OECD Digital Government Studies

Digital Government Review of Luxembourg

TOWARDS MORE DIGITAL, INNOVATIVE AND INCLUSIVE PUBLIC SERVICES

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BETTER POLICIES FOR BETTER LIVES

Please cite this publication as:
OECD (2022), *Digital Government Review of Luxembourg: Towards More Digital, Innovative and Inclusive Public Services*, OECD Digital Government Studies, OECD Publishing, Paris, https://doi.org/10.1787/b623803d-en.

ISBN 978-92-64-55650-8 (print)
ISBN 978-92-64-98542-1 (pdf)
ISBN 978-92-64-96269-9 (HTML)
ISBN 978-92-64-57406-9 (epub)

OECD Digital Government Studies
ISSN 2413-1954 (print)
ISSN 2413-1962 (online)

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Corrigenda to publications may be found on line at: www.oecd.org/about/publishing/corrigenda.htm.

Foreword

The rapid digital transformation of the society and economy has an impact on citizens' expectations of governments' ability to deliver high-quality services in line with new and existing needs. The purpose of OECD Digital Government Reviews is to assist governments in their digital transformation process, through the provision of guidance for managing opportunities, challenges and risks associated with the use of digital tools and data, as relevant to the specific national context.

With the recent creation of the *Ministry for Digitalisation*, the *High Committee for Digital Transformation,* the *Inter-Ministerial Committee for Digitalisation*, the *Govtech Lab*, and the launch of the *Electronic Governance Strategy 2021-2025*, Luxembourg has recognised digital government as a key strategic priority. Building on these initiatives, Luxembourg is well-positioned to take its digital government transformation further – including by advancing existing efforts and strengthening the work on critical themes such as data and public service design and delivery in the digital age. To ensure the digital transformation of the whole public sector, this Digital Government Review of Luxembourg focuses on four areas:

- strengthening the governance of digital government,
- securing policy levers, digital talent and skills in the public sector,
- treading the path towards a data-driven public sector,
- improving user-driven public service design and delivery.

Conducted at the request and coordination of the Ministry for Digitalisation of the Grand Duchy of Luxembourg and the involvement of national public organisations and peers from Finland, the Netherlands, Portugal, and Canada, this Review is based on the provisions of the 2014 *OECD Recommendation on Digital Government Strategies* [OECD-LEGAL-0406] and on the *OECD Digital Government Policy Framework*.

The policy recommendations presented in this Review are based on the thorough analysis of existing policies and initiatives. They aim to support the Government of Luxembourg in advancing a sustainable digital transformation of the public sector, and fully benefit from digital technologies and data to deliver more digital, innovative and inclusive public services. The OECD stands ready to continue supporting digital government policies in Luxembourg with the implementation of the recommendations elaborated jointly through this Digital Government Review.

This review is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and the arguments employed herein do not necessarily reflect the official views of OECD member countries.

Acknowledgements

The Digital Government Review of Luxembourg was prepared by the OECD Directorate for Public Governance (GOV), under the leadership of Elsa Pilichowski.

The review was produced by the Open and Innovative Government Division (GOV/OIG) led by Carlos Santiso, and under the supervision of Barbara-Chiara Ubaldi, Head of Digital Government and Data Unit.

Chapters 2 and 3 were written by Ethel Tan and Felipe González-Zapata; Chapter 4 was written by Cecilia Emilsson; Chapter 5 was written by Felipe González-Zapata. All chapters benefitted from the strategic orientation and revisions of Barbara-Chiara Ubaldi. Felipe González-Zapata served as the lead co-ordinator of the review. Andrea Uhrhammer and Meral Gedik provided editorial and publication assistance.

This project would not have been possible without the support of the Ministry for Digitalisation (MDIGI) of Luxembourg and the valuable expertise and knowledge provided by the following public officials from OECD countries who acted as peers during the OECD virtual peer review mission in July 2021:

- Mr. Olli-Pekka Rissanen, Lead expert on public ICT, Information Policy Unit at the Information and Communication Technology Department of Public Administration, Ministry of Finance of Finland.
- Mr. John Kootstra, Policy advisor in the Information Society and Government Department, Ministry of the Interior and Kingdom Relations of the Netherlands.
- Mr. Cláudia Gonçalves Barroso, Lead, International Relations Team, Agency for Administrative Modernisation (AMA) of Portugal.
- Mr. Benoit Deshaies, Mr. Michael Taylor, Mr. Robert Trottier and Mr. Jayson McIntosh from the Treasury Board of Canada Secretariat (TBS).

The OECD Secretariat would like to acknowledge the invaluable contribution of all public officials in Luxembourg who participated in the OECD survey, the virtual fact-finding mission, the two capacity building workshops; and who provided their comments to this review. The OECD Secretariat especially thanks Ms. Vera Soares, Government Counsellor at the Ministry for Digitalisation, and the team within the Ministry for their support and close collaboration throughout the whole peer review process.

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Abbreviations and acronyms

AI4GOV	Artificial Intelligence for Government Inter-Ministerial Committee
CTIE	Government IT Centre
DDPS	Data-driven public sector
INAP	National Institute for Public Administration
ME	Ministry of State
MDIGI	Ministry for Digitalisation
OGD	Open government data
OURdata Index	Open, Useful and Re-usable data Index
SIP	Service Information and Press
SMC	Department of Media, Connectivity and Digital Policy

Executive summary

In an increasingly digital context, governments are faced with the challenge of adapting and inventing new ways of better serving citizens. Whether it is paying taxes, proving an identity, or claiming financial support – government services are essential to the lives of people and businesses, and therefore, the digital transformation of these services is too.

