDS team to stand up a version of Digital Marketplace in six weeks, subsequently adapting it further to meet their needs. UK GDS worked with the Indonesian National Public Procurement Agency in 2020 on simpler contracts, bringing greater clarity to a previously complex system.

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**The SME market was saying, ‘your contracts are complex, bureaucratic and create barriers for us to do business with government’**

//  
**Warren Smith**

# You (probably) don't need a bespoke solution for hosting



**The hyperscale cloud is trusted by national defence agencies and by cybersecurity organisations, world-leading banks and law-enforcement agencies.**

Despite the advance of cloud technology, many governments believe they need to host things themselves. This is partly because they're concerned about the risks of putting services in the cloud, and there is a dedicated section in this series of transformation articles that focuses on security. This describes how [national defence agencies](#) and [cybersecurity organisations](#), world-leading banks and law-enforcement agencies trust hyperscale cloud platforms.

There are times when an internal solution might be needed, such as when you want to experiment with an emerging technology or provide something unique. However, today's external solutions are faster, better and more flexible. "You may want to create a bespoke solution for differentiating capabilities, and use a commodity solution for undifferentiating capabilities such as storage and compute," concludes Shodhan.

# Dealing with legacy IT

Governments have legacy systems that can't be switched off immediately and need to be managed. Replacement of a legacy system must allow for decades of legacy technological debt – the features and problems built up with each successive change to the system.

If it can't be replaced immediately, then a system must be maintained. Maxwell says, "In the UK, we built a government company, [Crown Hosting](#), that took the legacy off people's hands and looked after it until you could turn it off."

Not every legacy feature should be replicated on the new system, and it's a mistake to try, according to Shodhan. For example, a new loan application system might not need to support a traditional call centre as well as a website, email and mobile messaging channels. Its users, typically younger people, might not want to use the phone. Challenger banks (retail banks whose non-traditional model is challenging high-street banks) show that an app and a chat interface can replace a call centre and a bricks-and-mortar branch. Once again, the user need must come first.

As Shodhan puts it, "The key is to offload capabilities, not applications. Application is the language of technology. Capability is the language of business. If you offload a capability, then you can get rid of legacy tech more quickly."

## Additional resources

- [The AWS Institute](#)
- Thoughtworks-sponsored whitepaper: [Less stalling + More sprinting](#)
- [How to make public procurement smart and sustainable by design](#), Warren Smith for The AWS Institute



**In the UK, we built a legacy IT company, Crown Hosting, that took the legacy IT off people's hands and looked after it until you could turn it off**



**Liam Maxwell**

## Indonesia

# Simpler contracts improve transparency and boost competition among suppliers



Garuda Pancasila: the national emblem of Indonesia

### Challenge

The Indonesian government wanted to simplify and standardise the public procurement process to encourage transparency, broaden the pool of potential partners and suppliers and make it easier for all parties to work collaboratively on government projects.

### Solution

During two weeks in August 2020, the Indonesian National Public Procurement Agency ([LKPP](#)) worked with the UK Government Digital Service ([GDS](#)) and the global standards body World Commerce & Contracting ([WorldCC](#)) to establish a simpler process to draw up contracts.

The UK GDS previously developed a user-centred, design-led approach to government procurement contracts in the UK. Service designers, lawyers and commercial policy specialists collaborated to agree on essential requirements and make them clear to all relevant parties. The UK GDS had funding to then share its approach to improve transparency and reduce corruption in emerging economies.

The Indonesian National Public Procurement Agency worked with the UK Government Digital Service and the global standards body World Commerce & Contracting to establish a simpler process to draw up contracts

The project comprised six research workshops that covered how to:

1. Understand users and their needs
2. Map user journeys (such as how government projects advertise and how potential bidders draw up and assess contracts)
3. Explore design patterns (whether to include tables, examples and so on)
4. Develop prototypes
5. Test processes
6. Incorporate feedback.

Those involved also talked to four suppliers who already worked with the Indonesian government to discover their biggest frustrations and pain points.

## Result

The workshops and feedback sessions delivered three significant improvements:

1. The teams developed a clear introduction to the bidding process to help potential bidders understand the basic requirements, procedure and rules. They also provided examples of the types of documents bidders would have to complete
2. They clarified opportunities in government procurement and how potential bidders are assessed
3. They designed editable standard online forms, where users could remove irrelevant elements such as tables and terms and include any visuals they wanted.

Although the UK GDS funding was short term, the Indonesian National Public Procurement Agency was keen to apply the improved process to other areas of government procurement. These included:

1. A user research strategy
2. A simplified contract prototype to test with suppliers
3. More user feedback on forms and processes to create a new simplified contract
4. The design of simplified invitation-to-tender documents.

**Although the UK Government Digital Service funding was short-term, the Indonesian National Public Procurement Agency was keen to apply the improved process to other areas of government procurement**

**Acknowledgement:**  
Warren Smith

# Expert contributors

## Liam Maxwell

Government Transformation  
Director at AWS

Liam Maxwell is director of government transformation at AWS. He leads the global AWS team that helps senior government leaders accelerate their modernisation and reform programmes.

He was a civil servant from 2012 to 2018. As the UK Government's first chief technology officer, he led the reforms that enabled the modernisation of government technology and digital services. He was subsequently national technology advisor, responsible for accelerating growth in the digital economy, inward investment and creating intergovernmental and international trade partnerships post-Brexit.

