The future is *interoperable*

How to embrace interoperability in the public sector and deliver modern, seamless digital public services that save time, cost less and make life better and easier for everyone

Capgemini

The hidden power of interoperability

As a word, "interoperability" may not exactly roll off the tongue. But it is the principle behind many of the most seamlessly convenient aspects of modern life. It is interoperability that allows you to use your mobile phone as you step off a plane, for example – regardless of where you land. Or to buy a coffee with your smart watch when you have cleared customs. All without thinking twice.

Interoperability plays a similarly important role in the provision of public services. But while our research shows that it is a priority for 61% of public sector organizations globally, few cross-border services currently work in this way.[1] And in the EU, only around six in 10 such services can be completed online due to a lack of interoperability.[2] The main barriers include the inability to use national eIDs for cross-border identification and a lack of translation functionality.

That is because achieving public sector interoperability across organizational boundaries and jurisdictions is complex. The organizations involved need a legal basis for how they will work together to make such services possible. Their processes and definitions must be aligned, so they can co-produce services and understand and interpret data in the same way. Finally, they must overcome technical challenges around exchanging data, many of which stem from the prevalence of data silos and legacy systems.

The European Commission's Interoperable Europe Act, which came into force in July 2024, aims to overcome these challenges. It does so by providing government agencies with a holistic, four-layer approach for creating interoperable systems: legal, organizational, semantic and technical.

Here, we will take a closer look at the value interoperability brings to the public sector today. We will then suggest some practical ways to address the four layers of interoperability set out in the Act – whether you are in the EU or outside it.

We hope it inspires you to embrace an interoperable future.

1 Capgemini Research Institute, "Data foundations for government: From AI ambitions to action", May 2025
2 eGovernment Benchmark 2025, available from the Publications Office of the European Union, op.europa.eu

What is public sector interoperability and why does it matter?

Interoperability relates to the ability of systems – and, as a result, organizations – to communicate and work with each other. In the public sector, interoperability makes it easier for different government agencies to work together effectively when delivering public services. This means they can provide citizens with better-quality services and run them more efficiently.

In the European Union (EU), public sector interoperability plays an important role in supporting citizens and businesses to live, work, study and run businesses seamlessly and easily. Examples include EU passports, which remove the need for visas in member states, and the Bologna Process for harmonizing higher education systems. Beyond the public sector, the common charger regulation recently improved the interoperability of most electronic devices sold in the EU by standardizing charging ports to a USB-C.[3]

Notable digital equivalents do exist; the Single Digital Gateway, which provides access to public services within the EU, is one such example. The EU Digital Identity (eUDI) Wallet, which all EU citizens, residents and businesses can use to identify themselves, is another. Yet the eGovernment Benchmark Report 2025 shows that just 58% of cross-border services in the EU can be completed online. That is compared with 92% of services for national users. And only 45% of cross-border services permit users from other member states to authenticate with their national IDs.[4]

The Interoperable Europe Act (IEA) can help expand the use of interoperability in cross-border digital public services. As a new cooperation framework for interoperability, it aims to help governments and public agencies create easily accessible digital services for citizens and businesses across Europe.

3 EU common charger rules: Power all your devices with a single charger, published by the European Commission Directorate-General for Communication, commission.europa.eu

4 eGovernment Benchmark 2025, available from the Publications Office of the European Union, op.europa.eu

"Improving public sector interoperability is fundamental for building a digital European Union – one that is open, inclusive, fair and trusted."

Johannes Hahn
Commissioner for Budget and Administration (2014-2019)

Interoperable digital public services in action

Interoperable cross-border services may not yet be commonplace, but many leading examples of digital government could not exist without interoperability. That is because it allows the exchange of data between systems.

Here, we look at some leading examples of digitization in the public sector and the interoperable systems that underpin them.