This Digital Government Review of Luxembourg was conducted at the request of the Government of the Grand Duchy of Luxembourg with the purpose of supporting digital government transformation in Luxembourg and the ambitions of the Government to deliver more digital, innovative and inclusive public services.

With the launch of the Electronic Governance Strategy 2021-2025 and the creation of the Ministry for Digitalisation (MDIGI), the High Committee for Digital Transformation, and the Inter-Ministerial Committee for Digitalisation, Luxembourg has established a solid foundation for governing and coordinating digital government policies. This new governance approach can play an important role in aligning priorities among ministries and raising awareness about the need to further prioritise digitalisation in a sustainable and coherent manner.

The Government IT Centre (CTIE) continues to play a key role in providing common IT infrastructure, coordinating the central IT budget, and managing digital projects in support of public sector organisations. Although this centralised approach has positive benefits, a more sustainable and effective approach ahead would require increasing ministries' ownership of their digitalisation journeys and decreasing their reliability on the CTIE's resources. The Govtech Lab is a good example of an initiative aimed to help ministries in this process, similarly to the digital advisory service run by MDIGI, and the digital training courses hosted by the National Institute for Public Administration (INAP).

Knowing that data is one of the most important assets of digitalisation, Luxembourg is working to improve the management and use of data through policies and standards such as the National Interoperability Framework (NIF) and tools and platforms provided by the CTIE. However, a dedicated data strategy could help further clarify roles and responsibilities on data management across the public sector. Moreover, actions such as designing a national data architecture framework and improving the visibility of existing data standards and tools could help promote data quality and exchange, which would support data interoperability and implementation of the Once-Only Principle.

Finally, being a digital government implies rethinking public service design and delivery in the digital age. Initiatives such as the website and app MYGUICHET.LU and LET'S SIMPLIFY TOGETHER!.LU demonstrate the ambition of Luxembourg to improve the user experience with public services, ensure services are inclusive, and simplify access. At the same time, more focus could be directed towards designing integrated services, increasing the awareness of user journeys, adopting agile methodologies, and establishing communities of practices to work together in teams across government.

Key policy recommendations

Contextual factors and institutional models for digital government

- Leverage the contextual factors of Luxembourg's political and administrative culture and structure to support the digital government agenda, including its digital maturity, diverse population, and centralised administration.
- Strengthen the mandate and role of the Ministry for Digitalisation as the organisation-in-charge of co-ordinating efforts and building coherence in the development of a digital government.
- Prioritise further co-ordination and co-operation around digital government policies and projects through the High Committee for Digitalisation, the Inter-Ministerial Committee for Digitalisation, and the Govtech Lab.

Policy levers, talent and skills for digital government

- Strengthen the strategy and plan for digital government through the use of key performance indicators (KPI) and develop a publicly available monitoring tool to track progress of the implementation of the Electronic Governance Strategy 2021-2025 and roadmap.
- Use the new digital advisory service to support ministries and public sector organisations in defining their digital strategies to align with national standards and priorities.
- Promote the adoption and use of common policy levers for digital government investments that support alignment and agility in the implementation of ICT/digital projects, including agile project management and innovative public procurement mechanisms.
- Increase transparency of the CTIE's digital project management by publishing its project portfolio and pipeline and providing simple guidance on the prioritisation selection criteria for digital projects.
- Consider developing mandatory trainings both for public sector leadership and digital/data professionals in government on skills that are core to digital leadership and digital government project implementation.

Treading the path towards a data-driven public sector

- Develop and publish a national public sector data strategy with concrete objectives and milestones covering the different elements of the OECD data-driven public sector framework; and integrate existing provisions that currently are spread across the Electronic Governance Strategy 2021-2025, the National Interoperability Framework, the Open Data Strategy, and the national AI strategy.
- Improve the tactical capacity of ministries and public sector institutions to better manage and use data by developing ministry-level data strategies and designating data steward roles within each ministry.
- Develop a national architecture framework for basic data to support data standardisation and exchange of base register data and achieve related objectives such as the once-only principle.
- Support ministries and public sector institutions in generating value through data use by encouraging their application to 1) anticipate and plan; 2) deliver; and 3) monitor and evaluate performance related to services, internal processes, policy- and rulemaking.
- Secure trustworthy management and use of data in the public sector by providing common guidance on data ethics, data quality, transparency, privacy protection, and digital security.

Building user-driven public service design and delivery in the digital age

- Strengthen the strategic vision across the public sector to inspire a user-driven and omni-channel service design and delivery approach across ministries and public sector institutions.
- Foster an agile mind-set and culture that support the development of user-driven services by increasing awareness about the importance of service design, sharing practices and data related to services, and creating communities of practice for service designers.
- Empower ministries and public sector institutions to be more autonomous in the digitalisation of government services by providing common guidelines, service standards and digital enablers that also help secure coherence and alignment across the public sector.

1 Assessment and recommendations

This chapter presents the assessment of the state of digital government in Luxembourg, based on the analysis undertaken as part of this review. It also includes concrete recommendations which aim to support Luxembourg in advancing the digital transformation of the public sector. The assessment and recommendations are structured around four areas: 1) contextual factors and institutional models; 2) policy levers, talent and skills for digital government; 3) data-driven public sector; and 4) public service design and delivery in the digital age.