He was twice elected (in 2007 and 2011) as a councillor and served as a cabinet member for policy at the Royal Borough of Windsor and Maidenhead. Between 2004 and 2011, he was head of computing at Eton College, Windsor. Prior to these roles, he was an IT director in FTSE 100 and Fortune 500 business service companies. He has a strong interest in education and is a founder of [Holyport College](#), a Free School near Maidenhead, Berkshire, UK.

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## Warren Smith

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Warren Smith is associate director with commercial lifecycle consultancy [CURSHAW](#) and co-leads the International Telecommunication Union (ITU) 'United for Smart Sustainable Cities' (U4SSC) Thematic Group on Procurement for Smart Sustainable Cities. He has more than 25 years' experience in procurement and supply-chain management, across private and public sectors, leading transformative projects to introduce new ways of thinking and working in public procurement and contracting. At the UK Government Digital Service (GDS) Digital Marketplace, he led the introduction of user-centred, design-led, data-driven and open approaches to public contracting.



THE AWS INSTITUTE

**I have to protect  
people's data –  
is the cloud secure?**



**Security is a major concern in today's connected world – and the cloud can be more secure than on-premises systems.**

**This section explains how hyperscale cloud platforms are a better solution for technology security. It provides examples of powerful tools to leverage in the cloud. And it explores why the UK's Ministry of Defence is among organisations that consider the cloud to be safer than on-premises data centres.**

**Expert contributor**

**Alex Meek-Holmes**  
Sovereignty and Strategic  
Infrastructure Senior Manager  
at Amazon Web Services  
(AWS)

# Data is more secure in the cloud than on premises



Governments must keep citizens' data secure. As the cloud has matured and understanding increased, organisations in sectors ranging from defence to international finance recognise that their data is more secure in the cloud than in on-premises data centres.

Organisations typically measure their security in three ways: confidentiality, integrity and availability. These are known in a traditional security risk management context as the CIA Triad:

1. Confidentiality – the data can be viewed only by authorised people
2. Integrity – the data cannot be altered or deleted
3. Availability – it must be accessible when it's needed.

The cloud deals with all three requirements better than on-premises data storage.

## Confidentiality

"The thing people worry about most is that somebody else can see it, and should not be able to see it, and then does something bad with it – such as delete it," explains Alex Meek-Holmes. "It's important at a base level to be able to know what you have in order to secure it."

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The thing people worry about most is that somebody else can see it, and should not be able to see it, and then do something bad with it

//

**Alex Meek-Holmes**

Senior Manager, Sovereignty and Strategic Infrastructure, AWS

Good data classification can help with that. It determines what you have and where it is, and makes sure that it's properly labelled. It also controls who has access. With the cloud, it's simpler to know what you have and what you need to secure. Once you have visibility, it's simpler to manage and monitor access. For example, [AWS Identity and Access Management \(IAM\)](#) offers granular control of the people and systems that can access cloud resources. Meanwhile, a tool such as [AWS CloudTrail](#) monitors and logs activity across the organisation's infrastructure, which simplifies auditing.

**Many organisations are pleased to move to the cloud because managing the security of their on-premises estate is becoming expensive and difficult**



**AWS Identity and Access Management (IAM) allows clients to manage permissions and analyse access to refine permissions across AWS**

Managing and monitoring can be done on premises, according to Meek-Holmes, but it will increase the burden on the organisation. He explains, "It goes back to configuring things. It can be difficult to deploy new encryption keys to secure your systems; you're more likely to miss things, particularly if you're talking about managing the boundaries of your environment. That's important because there's no point trying to secure 90 percent of it and leaving 10 percent open."

### Integrity

Protecting data against threats and intrusions is a central aspect of integrity. Cloud service providers are focussed on securing the data of millions of customers and so they constantly check for threats and intrusions. The time between an on-premises environment being breached and that breach being detected and closed out is, on average, nine months.

Cloud service providers invest billions of dollars in security. This investment leads to innovations such as the [AWS Nitro System](#), which splits the operations of a computer chip into two so the processes that manage data are separate from those that run the cloud. This secures the data from a range of advanced cyber attacks.

### Availability

Availability is an aspect of security that may not be the first feature people think about. However, government services need to work 24/7 and need constant access to data. “If you store data on premises, you sacrifice availability for a perception of control,” explains Meek-Holmes. “There’s a dated view that you have more control because you can see something. In the cloud, data is stored in clusters of data centres, ensuring that it’s still available if there’s a problem with one of them. These are geographically defined because some organisations, such as governments, want to confirm their data is not passed into foreign jurisdictions.”

To illustrate this, consider the AWS Region. This is a cluster of data centres in a physical location. Each group of logical data centres is known as an Availability Zone (AZ). Each AWS Region consists of a minimum of three isolated and physically separate AZs within a geographic area, rather than a single data centre. Each AZ has independent power, cooling and physical security and is connected via redundant, ultra-low-latency networks. This has benefits for high availability and fault tolerance. All traffic between AZs is encrypted. AZs are physically separated by a meaningful distance, many kilometres, from any other AZ, although all are within 100 km (60 miles) of each other.

The customer still has some responsibility for security. At AWS this is known as [the shared responsibility model](#). As the cloud service provider, AWS secures the hardware and software and also ensures that the database and storage are secure. Customers are responsible for configuring their encryption, traffic protection, the applications they run and so on. There are fine-grained tools to control all these features in accordance with your security policies and risk appetite.