1. Estonia

With a remarkable 100% of its public services available online 24/7, Estonia is an often-cited example of innovative, transparent and user-centric eGovernment. Citizens can file their taxes 99% electronically in as little as three minutes.And the e-Business register allows them to register a company in a couple of hours without going to a notary or other authority.[5] Estonia also coordinates the eFTI4EU: the Future of Freight Transport is Digital – a joint initiative between nine EU member states to improve cross-border freight by exchanging data.[6]

The interoperable ingredient

The backbone of all Estonia's modern public services is X-Road – a secure, interoperable and reliable system for seamlessly exchanging data between public administrations. X-Road allows administrations to cooperate easily while simplifying tasks for public employees. It is also credited with helping to save 1,345 years of working time for citizens annually.[7]

As X-Road is open source, 25 other countries are currently implementing the system, reaching an estimated 542 million end users worldwide.[8] And in 2017, Finland and Estonia became the first countries to create a cross-border data exchange platform using X-Road as its foundation.[9]

2. Ukraine

Ukraine has achieved outstanding results in a challenging context. The Diia app, a single portal to government services and digital documents, launched in 2020 to much global interest. It is estimated that the app now has more than 21.7 million users, including citizens displaced by war. Over 70 government services are available online and the business registration process is the fastest in the world. As of April 2024, the app is also available as open-source code.[10]

The interoperable ingredient

Underpinning this ambitious project is another interoperable data-exchange platform, Trembita, which connects more than 80 public authorities across Ukraine. While it was built using X-Road open source code, Trembita has a higher level of security to counter cyber-attacks.[11] It is estimated to have processed over five billion transactions since its 2019 launch, proving that interoperability can enable modern eGovernment for larger populations than Estonia's.[12]

5 Ease of doing business, e-estonia.com
6 eFTI4EU: the Future of Freight Transport is Digital, efti4eu.eu
7 X-road – Interoperability services, e-estonia.com
8 X-Road World Map, x-road.global
9 X-Road – cross-border co-development of national data exchange platform, European Commission, ec.europa.eu
10 Digital Country, ukraine.ua
11 Deployment of Trembita system in Ukraine a milestone for Estonian digitisation efforts, e-estonia.com
12 Cybernetica renews Ukrainian data exchange platform, tradewithEstonia.com

3. Japan

Interoperability is a prerequisite for achieving the end goal of Japan's digitization journey: modern public services within an advanced digital society. Citizens can use the Mynaportal, an online gateway linked to their unique 12-digit My Number ID, to access a wide range of services including childcare, healthcare and tax filing.[13] Mynaportal also allows users to receive personalized notifications from governmental institutions and securely access other government-run portals such as e-Tax and pension services.[14]

The interoperable ingredient

The Government Interoperability Framework (GIF), published by Japan's Digital Agency, serves as a practical guide and reference model for improving interoperability between government agencies.[15] By providing standard data models, guidelines and principles, it enables agencies to integrate and scale interoperable services seamlessly, reducing costs and improving the user experience.[16]

4. EU member states

Interoperable systems are also delivering concrete benefits in several EU member states, including:

Spain: The "Citizen Folder" service is a one-stop-shop for citizens to access documents, update personal information and manage health appointments. The service currently offers a web portal, an app and a virtual assistant.[17]

Hungary: The EgészségAblak mobile application ("Health window") is a free mobile app that connects healthcare providers, pharmacies and citizens. Pharmacists can view, query and dispense ePrescriptions, while citizens can view and download ePrescriptions and health documents, receive push notifications and book, view or change appointments.[18]

Helsinki, Finland: The "Reimagining Helskinki" project features an interoperable platform, Urbanist AI, that allows citizens to play an active role in urban planning. The platform uses images created by Generative AI, along with co-design tools and digital twin concepts, to make future transformations more understandable and interactive.[19]

Germany: the Center for Digital Sovereignty (ZenDiS) encourages public administrations to adopt open-source software. It does so by offering guidelines, expert consultation and co-development opportunities. It also fosters community engagement to promote collaboration between agencies and the reuse of technology.[20]