Contextual factors and institutional models for digital government in Luxembourg

Overall political and administrative culture and structure

The political and administrative culture and structure of Luxembourg provide a favourable environment for advancing the digital government transformation. The Government Coalition's Agreement for the period 2018-2023 identifies digitalisation as a top political priority of the current government led by Prime Minister Xavier Bettel. With its relatively centralised government structure and close collaboration within and across government levels, Luxembourg has a good opportunity to establish a joined-up, whole-of-government approach to digital government policies to improve public services, and as a result citizens' overall experience of government.

The political priority awarded to digitalisation in Luxembourg is also backed up by an ambitious agenda at the European Union (EU) level. Several EU policies, directives and regulations are currently helping push forward Luxembourg's digital government efforts. These include the update of the national digital identity framework through eIDAS and the newly adopted Data Governance Act. Luxembourg actively participates and shapes regional policy agendas on digital government, such as the case in developing experimentation ecosystems for digital entrepreneurs, start-ups, and innovators in the public sector (govtech). This approach nurtures a pioneering culture within Luxembourg's public sector that can help advance other relevant policy areas within government digital transformation.

Socio-economic factors and digitalisation context

The highly developed economic, social, and technological environment in Luxembourg also provides a strong foundation for the digital government transformation. The country is a service-oriented economy, with services accounting for more than 80% of its gross domestic product (OECD, 2021[1]). Luxembourg also performs above average in indicators on digital infrastructure such as internet penetration and connectivity compared to both EU and OECD countries, underlining the importance of having a mature digital policy to align the efforts of different stakeholders - from the public and private sectors - to collaborate towards the achievement of digital transformation goals.

The demography of Luxembourg shows the relevance of ensuring well-designed and inclusive public services in the digital age. With a total population of 632 275 people, foreigners from more than 170 different nationalities make up 47% of Luxembourg's inhabitants. As a landlock country neighbouring France, Germany, and Belgium, 197 200 regular commuters travel to Luxembourg to work (STATEC, 2021[2]). Citizens in Luxembourg also trust its public sector significantly more compared to other OECD countries, and the government places inclusiveness very high within domestic policies and initiatives.

Given the predominant role of digital technologies in Luxembourg's economy, the country has developed several policies to promote and tap on the digital transformation of its society, economy and government. Prospects for technology deployment and adoption are higher in comparison to EU and OECD indicators, which creates a positive environment for digital innovation and engagement with start-ups and entrepreneurs. The country also actively promotes the uptake and integration of cutting-edge digital technologies (e.g., AI, IoT, Blockchain) into public governance and business models. Within this context and developments, Luxembourg can leverage this excellent environment to continue embracing a user-driven approach that can help securing increased use of digital government services and strengthen its capacity to leverage digital technologies and data to anticipate service needs (OECD, 2022[3]).

Macro-structure and leadership on the digital government agenda

In Luxembourg, the Prime Minister has taken himself the digital transformation portfolio through the creation and leadership of the Ministry for Digitalisation (MDIGI). Policies related to the digital transformation of the public sector are under the remit of MDIGI, while the implementation of most initiatives are under the responsibility of its execution arm, the Government IT Centre (CTIE). The CTIE builds on a long-standing tradition of IT service provision in Luxembourg's government, as well as on a positive reputation and recognition by ministries and administrations of its support to their digital needs. Working in tandem and in close collaboration and consultation with ministries and administrations, the CTIE and MDIGI developed the Electronic Governance Strategy 2021-2025 that currently frames the development of digital government in Luxembourg.

The leadership of MDIGI and CTIE to advance the digital transformation of Luxembourg's government is especially important given the relatively limited awareness and capacities of ministries and administrations to lead their own digital transformation journeys. The OECD mission observed that ministries and administrations are sometimes on different paths and with different understanding of the needs and vision for their digitalisation processes. Building a sustainable digital government would therefore be supported if MDIGI and CTIE could use their leadership role to further clarify the government's vision and what the expectations are for ministries and administrations to follow this. In this sense, the OECD welcomes the announcement of a service for consultancy for digitalisation for ministries and public sector organisations offered by the MDIGI.

Co-ordination and collaboration within the public sector and ecosystem

A sustainable and legitimate digital government policy benefits from increased collaboration and partnerships with stakeholders from across the public- and private sectors, and civil society. Within the public sector, Luxembourg's digital government ecosystem builds upon the advisory role of the Inter-Ministerial Committee for Digitalisation, which was established for organisational and technical co-ordination in the development and implementation of the Electronic Governance Strategy 2021-2025. Under the leadership of MDIGI and CTIE, it brings together representatives from all ministries on a regular basis to advise on the technical implementation of the strategy, and it serves as an opportunity to share good practices and initiatives currently developed in Luxembourg's public sector. However, further efforts are needed to enable high-level co-ordination to ensure the alignment and prioritisation of initiatives within individual ministries to fulfil the digital government strategy. The launch of the High-Committee for Digital Transformation is welcomed as it goes in the right direction to secure top-level alignment and prioritisation. The High-Committee brings many ministers in Luxembourg together and provides a space for collective discussions on digital government priorities. In light with the need to make ministries and administrations more aware and empowered for increased ownership of their own digital transformation journeys, the High-Committee can also serve as a mean to create this shared sense of responsibility and accountability.