Your organisation will still need clear security policies, based on its appetite for risk, and a chief information security officer (CISO). Ideally, there should be somebody at board level who understands cybersecurity. However, moving to the cloud significantly improves the quality of security decisions because it improves the quality of information available on which to base such decisions. This ranges from knowledge of threat levels and infrastructure reliability to the capability of your security tools.

**Availability is an aspect of security that may not be the first feature people think about. However, government services need to work 24/7 and need constant access to data**



The UK Ministry of Defence considers the cloud offers security benefits

Many organisations are pleased to move to the cloud because managing the security of their on-premises estate is becoming expensive and difficult. For the UK Ministry of Defence, the cloud offered many benefits. [Rich Crowther, as head of the Defence Digital Service, wrote](#), “Today I’d say that in most circumstances we can do a better job of security in the cloud than we can do on premises.”

The three reasons were: patching, scale and authorisation.

### Patching

Keeping systems patched by installing the latest updates is a vital part of security, whether you need to protect a personal laptop or an entire nuclear power plant. All threat actors – from bored and mischievous teenagers through to nation states – have the capability to attack an unpatched system. New vulnerabilities are discovered all the time, and the number of patches can be overwhelming.

Few organisations have a capacity for patching to match that of hyperscale cloud service providers. They can apply patches quickly to every layer of the technology stack as soon as they’re available. This can be before smaller organisations are even aware of a problem. It’s a simpler task when you run an operation at hyperscale.

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**Today I’d say that in most circumstances we can do a better job of security in the cloud than we can do on premises**

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**Rich Crowther**

Head of the Defence Digital Service in the UK

# Security trusted by the military

## Scale

The scale advantage runs right through every part of the cloud platform. If you want to change your security controls for an in-house system, that might entail someone visiting each location to manually update servers and switches. At the cloud level, if you need immediate monitoring of traffic leaving your system, that's straightforward. It's similarly simple to check that your internet-exposed servers aren't open to hackers. And if your challenge is to ensure your administrators' access is recorded in an immutable log and stored indefinitely, then that is quickly addressed, too.

These things can be done in on-premises environments, but some could represent hours, days or even weeks of effort, whereas they are simple and quick to achieve in the cloud.

Bespoke systems, although tempting for those who are wary of the cloud, can struggle with scale. When they try to scale and can't, they tend to stop working entirely. Cloud platforms are specifically designed with flexible scaling at their core.

## Authorisation

Anyone who has deployed infrastructure in a cloud environment will be aware that there is a strong focus on identity and authorisation. Almost any action can be set to require authorisation and an audit trail kept of every one of these actions. The decision logic can account for who is logging in, where from, whether the action they want to take is allowed, and more.

Ultimately, what cloud platforms allow is a security scope and scale that most organisations could not manage themselves. With that taken care of, they can focus on their core business tasks.

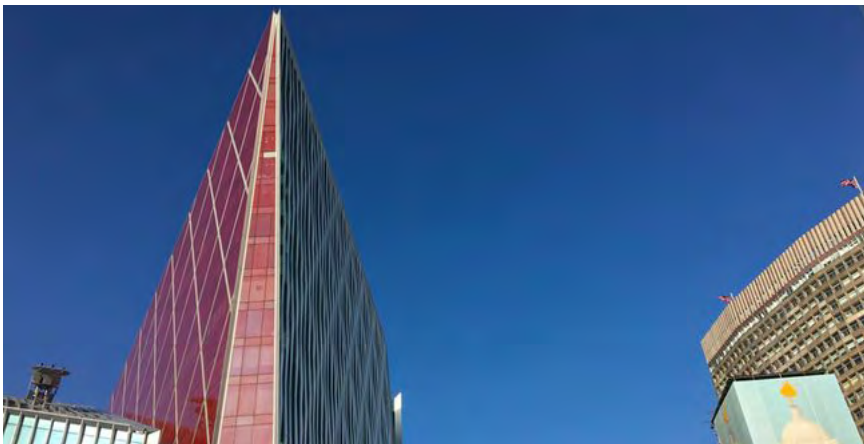
## Additional resources

- [Blog](#): Confidential computing: an AWS perspective
- [Video](#): AWS Public Sector Transformation Essentials: Security in the cloud
- [Podcast](#): AWS Conversations with Leaders: Making security personal for the public sector
- [Solutions](#): [Data Protection](#)
- [Blog](#): AWS cloud services adhere to CISPE Data Protection Code of Conduct for added GDPR assurance
- [AWS-sponsored IDC whitepaper](#): Trusted Cloud: Overcoming the Tension Between Data Sovereignty and Accelerated Digital Transformation
- [Announcement](#): AWS Regions and Availability Zones explained

**Bespoke systems, although tempting for those who are wary of the cloud, can struggle with scale... Cloud platforms are specifically designed with flexible scaling at their core**

# United Kingdom

## National Cyber Security Centre balances user needs and security using the cloud



Nova South, in London, is home to the National Cyber Security Centre

### Challenge

The UK government formed the [National Cyber Security Centre \(NCSC\)](#) in 2016 in support of a national ambition to make the UK the safest place in the world to live and do business online. The project leveraged expertise from several bodies with different IT systems. This included the information assurance arm of GCHQ, the National Technical Authority for Information Assurance ([CESG](#)), which had a record of providing trusted, independent research and intelligence-based service on information security. However, a unified system was needed to strike a new balance between security, usability and functionality. This system would:

1. Be highly resilient and secure for use with official data
2. Support mobile and multi-site working
3. Provide best-of-breed services that users want to work with
4. Set an example for how to build government IT with modern technology.