France: France's 3DS Law streamlines data-sharing between government entities and simplifies procedures for citizens by allowing administrations to reuse existing data. This in turn helps them move from the once-only principle towards a "Never tell us" approach, where they grant rights and services proactively based on information they already hold.[21]

13 About my number system, Digital Agency, digital.go.jp
14 X-Road – cross-border co-development of national data exchange platform, European Commission, ec.europa.eu
15 What can you do through Mynaportal?, practicaljapan.com
16 Government Interoperability Framework (GIF), Digital Agency, digital.go.jp
17 Mi Carpeta Ciudadana, masinformacioncarpeta.carpetaciudadana.gob.es
18 Heatlth Window: the application that has proven itself in Hungarian healthcare, www.vg.hu
19 UrbanistAI – the platform to reimagine the future of our cities, site. urbanistai.com
20 Interoperability Initiatives – Germany, IOPEU Monitoring, EC Interoperable Europe, interoperable-europe.ec.europa.eu
21 Interoperability Initiatives – France, IOPEU Monitoring, EC Interoperable Europe, interoperable-europe.ec.europa.eu

What could interoperability bring in the future and what might be standing in the way?

The examples we just supplied are impressive, but they are mainly restricted to services within individual states. If applied to cross-border services, interoperability could speed up the process of mutually recognizing academic qualifications – making it quick and easy for professionals to apply and receive approval online. It could also improve pandemic readiness and response, including vaccine development, by allowing governments to share health data between countries.

In the EU alone, it is estimated that cross-border interoperability could save up €20 billion for citizens and businesses by reducing the cost and time of carrying out government services.[22] The global economy could also benefit from easier, cheaper and more efficient access to markets and services.

As it stands, though, public sector organizations face some barriers to delivering interoperable cross-border services. That is largely because of the need to apply a holistic approach that involves legal, organizational, semantic and technical harmonization. This complexity is why the EU as a whole can be seen to lag individual states or those creating cross-border services with just one another state.

In our experience, other barriers can include:

- **Weak incentives to "go first" or "go solo"**. With no political pressure or lobbying, and murkiness around whether the benefits outweigh the risks of sharing data, governments are reluctant to take the lead.
- **Poor governance and coordination of policies.** When several parties with differing interests and approaches are involved with delivering a cross-border project, it can be challenging to coordinate and assign responsibility for tasks.
- **No common goal.** Even with a strong incentive in place, organizations need to agree on, and coordinate around, a set of binding specifications and standards.

22 Capgemini Research Institute, "Data foundations for government: From AI ambitions to action", May 2025

How will the EU IEA make cross-border interoperability easier?

The IEA provides public sector organizations in the EU with a reason to act, a common goal and a holistic process for getting there. It requires those organizations to, among other things, assess any (qualifying) new or revamped digital systems against the four areas of cross-border interoperability: legal, organizational, semantic and technical. It also places the development and use of the European Interoperability Framework (EIF) on a legal footing.

The Act encourages organizations to consider interoperability at an early stage, while also strengthening their ability to interact with each other. In doing so, it could open the door to cross-border digital public services that save money for businesses, as well as for citizens and public administrations. That is not only in the EU, but in any jurisdiction that chooses to apply the principles of the Act.

Since the IEA came into force, the European Commission has supported it in various ways, including:

- Putting regulatory sandboxes in place, where public sector organizations can develop, test, and validate digital solutions while receiving regulatory guidance and working towards compliance.
- Consulting stakeholders to inform the draft Interoperable Europe Agenda.
- Providing collaboration opportunities through the Interoperable Europe Community, and updates, resources and events on the Interoperable Europe Portal.