This would be particularly relevant considering the number of services provided by municipalities in Luxembourg and the expected more aligned and cohesive experience of users when accessing public services – regardless the channel and level of government. There are also several working groups to advance key policies for digital government, for example for the implementation of the National Interoperability Framework (NIF), AI and ethics. At operational level, the limited availability of instances for peer learning and sharing of good practices constrain a cohesive and collaborative implementation of the digital transformation strategy. This is the case on core pillars of the Electronic Governance Strategy 2021-2025 such as service design and delivery, open government data, data reuse or other common priorities.

Finally, Luxembourg has an opportunity to leverage its dynamic broader digital ecosystem to support the digital needs of ministries and administrations. Given the solid IT private sector and the role of digital innovation and emerging technologies in the country's economy, MDIGI and CTIE have found in the Govtech Lab a pioneer initiative to bridge the needs of ministries and administrations with digital

entrepreneurs, start-ups and innovators that have better capacities to absorb innovative technologies to transform public services in a more agile, flexible, and dynamic way. The Govtech Lab is helping address some of the cultural and procedural challenges existing to embed agility, collaboration, and experimentation in the public sector.

Proposals for action

In light of the key assessments elaborated above, which draw on the main findings and analysis included in Chapter 2 of this review, the Luxembourg government could consider implementing the following policy recommendations:

1. **Leverage the contextual factors regarding Luxembourg's political and administrative culture and structure to support the digital government agenda.** The following priorities can be considered:
   a. Strengthen the institutional foundations for digital government to secure long-term and innovative digital government policies and their independence from political cycles and changes.
   b. Build on Luxembourg's relatively high level of administrative centralisation at the national level to improve coherence, integration and alignment in digital government development.
   c. Continue supporting and being aligned with the digital agenda, legislations and policies of the EU – with the aim of advancing digital government maturity.
2. **Reinforce policy efforts in economic, societal and technological development as the basis for fostering a stronger digital government ecosystem.** The following priorities can be considered:
   a. Ensure a better alignment between the government's strategies and plans for building up the ICT/digital industry sector and those for digitalising the public sector to build synergies through public-private partnerships (e.g. on R&D, talent and skills, open data, public service design and delivery).
   b. Continue to demonstrate use cases and the value of adopting new technologies in the public sector and engage SMEs and GovTech communities in this process to gain their support in co-developing digital government services.
   c. As is already a high priority, continue to pay attention to various needs, preferences and cultural norms of different population groups in Luxembourg, and actively communicate and engage with them given the great diversity and cross-border mobility of the population and workforce.
   d. Capitalise on citizens' high trust in government to further promote openness, transparency, integrity, accountability and stakeholder engagement in the digital transformation of the public sector that requires a whole-of-government effort.
3. **Strengthen the mandate and the role of the MDIGI as the organisation-in-charge of co-ordinating efforts and building coherence in the development of a digital government.** The following should be considered:
   a. Empower public sector organisations to produce their own digital transformation plan (i.e. vision, strategy, roadmap) – in consultation with MDIGI and CTIE.
   b. Continue promoting a culture of shared leadership and responsibility between MDIGI and the other ministries and administrations to strengthen digital government maturity.
   c. Provide strategic advisory services to ministries and administrations in the implementation of the digitalisation strategies and actions plans, including the Electronic Governance Strategy 2021-2025.

4. **Prioritise the further development of co-ordination and co-operation arrangements and mechanisms among public sector organisations.** The following should be considered:
    a. Invite the members of the new High-Committee for Digital Transformation to provide opinions and share experiences or challenges experienced and analyse this respective input in upcoming digital government initiatives to ensure broadest alignment across government for the digital government agenda.
    b. Use the High-Committee for Digital Transformation to raise awareness about digital government across government and increase the ownership of ministries for the successful implementation of the Electronic Governance Strategy 2021-2025.
    c. Expand the scope of discussion by the Inter-Ministerial Committee for Digitalisation to cover the development of digitalisation strategies and action plans in consultation with all ministries and administrations, to increase engagement and alignment with institutional needs.
    d. MDIGI and CTIE may consider establishing more formal means of collaboration with relevant local government representatives or their respective IT service provider, including notably SIGI, for the development or revision of digital government policies and initiatives.
    e. Strengthen accountability mechanisms to guarantee that the Electronic Governance Strategy 2021-2025 and other digitalisation policies are implemented correctly and according to plan by all public sector organisations.
    f. Use lessons and insights from the Govtech Lab to identify further actions that can foster increased collaboration between the public sector and digital entrepreneurs, start-ups and innovators.

Policy levers, talent and skills for digital government in Luxembourg

Policy levers

Policy levers for digital government are hard and soft instruments that policymakers can leverage to enable broad change in the public sector in a coherent manner, from the definition of a strategy to its implementation. In the E-Leaders Handbook on the Governance of Digital Government, the OECD defines four core policy levers for digital government transformation: 1) strategy and plan; 2) project management tools; 3) financial management mechanisms, and 4) regulations and standards (OECD, 2021[4]).

Luxembourg's national digital government strategy – the Electronic Governance Strategy 2021-2025 – was formulated by the MDIGI and CTIE and adopted in 2021 by the Government. Since then, an implementation roadmap has been shaped in coordination with other ministries. While the electronic governance strategy is comprehensive, it will be important to continue existing efforts to secure awareness among the different stakeholders on how the strategy relates to other existing government plans in the broader area of digitalisation – including the government's AI Vision, the National Plan for a Green, Digital and Inclusive Transition, the Recovery and Resilience Plan, and the National Plan for Digital Inclusion.