Users – civil servants and cybersecurity experts at the NCSC – wanted to collaborate and be confident that their work would be backed up. They wanted the same services on all their devices and for work internet to be as good as their home connection. And everything had to comply with NCSC's document retention and Freedom of Information Act obligations.

The UK government formed the National Cyber Security Centre (NCSC) in 2016 in support of a national ambition to make the UK the safest place in the world to live and do business online

## Solution

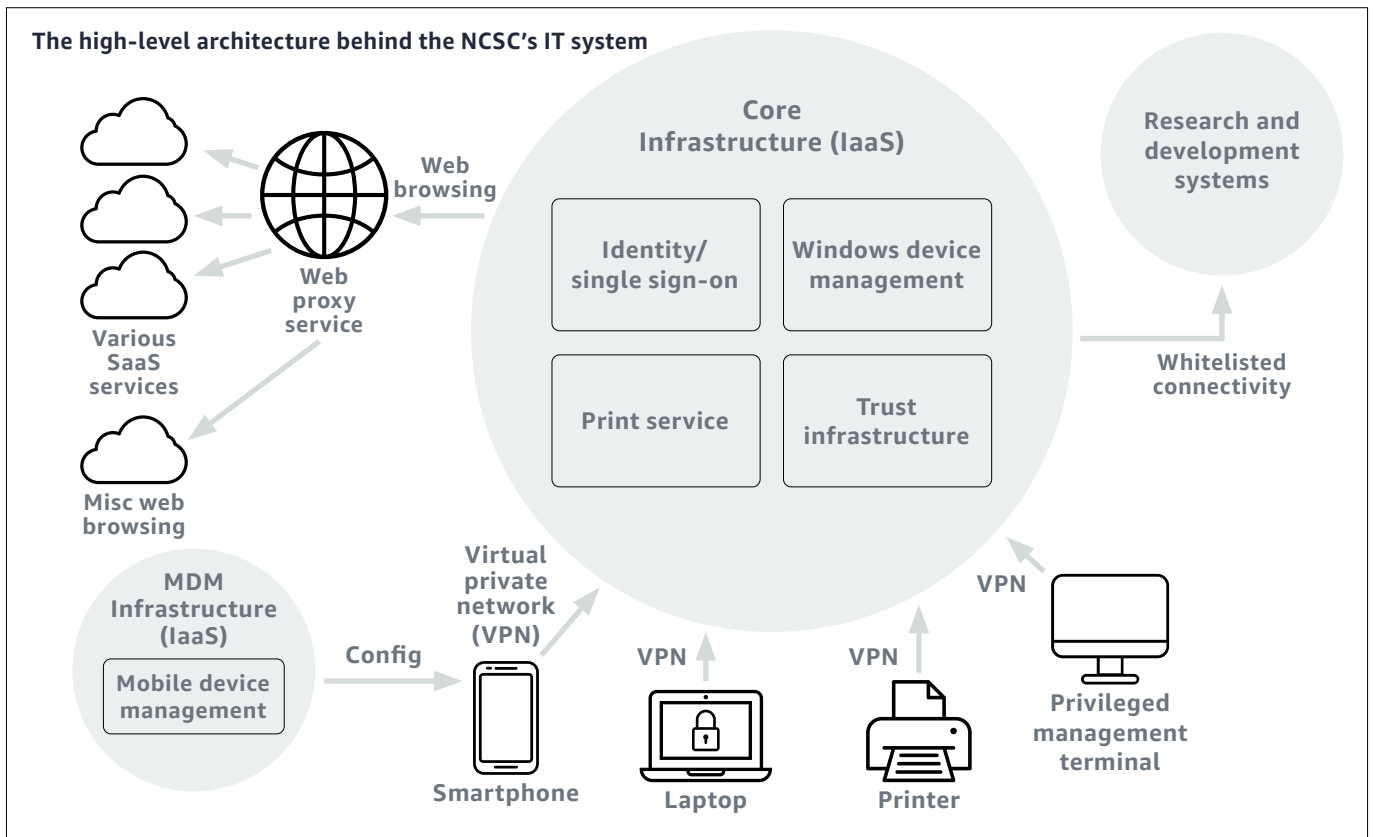
NCSC wanted to be cloud-first and use [agile development techniques](#), so it created a multi-disciplinary team with the authority to make decisions. Some aspects of an infrastructure project are not compatible with Agile techniques, such as elements that need high certainty and predictability, but the team found it possible to build good, secure tech using an Agile approach. The system evolved iteratively, taking sensible risks while building in new functionality.

To assess cloud providers, the NCSC used its own [cloud security guidance](#), matching available services to its 14 [security principles](#). It wanted to use as much of the same software and cloud services as the rest of the tech sector, rather than rely on legacy or bespoke systems, and as much [software-as-a-service \(SaaS\)](#) as possible. This would enable a greater ability to interoperate and collaborate with partners, for example in industry and academia.

However, in some areas, notably device management, user identity and trust infrastructure, the team wasn't confident it could rely on SaaS. In these cases, it opted for an [infrastructure-as-a-service \(IaaS\)](#) model to provide a strong security boundary.

NCSC is confident in its user security because of its control over device provision, configuration and maintenance, combined with strong user-device authentication.

**NCSC is confident in its user security because of its control over device provision, configuration and maintenance, combined with strong user-device authentication**



Reproduced with thanks to the NCSC

## Result

The NCSC created a software architecture from a set of SaaS services, along with the core infrastructure needed, so only trusted devices and users can connect to its resources.