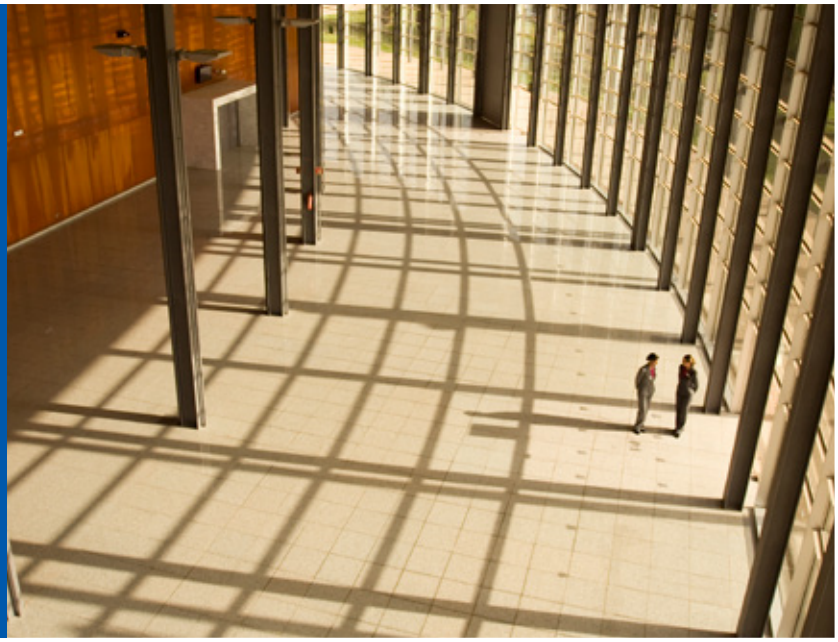
To find out more, read our blog or go to interoperable-europe.ec.europa.eu

23 EU common charger rules: Power all your devices with a single charger, published by the European Commission Directorate-General for Communication, commission.europa.eu

24 eGovernment Benchmark 2025, available from the Publications Office of the European Union, op.europa.eu

"There is neither the time nor the money now to reinvent the wheel in all areas of the public sector. The principle of building interoperable services that 'click' together makes sense and gets results fast."

Marc Reinhardt
Executive Vice President
Public Sector Global Industry Leader
Capgemini



How to build interoperable systems in the public sector

While the IEA targets the EU, its framework can support public sector organizations around the world. Here is how we suggest applying each of its four layers.

1. Legal interoperability

What it means

Legal interoperability allows public sector organizations operating under different legal systems to collaborate seamlessly. It does so by aligning laws, policies and regulations to support cross-border and cross-sector digital services.

Why it matters

- Reduces legal and bureaucratic barriers to cooperation.
- Improves interoperability by embedding its aspects and impacts into digital-ready legislation.
- Creates a policy environment that encourages the use (and reuse) of technology and innovative solutions.

How to address it

- Go through the laws and rules your organization works under and identify contradictions, overlaps, red tape or other complexities that make collaborating with other organizations harder. The same applies when ministerial officials or parliamentarians work on legislative drafts.
- Collaborate with agencies across jurisdictions to align implementation practices and share legal interpretations.
- Take part in interoperability assessments and initiatives to provide feedback on practical legal challenges.

2. Organizational interoperability

What it means

- Business processes, role, responsibilities and expectations are aligned to achieve commonly agreed and mutually beneficial goals.

Why it matters

- Everyone involved in delivering a cross border service knows who to contact in their equivalent agencies – and who is responsible for what.
- Delivery and technical processes between agencies are seamlessly harmonized.
- Public administrations can work together better, faster and more efficiently.

How to address it

- Map your own processes, roles and contact points, then line them up with the partners you need to work with.
- Pick clear points of contact in each partner agency so people know exactly who to call.
- Use simple visuals like process maps or RACI charts so everyone sees responsibilities the same way.
- Set expectations with partners through short agreements or memorandums of understanding (MoUs) that cover who does what and by when.
- Run joint workshops and training so teams understand each other's ways of working.

3. Semantic interoperability

What it means

- Both the formats and the meanings of exchanged data and information are standardized, so everyone understands them.