Looking from an institutional perspective, it was noted through this review the often-diverse capacities and digital maturity of ministries and public sector organisations, which can cause a challenge to securing a whole-of-government and coherent digital transformation. Moreover, relatively few of the surveyed ministries and organisations are fully aware of the development and organisational implications of the Electronic Governance Strategy. The Ministry for Digitalisation and CTIE are working to address this issue through co-ordination mechanisms such as the recently launched High-Committee for Digital Transformation (strategic co-ordination) and the Inter-Ministerial Committee for Digitalisation (operational co-ordination). Furthermore, MDIGI and CTIE are working towards launching an advisory service to

support public sector organisations when defining their own institutional digital transformation strategies to ensure alignment with national standards and priorities.

Besides strategy and implementation plans, common project and financial management tools and mechanisms including standardised business cases, agile project management methodologies, public procurement processes, budgeting and co-funding mechanisms are key to drive forward and deliver alignment in the digitalisation process. In Luxembourg, around half of ministries and public sector organisations claim to be developing business cases or other value proposition assessment for digital government projects. Similarly, they indicate being aware of a standardised model for digital government project management. Around 65% claim that there exists a central strategy for ICT/ digital procurement within the public sector. Yet, given the central role of procurement and project and financial management for sustainable digital government projects, the findings show that more could be done to increase awareness among all public sector organisations of existing standards and processes developed primarily by the CTIE. The important role of the CTIE in this area and the fact that most public sector organisations are relying on its support comes with positive implications but also some challenges. For example, with the large number of digital projects ongoing the CTIE also needs greater capacity to meet the needs of ministries and public sector organisations while empowering them to work more autonomously. This includes communicating even further existing standards and tools, but also increasing the transparency of the CTIE's internal working methods and methodologies, including the existing project portfolio and prioritisation and selection criteria for digital projects.

Given the current concentration of digital government project management under CTIE and the large number of projects being implemented, the pace of project delivery is a challenge that could be aided by introducing more agile project management. Agile project management includes increasing transparency about projects and introducing more horizontality and iterative approaches to project development. The launch of the Govtech Lab with calls for projects and pilots is an excellent example of introducing this approach.

Concerning Luxembourg's approach to digital government investments, the centralised but flexible budget controlled by the CTIE is a positive example of a system for matching policy priorities with budgets. However, there are challenges regarding planning and monitoring of ICT/digital projects that are not prioritised and implemented by the CTIE which may cause duplication of initiatives and shadow IT costs. When it comes to procurement, Luxembourg benefits from the availability of EU normative instruments, including for promoting innovation partnerships, dynamic purchasing systems, competitive dialogues and centralised procurement exercises that are available to all public sector institutions in Luxembourg thanks to the EU Directives 2004/18/EC and 2004/17/EC. Building on these efforts there can be opportunities still to embed more agile approaches to ICT/digital public procurement.

Finally, when it comes to regulations and standards for digital government, Luxembourg follows several regulations and directives established as part of the EU Single Digital Market strategy. During the mission, several public sector organisations however highlighted the need to improve the national regulatory framework for digital government, including in areas such as data exchange and data sharing. Also, while the CTIE provides a large number of digital services and products they do not have the mandate to provide legal and regulatory assistance concerning them. The need for more standards and normative instruments to complement the existing regulations has also been highlighted as an important factor to support ministries and public sector organisations in taking more responsibility and can help encourage the integration, harmonisation and collaboration on digital government projects across the public sector.

Digital talent and skills in the public sector

The OECD Framework for Digital Talent and Skills in the Public Sector (OECD, 2021[5]) provides a conceptual framework for what public servants and leaders need in order to secure a digital public workforce which can shape and implement digital government transformation. The framework, which is

based on international best practices, has three pillars: 1) create and environment to encourage digital transformation; 2) skills to support digital government maturity; and 3) establish and maintain a digital workforce.

Over the past few years, Luxembourg has been prioritising the development of digital talent and skills in the public sector and in society. The ownership of the policy agenda for digital talent and skills is currently shared among several actors, as opposed to the digital government agenda more broadly which is led by MDIGI and the CTIE. There is a long list of projects currently ongoing to strengthen digital talent and skills in the public sector, including the Digital Academy, the AI Academy, and the Digital Leadership Programme run by the National Institute for Public Administration (INAP), as well as the Future Skills programme run by the National Employment Agency (ADEM). INAP is currently also looking to further develop a plan and digital skills training to support public servants in upskilling and reskilling while ensuring it is aligned with the objectives of the strategy for digital transformation.

The review also shows that more than half of ministries and administrations have initiatives in place to develop digital talent and skills, such as communities of practice, providing networking and mentoring, and developing skills and competencies for data and digitalisation for public servants. At the same time and in contrast, the review findings show that only 15% and 33% of the surveyed ministries and public sector organisations respectively see improving digital talent and skills as a very high or high priority.