The core infrastructure:

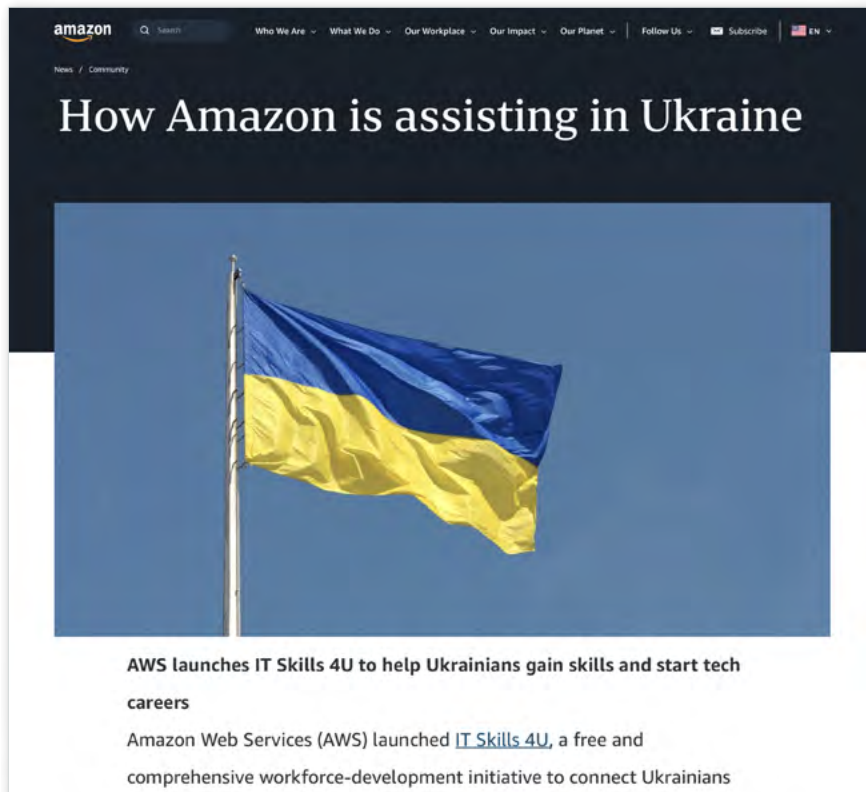
1. Provides a directory of users, devices and other infrastructure
2. Authenticates users and devices and provides single sign-on to let users reach cloud services
3. Provides filtered and protected internet access
4. Maintains secure configuration of devices
5. Manages software deployment to devices
6. Provides the means for specialists to connect to niche systems.

The resulting system balances user needs and security. Users have the tools and capabilities that work for them because a well-designed IT solution draws on the best of commodity technologies. At the same time, there is effective risk management.

**Acknowledgement:** Ian McCormack, deputy director of the Government Team, NCSC; Richard Crowther, deputy technical director; Carolyn Ainsworth, head of engineering

# Ukraine

## Securing government data in the cloud in a time of crisis



Benefits of migration to the cloud have been both everyday and historic. The Ukrainian government has been able to carry on serving citizens

In July 2022, President Volodymyr Zelenskyy awarded AWS the Ukraine Peace Prize for its support of the country's digital infrastructure

### Challenge

Before the Russian invasion, Ukrainian law required certain types of government and private sector data in Ukraine to be stored in servers located throughout the country. However, with the threat of military action growing, just a week before Russian troops entered the country in February 2022, Ukraine passed a law allowing such data to be moved and stored in the cloud.

The government then issued a call for help to undertake the data migration while the information was still secure. Prior to the war, Ukraine had already been working on the digital transformation of its government and Amazon Web Services (AWS) cybersecurity experts had collaborated with organisations to build up the country's cyber defences. They were therefore able to establish secure communications with government officials in Kyiv to get secure data safely out of Ukraine and into the cloud.

## Solution

On February 24, the day Russia invaded, Ukrainian officials met with members of the AWS public sector team to discuss bringing [AWS Snowball](#) devices into the country. Snowballs are a service that provides secure, rugged devices, so you can bring AWS computing and storage capabilities to your edge environments and transfer data into and out of the AWS cloud. Just 48 hours later, a set arrived in Poland ready to cross the border into Ukraine the next day.

AWS solutions architects worked remotely with technical colleagues in Ukraine to move large amounts of secure information quickly from local servers to the cloud.

By July 2022, more than 10 petabytes (10 million gigabytes) of data had been moved from Ukrainian servers to the cloud, from government departments, universities, private companies (including PrivatBank, the country's biggest bank) and a large remote-learning school that teaches hundreds of thousands of children displaced from their homes by the war.

## Result

Benefits of migration to the cloud have been both everyday and historic. The Ukrainian government has been able to carry on serving citizens. For example, by moving data from the Ministry of Education, students inside and outside Ukraine were able to complete their end-of-school exams in the summer of 2022. When the time comes for reconstruction, the country won't be starting from scratch. Digital data from Ukraine's land registry, for example, has been preserved so property ownership records can be accessed.

In July, President Volodymyr Zelenskyy [awarded AWS the Ukraine Peace Prize](#) for its support with the country's digital infrastructure.