Why it matters

- Removes ambiguity by creating a common vocabulary and data repository for information shared between systems.
- Helps to create efficient, effective digital public services by improving communication, coordination and decision-making.

How to address it

- Agree on a shared set of key terms and definitions with your partners to avoid confusion.
- Use existing standards (like DCAT-AP for data catalogues or Core Vocabularies for common entities) and make them easy for employees to find.
- Keep a basic data dictionary or glossary so everyone reads data the same way.
- Always add clear metadata so others know what your data means and how to use it.
- Check that terms and definitions match if you are working across languages.
- Establish joint processes and working groups for collaborating on the above-mentioned tasks.
- Consider using intelligent systems to support semantic analysis, such as LLM-based tools for semantic matching and structuring.

4. Technical interoperability

What it means

- Different systems or software applications can securely connect and communicate with each other by exchanging data, information and commands.

Why it matters

- Technology such as interoperable architectures, platforms and open APIs allow organizations to share data seamlessly – streamlining and speeding up processes.
- Results in cross-border digital services that are user-centric – saving time and money for citizens, businesses and the public sector.

How to address it

- Use open standards and APIs in your systems so new partners can connect without custom fixes.
- Reuse existing tools and components instead of building everything yourself.
- Test connections early when rolling out new systems.
- Build modular systems so you can swap out parts or plug them into other services.
- Bake in security: encrypt data, use role-based access and run regular audits.
- Track system performance and connections with partners so you can fix issues fast.

Final word

Interoperability is a clunky term for something that is designed to take the clunkiness out of our everyday interactions with businesses and government. It is already improving our lives in many respects; in fact, once you know what it is, you see it everywhere. As we have shown, though, governments are struggling to make their services interoperable – particularly those that transcend borders.

The IEA marks a major step towards a more integrated and collaborative digital public sector across Europe. It fosters interoperability through shared governance, innovation and mutual learning. And by prescribing a more holistic approach, it offers an opportunity to start realizing the benefits of interoperability and speed up progress towards interoperability-by-design. Governments globally need to take advantage of it.

"Government CIOs and IT experts barely need convincing of the benefits of interoperability. What has been missing is explicit guidance on the necessary non-technical requirements. The Interoperable Europe Act (and the ecosystem evolving around it) helps with exactly that. What's more, with a critical mass of collaborators, individual public sector agencies will find that their investments into interoperable and sharable solutions will result in much bigger returns."

Philipp Fuerst
VP Data-Driven Government and
Offer Leader, Global Public Sector
Capgemini

How Capgemini can help

Capgemini is the leading global system integrator and IT service provider of European origin. We have a strong public sector footprint in all segments, including core public administration, tax and customs.

As a long-time partner of the European Commission, we have intimate knowledge of European policies and regulation. We evaluate the quality of online public services in Europe and identify service gaps, publishing our findings in the EU eGovernment Benchmark. Its 22nd annual edition is the definitive source of information on the status of interoperability in Europe.

We have also been central to advancing data sharing in the public sector. And we have both commitment to – and capabilities in – open source, which lays the foundation for interoperability.

Our Public Sector Interoperability solutions harness this expertise to guide organizations through the process of understanding and implementing interoperability – both within and beyond the EU.

To find out more, contact:

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About Capgemini

Capgemini is a global business and technology transformation partner, helping organizations to accelerate their dual transition to a digital and sustainable world, while creating tangible impact for enterprises and society. It is a responsible and diverse group of 340,000 team members in more than 50 countries. With its strong over 55-year heritage, Capgemini is trusted by its clients to unlock the value of technology to address the entire breadth of their business needs. It delivers end-to-end services and solutions leveraging strengths from strategy and design to engineering, all fueled by its market leading capabilities in AI, generative AI, cloud and data, combined with its deep industry expertise and partner ecosystem. The Group reported 2024 global revenues of €22.1 billion.

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