Proposals for action

In light of the key assessments elaborated above, which draw on the main findings and analysis included in Chapter 3 of this review, the Luxembourg government could consider implementing the following policy recommendations:

5. **Strengthen the strategy and plan for digital government.** The following measures should be considered:
    a. Make the roadmap for the Electronic Governance Strategy 2021-205 more visible to all key stakeholders, for example communicating it broadly to ministries and public sector organisations who do not actively participate in the Inter-Ministerial Committee for Digitalisation, as well as to the wider community to increase awareness about purpose, scope, and relevance to different public sector organisations and external stakeholders.
    b. Strengthen the key performance indicators (KPI) system and develop a publicly available monitoring tool to track progress of the implementation of the strategy and roadmap.
    c. For the next iteration of the Electronic Governance Strategy, involve more public sector organisations in designing the strategy, and accompany the strategy with ministry-level strategies and plans to ensure broad alignment and buy-in across government.
    d. Use the new digital advisory service to support ministries and public sector organisations in defining their digital strategies to align with national standards and priorities.
6. **Secure the use of common project and financial management tools and mechanisms.** The following measures should be considered:
    a. Improve the deployment, use and communication of existing project and financial management tools and mechanisms for digital projects among ministries and public sector organisations.
    b. Increase the transparency of CTIE's internal work and decision-making processes around digital project management, including by publishing the project portfolio and pipeline, providing simple guidance on the prioritisation selection criteria for digital projects, and publishing the roadmap and plans for digital government projects.

c. Increase the capacity of the CTIE to oversee projects that are implemented directly by public sector organisations to secure adherence to digital standards and increase coherent spending on ICT/digital in the public sector.

d. Create templates for developing business cases for digital projects and mandate the use of the templates in the planning of digital projects throughout the public sector.

e. Leverage data from the Quapital IT Portfolio system and projects not in this system to increase the standardisation and accountability for digital project implementation by developing and embedding performance indicators into individual digital project plans and making these openly available for each project.

f. Leverage the Govtech Lab and similar mechanisms to promote agile approaches to digital project management that encourage testing, flexibility, and responsiveness to feedback in the iterative development of digital products and services.

g. Create communities of practice that foster a bottom-up approach for sharing good practices and identifying common challenges that can be shared with and tackled by the MDIGI and CTIE.

h. Increase the use of innovative and agile approaches to public ICT/digital procurement such as innovation partnerships and competitive dialogues to foster a more dynamic IT sector as well as to reduce existing processing times of regular procurement exercises such as open tender procedures.

7. **Establish a solid regulatory framework and standards for digital government.** The following measures should be considered:

   a. Create a service through MDIGI/CTIE that provides legal and regulatory assistance specific to the digital products and services the CTIE provides/helps develop or those developed independently by ministries and public sector organisations. Use this service also to identity gaps in the regulatory framework for digital government and address where possible.

   b. Build on the success of the National Interoperability Framework and put in place common standards such as technology codes of practices and ethical principles for digital government projects. The standards should be friendly and easy to use for all public sector organisations.

   c. Create a national open toolbox of common standards and good practices for digital government projects. Collaborate with stakeholders to foster uptake and alignment of the standards, including the Inter-Communal Informatics Management Association (SIGI) at the municipal level, to support also the digitalisation of local governments.

8. **Foster digital talent and skills in the public sector.** The following measures should be considered:

   a. Ensure continued coordination and collaboration between INAP and MDIGI around the development of digital skills and talent in the public sector. Together, the INAP and MDIGI could coordinate the development of a strategy for digital talent and skills in the public sector that aligns with the Electronic Governance Strategy 2021-2025.

   b. Focus on the continued development of the national education system and lifelong learning programmes for civil servants to include digital and data skills.

   c. Consider developing mandatory training courses both for public sector leadership and digital/data professionals in government on skills that are core to digital leadership/digital government project implementation.

   d. Ensure that digital skills and talent is covered in the digital strategies developed by individual ministries and public sector organisations through the digital advisory service run by MDIGI and CTIE.

Treading the path towards a data-driven public sector in Luxembourg

Data governance

The OECD's conceptual framework for data governance in the public sector encourages public sector organisations to govern data as a key strategic asset. It emphasises the need to establish a common framework and adopt a common strategy and sound rules to secure effective leadership, coordination and collaboration, as well as the availability of skills, and of robust data infrastructure and architecture.

In the Electronic Governance Strategy 2021-2025, the Luxembourg government expresses an ambition for data in the public sector, which is also covered in Luxembourg's Open Data Strategy, the National Interoperability Framework (NIF), the Data-Driven Innovation Strategy, and the national AI strategy. In this sense, the challenge for the Luxembourg government is not the absence of a strategy covering data in the public sector, but rather the insufficient consolidation of efforts across the public sector that appear too disparate, due to the absence of clear objectives and expectations which can impact effective implementation. The Ministry for Digitalisation (MDIGI) is well-positioned to try to lead the improvement of this work, in collaboration and consultation with relevant parties and existing committees.

Alongside strategy, robust yet fit-for-purpose rules and guidelines are necessary for a DDPS. More could be done to make the current regulatory framework in Luxembourg responsive to the needs of ministries and public sector organisations as they seek to improve data access and sharing, and to ensure the availability of guidelines and standards related to data management. Furthermore, there are general concerns of insufficiently available adequate human resources and skills across ministries and public sector organisations for independently managing and using data consistently, with negative impact on data quality and interoperability. As the work with data intensifies across the Luxembourg public sector, it is essential to develop these talents and skills, and enhance those already existing. The work of the Digital Academy and INAP will be essential for this to happen.

As mentioned above, data infrastructure and architecture are fundamental to drive a DDPS. The Government IT Centre (CTIE) is highly appreciated in providing common infrastructure for safely storing, processing, analysing, and exchanging data across the public sector, allowing ministries and administration to direct their resources more to their primary tasks. However, ministries and administrations have indicated they are not always aware of these platforms, tools and resources. It was also emphasised in the review that ministries and public sector organisations still to a large extent manually download and share data (as opposed to using machine-to-machine interaction).