**By July 2022, more than 10 petabytes (10 million gigabytes) of data had been moved from Ukrainian servers to the cloud, from government departments, universities, private companies and a large remote-learning school**



# Expert contributor

## **Alex Meeks-Holmes**

**Sovereignty and Strategic Infrastructure Senior Manager at Amazon Web Services (AWS)**

Alex Meek-Holmes is a digital transformation leader on the government transformation team at AWS. He worked in the UK civil service before joining AWS. He was most recently responsible for cybersecurity across UK industry. As chief operating officer of the Government Digital Service (GDS), he played a key role in the digital transformation of UK government, improving services for citizens and saving billions of pounds. Previously he worked in HM Treasury, where he devised and implemented spend controls, which helped the UK government move to cloud computing. He is a policy fellow at the [Royal Academy of Engineering](#).

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Editor: **Sarah Ryle** - *AWS Institute Senior Content Manager*





THE AWS INSTITUTE

# How can I design digital services to be better for citizens?



Government services based on digital capabilities shared by all departments are simpler for citizens to use and can reduce development costs. This section explores what's needed to overcome traditional silos and explains how national digital identity platforms underpin seamless citizen services.

Government services have grown up in silos. They collect the same information about citizens in various formats but for similar tasks, for example, to make an appointment, register ownership of something or receive funds.

Mark Thompson explains why this is a problem and what can be done to change it: "In the UK there are 215 NHS trusts, 317 local government authorities and 45 police forces, and they have all been building slightly different versions of the same thing," he says. "This costs money and it means we can't share data and we can't update things."

Digital transformation is an opportunity to improve this situation for public sector organisations and the citizens who use their services. There are two elements to the transformation: culture and technology. The cultural change can be the harder one as the way an organisation works tends to be embedded and to have been set up to work for the organisation itself rather than for the end users. This can reinforce silos whereas in fact much of what public sector organisations do can be achieved through shared capabilities. Similarly, the technology that supports service innovation can also be shared across functions and whole departments. This becomes clear once your organisation designs services for the user need and works backwards from there.

## Expert contributors

**María Inés Baque**  
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# Interoperability

Government as a platform, or the Lego principle as transformation leaders sometimes describe it, means establishing and accepting certain shared components and capabilities, guided by standards that are common to departments and organisations. Only unique and specialist services need to be built in a bespoke way.

Authentication tools and common application programming interfaces (APIs) make it possible to share information securely between departments. However, to get the best out of these tools, data standardisation, convergence and common standards are essential. Governments including in India, Singapore and Argentina have progressed interoperability and a core component of their success is a single digital identity, which enables citizens to access multiple government services.

## Put citizens at the centre

When people come to register the birth of a baby or replace a lost passport, “what they want is to spend less time with government and get to the end of the process as quickly as possible,” says María Inés Baque, AWS government transformation leader, who previously led Argentina’s digital government transformation

“Starting with citizens’ needs and working backwards from this is how you connect silos and build the end-to-end services that touch different departments and different parts of the same agency – you design with citizens, not for them – you find out what their pain points are,” she adds.

The first task is journey mapping in order to understand the existing experience citizens have when they phone a call centre to access a service. Next, observe the users of that service as they go about their daily lives and then talk to them in focus groups to establish what matters to them.

In Singapore, the government expressed this concept as Moments of Life, named this way because citizens interact with government regarding important life stages such as registering a birth. Chief Technology Officer Chan Cheow Hoe explains that making sure the experience is seamless for the citizen requires joined-up public digital infrastructure. He explains in this AWS Institute video, [User First](#), how Singapore’s government was very fragmented, as many governments are. Singapore took an inside-out approach instead of seeing the services through citizens’ eyes.

Chan Cheow Hoe explains how although governments may have a lot of data, there’s no “single source of truth.” It’s technically challenging to bring together multiple systems that don’t talk to each other. Singapore’s solution was to create a government-wide API gateway. Each agency created an API that works through this gateway. This all fed into a single interface for the citizen – [LifeSG](#).

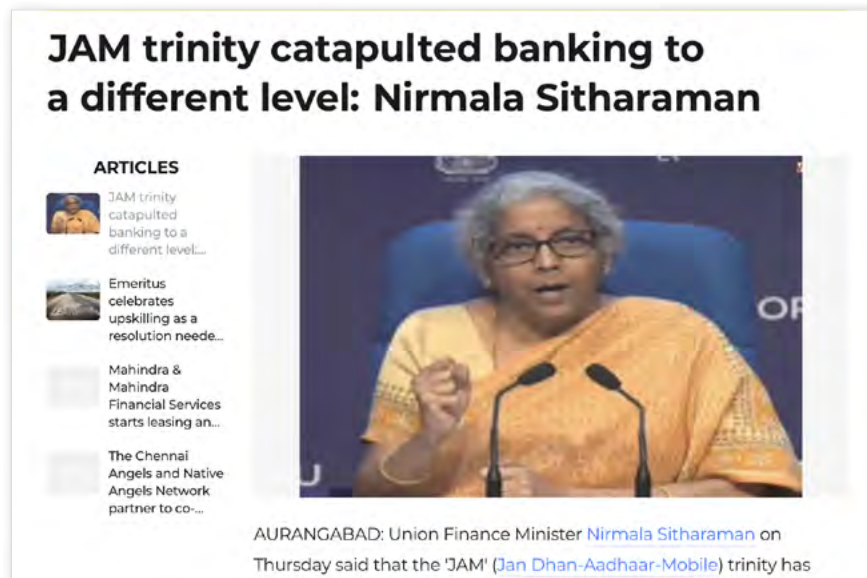


**You design with citizens, not for them**



**María Inés Baque**

# Tools to enable interoperability



India's Jan Dhan-Aadhaar-Mobile (JAM) digital identity scheme is used by 1.3 billion citizens

The main technology elements that enable digital interoperability are available, says Choy Peng Wu, AWS director of government transformation (ASEAN).

"The ability for governments to know which information sits in which department and how to pull it out, those are not esoteric technologies, they are mature," she explains. She adds that alongside the technology it's essential to have "a good data management and sharing framework so people have trust in the system."

## A single digital ID

The seamless experience for the citizen was enabled by the [Singpass](#) digital ID program, which made it possible to enact quickly and simply with government online services. There are considerable benefits on the government side because when departments have a clear picture of an individual's interactions across government agencies, which a unique ID enables, fraud and overlap are more difficult.

"For a real digital transformation centred on citizens' needs, a digital ID is essential," says María Inés Baque. She says the move to a single digital ID in Argentina was eased because people in the country were already used to showing their identity card to access services.

One of the most effective ways to enable citizens to interact with the whole of government quickly and seamlessly is to establish a single digital identity to access services online

However, she says that the flagship digital identity scheme worldwide is India's. The country launched the [Aadhaar ID](#) scheme in 2009 to make it easier to get welfare payments to the poorest in society, and to reduce fraud. Citizens submit eight items of personal data including name, date of birth, address and gender as well as a biometric. They then receive a unique 12-digit number following an iris scan and validation of a photograph and their fingerprints.

Some 1.3 billion Indians now have an Aadhaar ID. In addition to accessing government services, Aadhaar is the foundation of the [JAM trinity of Jan Dhan \[public bank accounts\]-Aadhaar-Mobile](#), which has increased financial inclusion in India. Being able to authenticate their identity has enabled citizens to access bank accounts and mobile phone contracts, and carry out financial transactions.

The ID provides authentication, authorisation and access. It delivers efficiency, effectiveness, reliability, transparency and accountability in provision of government services to citizens in an inclusive manner.

The success of JAM has been accompanied by the development of a thriving digital payments infrastructure in India, which together form the basis of India Stack. [India Stack Global](#) now provides 12 platforms for digital services, including payments and telemedicine. In Singapore, too, a resident's digital ID can be used in commercial transactions, such as with banks. The Philippines, Togo, Burkina-Faso, Madagascar, Ethiopia, and Sri Lanka are also working to adopt Aadhaar-like ID systems, and are at different stages of maturity.

In Canada there are digital ID solutions at province level, at different levels of maturity. For example, in British Columbia, citizens may use a BC Services Card app to access federal taxes online. The challenge now is how these solutions could be integrated to have a digital ID at national level. The federal government is in the planning stages of a digital credential system.

**The flagship digital identity scheme worldwide is India's. The country launched the Aadhaar ID scheme in 2009 to make it easier to get welfare payments to the poorest in society and to reduce fraud**

## The state of Digital ID in Canada



Canada has digital ID solutions at province level. The challenge is how these could be integrated to enable a digital ID at national level

Baquer emphasizes how important it is for governments to be able to keep personal data secure and use it appropriately and according to the sharing permissions granted by citizens. There needs to be a clear and positive case for governments to establish digital ID systems. Shared access, and the seamless services that interoperability enables, transform the user experience of essential government interactions. This provides a positive case for the convenience of one ID from the point of view of citizens.

"If you already have the data, you don't need to ask citizens for it again and again," Baquer explains. "As long as they have a real need for it, you should provide it to the other departments that require it. All the pieces of this come back to delivering better services for citizens."

### Additional resources

- [Video](#): *Building Responsive Government Services: digital identity for 1 billion people*
- [Report](#): AWS Institute and Access Partnership: *Digital identity: The opportunity for government*
- [Blog](#): *Six best practices for government leaders to plan for success with digital ID*
- [Blog](#): *Designing for success: Strategic approaches to digital ID systems using the cloud*
- [Blog](#): *Governments look to digital ID to modernize services and boost growth*

**Governments must keep citizens' personal data secure and use it appropriately and according to the sharing permissions granted by citizens**

# Singapore

## Singpass simplifies government services



Singapore Parliament is the official seat of the Singapore government

### Challenge

State agencies around the world typically operate in silos. This means that citizens have to make separate registrations for each service they require. Too often, the renewal of a passport or a benefit claim involves waiting in phone queues, dealing with helpdesks that lack the required information and websites that are challenging to navigate.

Singapore's government wanted to provide citizens with a unique digital identity that gave them instant, easy access to all its public services and published data via a single portal. At the same time, the government aimed to use this transformation project to embed a service culture across all public sector agencies.

In 2000, Singapore's leaders took the decision to go straight to the most modern approaches and technologies to deliver government services efficiently

## Solution

Launched in 2018, the [Singpass](#) mobile app is a secure, personalised digital platform that builds on earlier versions to enable individuals to transact directly with government agencies.

Singpass offers access to everything from pension, health and welfare claims forms to more specialised services, such as complaints against estate agents and civil aviation licences for flight crews. Users can also consult a vast range of government data, such as the latest COVID-19 information or changes to taxation rules.

In addition, Singpass provides links to the products and services of a growing list of more than 150 private-sector companies, mostly focused on personal and consumer finance. If they wish, citizens can use Singpass to open a bank account, rent a car or apply for a mortgage. They can also take advantage of personal management software (MyInfo) installed with their unique identity to organise their transactions and enquiries.

## Result

With more than [4.5 million holders](#), Singpass now covers almost all the country's citizens and permanent residents over the age of 15. They use Singpass to conduct around 350 million personal and corporate transactions every year.