Finally, data interoperability and the once-only principle are major priorities for the Luxembourg government, with several of the NIF recommendations targeting these specific areas. In the course of this review the insufficient availability of common standards and semantic rules was highlighted as important challenge for enabling data exchange between ministries and public sector organisations. Moreover, improving master data management was raised as a critical need. Ongoing efforts have been initiated as part of the NIF working groups to support the development of basic data frameworks and management of authentic data sources, and the Luxembourg government could focus on ensuring the continuation of these efforts. Finally, the Luxembourg government has for many years been successful with open geospatial data while the general performance in open government data has been falling behind. In 2019, Luxembourg ranked 23 out of 34 OECD countries and 13 out of 21 EU Member States in the OECD OURdata Index. Ministries and administrations currently see insufficient resources and deficient data governance as the major obstacles for them to further publish open data. Hopefully, new developments at both EU level and under the Ministry for Digitalisation will help tackle these challenges.

Applying data to generate value

The second part of the analysis on DDPS covered in the review focuses on how public sector organisations in Luxembourg use data to deliver value as part of either forecasting or planning; delivery of services or implementation of policies; or in making retrospective analyses such as on policies' impact assessments.

In Luxembourg, data from base registries is the second most common data source among surveyed ministries and public sector organisations, after data collected directly by the public sector organisations itself. Most ministries and public sector organisations use data to anticipate and deliver government interventions, including evidence-based policy making. Yet fewer are using data to evaluate and monitor government interventions, including regulatory impact assessments, auditing, and to demonstrate return on investment. As such one takeaway is to improve the use of data to evaluate and monitor government interventions and their impact.

Finally, the review highlights the large interest that the Luxembourg government sees in artificial intelligence (AI), as an increasingly important tool for processing and analysing large volumes of data. With the launch of the national AI strategy in 2019 and the AI4Gov inter-ministerial committee, comprised of the Ministry for Digitalisation and the Ministry of State (Department of Media, Connectivity and Digital Policy and Service Information and Press) Luxembourg has taken a big step forward in this area. The AI4Gov Committee has launched several calls for pilots using AI in the public sector, e.g. like the one completed by the National Library.

Data and trust

The final aspect of the OECD DDPS Framework analyses the relationship between data and trust, focusing on data ethics, privacy, consent, transparency and security. The Luxembourg public sector is well-equipped to perform in this area, with citizens in Luxembourg having high confidence in their government compared to other countries. As shown in a study commissioned by the Luxemburg government, Luxembourgish citizens also have higher confidence in the public sector's use of artificial intelligence compared to the private sector. While the Luxembourg government has made considerable achievements around privacy and consent (e.g., making personal attributes visible on MyGuichet.lu) and digital security (standardised and centralised by CTIE), the review reveals some challenges with regards to promoting data ethics and trustworthy data management among ministries and public sector organisations, supporting GDPR compliance, and the need for increasing overall transparency about the use of data, algorithms, and emerging technologies.

In relation to trustworthy data management, insufficient consistency in data management, and low-quality data have been raised as issues, together with unclear accountability for data management across the public sector. Furthermore, an understanding of data ethics beyond GDPR-compliance and personal data protection is seemingly lacking among most surveyed organisations. However, it can be stressed that GDPR-compliance is seen as one of the primary difficulties to enhancing trust in the use of data inside the public sector by both ministries and public sector organisations. The current guidance is not seen as sufficient to support more sophisticated use of data by data-related experts, and therefore discourages such use.

Proposals for action

In light of the key assessments elaborated above, which draw on the main findings and analysis included in Chapter 4 of this review, the Luxembourg government could consider implementing the following policy recommendations:

9. **Define leadership roles and strengthen the strategic vision for data in the public sector.** The following measures should be considered:
    a. Develop and publish a national public sector data strategy with concrete objectives and milestones covering the different elements of the OECD DDPS framework; and integrate and consolidate as part of the new strategy the existing provisions related to DDPS that currently are spread across the Electronic Governance Strategy 2021-2025, the National Interoperability Framework, the Open Data Strategy, and the national AI strategy.
    b. Assign MDIGI as the ministry responsible for formulating policies for DDPS and the data strategy (9a.). This should connect DDPS with the existing work on digital government of the Ministry and assign clear leadership for the DDPS agenda at ministry level.
    c. Assign MDIGI/CTIE as the organisation in charge of coordinating the implementation of the data strategy (9a.) together with ministries and public sector organisations (10a., 10d.).
    d. Develop and publish a concrete action plan for implementing the national public sector data strategy (9a.). The action plan should include measurable KPIs for monitoring implementation.
    e. Depending on who will be the leading organisation-in-charge of the data-driven public sector agenda, consider integrating the unit in charge of open data under this organisation to better associate the two strictly linked work streams.
10. **Improve the tactical capacity of ministries and public sector organisations to better manage and use data.** The following measures should be considered:
    a. If a data strategy is developed, the organisation-in-charge of the data agenda could consider requesting each ministry to develop and publish their own roadmap that aligns with the national public sector data strategy (9a.) and action plan (9d.), while being adjusted to their specific mission and objectives.
    b. Consider mandating the establishment of a data steward role in each ministry and public sector organisation. The data steward role should oversee the implementation of the data strategy (9a.) and roadmap (10a) and would take responsibility for promoting and overseeing the work related to the DDPS framework within the respective ministry or public sector organisation.
    c. Establish a data steward's network for each ministry and public sector organisations data steward (10b.), ensuring it aligns its work with existing committees and coordination mechanisms. The network should help promote, at a more operational level, increased collaboration and the finding of synergies between public sector organisations and ministries to support the implementation of the data strategy (9a.). MDIGI/CTIE could coordinate the network and report to the Inter-Ministerial Committee for digitalisation.
    d. Conduct a study of (existing and future) data needs across ministries and public sector organisations and the barriers that exist to meet those needs. Use the study to evaluate the current legal- and policy framework for DDPS and take steps to improve it where necessary, taking a comprehensive approach and avoiding patchwork regulatory measures.
    e. Enhance data-related skills of public sector employees already experienced working with data by developing mandatory training courses as part of the Digital Academy.
    f. Establish a specific department at the MDIGI/CTIE that can support ministries and public sector administrations with data-related projects as short-term or unexpected needs arise. This should