Singpass's popularity testifies to its success in meeting citizens' needs on two levels. First, they have the freedom to pursue enquiries across departments and ministries, roaming between different agencies and data sources with their unique Singpass digital identity. This user control erodes the tendency of public-sector organisations to function in silos. Second, users trust Singpass – and by extension, Singapore's government – to manage and protect their data securely. Security features include face verification, optional extra firewalls and regular updates on phishing scams and other cyber threats.

**Singpass now covers almost all the country's citizens and permanent residents over the age of 15. They use Singpass to conduct around 350 million personal and corporate transactions every year**

# India

## The interoperable digital payment system that transforms personal finance

### Challenge

The Indian government wanted to address financial exclusion – particularly among its rural population – and widen access to digital payments and banking services in an economy where people relied on cash. The vision was for digital services that would enable faster and cheaper transactions than was possible under the existing paper-based system. This in turn could help to remove bottlenecks that restricted economic growth.

### Solution

The government addressed this challenge through [India Stack](#). Crucially, India Stack would not have been feasible without an existing government initiative, [Aadhaar](#) (foundation, in Hindi), which is the world’s largest digital identity system, introduced in 2009. Aadhaar allows every citizen to create a 12-digit unique digital identifier, based on their personal information plus their biometric data (fingerprints, iris scans and photograph). They can then use this to verify their identity when accessing government and private sector services.

Indian banks and fintechs were able to use the Aadhaar ID database to confirm instantly the identity of people who applied for bank accounts or digital wallets. This opened access to digital payments for anyone with an Aadhaar ID. According to the Aadhaar dashboard, almost 80 billion ID authentications have been performed so far and almost 13 billion electronic know-your-customer checks.

With this as a base, the National Payments Corporation of India (NPCI) developed the [Unified Payments Interface \(UPI\)](#), a real-time payment system. This system powers multiple bank accounts into a single mobile application, which is open to all retail payment providers, both banks and non-bank fintechs. The UPI made sure that payment services were interoperable.

**Identity authentication has enabled more than 1 billion citizens to access bank accounts and mobile phone contracts, and carry out financial transactions**

## Result

The Indian government used the Aadhaar system as the basis of its policy, launched in 2014, to spread access to bank accounts to every Indian household. Within a year, 166 million people had opened an account using the Aadhaar ID verification system. By 2019, the total had risen to more than 380 million.

By September 2022, almost 1.35 billion Indians, more than 90 per cent of the population, had obtained a digital ID and around half of them had linked a bank account to their Aadhaar identity. Tens of millions of transactions a month are processed through the India Stack, most of which originate from rural areas that in the past have experienced the greatest levels of financial exclusion.

During the COVID-19 pandemic, the volume of payments using digital wallets soared as people grew wary of handling physical cash due to the risk of infection. The UPI handled most of the extra payment volumes and now accounts for the majority of small retail payments that Indians make.

# Australia

## Digital driving licences open doors to other Queensland public services

### Challenge

Around the world, people use driving licences to confirm their identity for many other activities and transactions. This is an example of how a service intended in theory for one narrow purpose can evolve when people use it in real situations. For example, airline companies may accept driving licences rather than passports for domestic flights. Young people use them to prove their age in venues licensed to serve alcohol. In recent years, new technologies such as face-recognition software have further increased the potential for digital driving licences to function as multipurpose identity passes.

The Australian state of Queensland wanted to provide its citizens with better, faster and more cost-effective access to public services and benefits via their driving licences. In 2020, the state's Transport and Main Roads (TMR) authority [launched an initiative](#) to encourage government agencies to accept driver licences for a range of benefits and welfare programmes.

### Solution

Data supported the initiative: 90 percent of Queensland's adult population of around four million people registered with TMR and use one of its driving licences, depending on their vehicle and status. Secondly, this customer base represents total revenue of about A\$4 billion (US\$2.6 billion), including licence fees and income from other sources such as tests and exemptions. Yet the TMR saw itself purely as a revenue collector, with no obligation to add value to the driver licences it was issuing beyond their primary purpose.

The TMR's Customer Oriented Registration and Licensing (CORAL) programme, which led Queensland's digital licence initiative, took a different approach after it discovered that 49 times out of 50, citizens were using their driving licences for commercial reasons. CORAL's general manager, Chris Goh, describes the project in more detail in this [AWS Institute video](#).

Goh and his colleagues on the CORAL programme set out to persuade other Queensland ministries and agencies that they should

adopt the same retail mindset and accept driving licences as a rapid, direct means to gain access to government benefits and services.

### **Result**

Goh cites emergency relief as an example of where data already stored on TMR's driving licence database would enable the government to provide financial aid to citizens in the affected area without them even needing to apply for it.

These are early days, but Queensland is already on the road to a future where digitalised driving licences become universal gateways to everything the government provides for citizens. TMR announced in August that it will [expand the trial](#) to a new area. The Queensland government intends that the [Digital Licence app](#) will be available to all of its citizens.

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Global awards and recognitions she has received include [Innovation Lab, Tel Aviv, 20](#) [exceptional GovTech Leaders \(2020\)](#), [Women Corporate Directors 2019](#) and [The 100 Most Influential People in Digital Government, Apolitical, 2018](#).

She was co-chair of the G20 Digital Economy Taskforce for Gender Inclusion in 2018 that issued the [Bridging the Digital Gender Divide report](#).

Before government, her career was in global IT and financial services enterprises. She focused on process reengineering, start-ups, IT management, outsourcing and business process operations.

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