help ease the workload during specific projects for the CTIE and support the decentralisation of data-related skills and talent.

11. **Develop a national infrastructure- and architecture framework for data in the public sector to develop a more mature data-driven public sector and achieve related objectives, such as the once-only principle.** The following measures should be considered:
    a. Develop a national architecture framework for basic data.
    b. Develop a national framework for data management and data exchange. Create an easily accessible and well-communicated catalogue of available data, data standards, metadata standards, specifications, semantic rules, and information models.
    c. Collaborate closely with SIGI in the development of the national data infrastructure and architecture to improve interactions, transactions, and service design and delivery also at local and regional levels of government, and between levels of government.
    d. Continue the development of data infrastructure and platforms that support the automation of data exchange and data analytics across and within ministries and public sector organisations. Ensure that new platforms and tools are well-communicated and train data professionals in how to use them.
12. **Support ministries and public sector organisations in generating value through data use by encouraging their application to 1) anticipate and plan, 2) deliver, and 3) monitor and evaluate performance related to services, internal processes, policy- and rulemaking.** The following measures should be considered:
    a. Incentivise active use of data across ministries and public sector organisations for regulatory impact assessments.
    b. Incentivise active use of data for monitoring the performance of policies and services, and to evaluate them against established benchmarks and performance metrics. Be transparent about performance by publishing and updating performance data as open data and visualisations on data.public.lu.
    c. Increase the strategic use of large volumes of data inside the public sector by continuing to support the adoption of Artificial Intelligence and algorithms, including but not limited to automated decision-making.
    d. Promote greater experimentation with data in the public sector, and development of more scalable AI applications that can be used across ministries and public sector organisations.
13. **Secure trustworthy management and use of data in the public sector by strengthening the work on data ethics, data quality, transparency, privacy protection, and digital security.** The following measures should be considered:
    a. Increase the awareness and understanding of data ethics among ministries and public sector organisations
    b. Direct efforts towards improving data quality and integrity across the public sector, including by ensuring that data that feeds into AI and other applications is representative
    c. Develop frameworks and mechanisms to secure the transparency of algorithms and automated decision-making used in the public sector.
    d. Develop guidance on data ethics and establish a role or function that supervises the implementation of data ethical practices in the public sector, not restricted to AI-related applications.
    e. Provide support to ministries and public sector organisations to comply with the General Data Protection Regulation.

i. Strengthen the mandate of the existing network of ministry-level DPOs including by jointly monitoring and developing guidance and training on data protection to data professionals in government.

ii. Ensure that each DPO within ministries has sufficient resources (incl. skills, time, and physical presence) to support public servants and data professional as they need it.

iii. Develop practical guidance and awareness campaigns to support public sector organisations in complying with the GDPR while working on data-related projects, including more advanced projects. Target those that are already experienced in working with data.

Building user-driven public service design and delivery in the digital age in Luxembourg

The OECD vision on service design and delivery promotes a comprehensive approach to understand user needs and meet them through responsive and trusted public services. It encourages a digital-by-design mindset that establishes the governance, capacities, culture, and enablers for public sector organisations to harness the benefits of digital technologies and data and transform public services. Unlike traditional top-down methods that interpret user needs and journeys, it encourages a bottom-up approach that builds upon the experiences, expectations and needs of diverse users to provide responsive services.

Luxembourg has worked for several years to improve people's life through digitally enabled government services. The Ministry for Digitalisation (MDIGI) and Government IT Centre (CTIE) have been playing a key role in helping ministries and administrations to have equal access to digital tools and capacities to digitalise their internal processes and services. However, as part of this review it was also observed that neither the CTIE has the capacity to cover all digital developments in Luxembourg's public sector nor are ministries and public sector organisations administrations equipped to be more autonomous in their digital transformation journeys towards improved public service provision. This situation requires specific actions to secure a sustainable and scalable digitalisation of government services. Similarly, further efforts are needed to consolidate a common vision and capacities across ministries and administrations regarding the central role awarded to users in shaping rather than informing the design and delivery of services.

Context for public service design and delivery

The government services agenda is core for MDIGI and the CTIE, materialised in the relevant role awarded in the Electronic Governance Strategy 2021-2025. The strategy is defined under the principles of inclusiveness, convenience and the transition towards a digital-by-design culture and practice, providing a vision for ministries and public sector organisations to use digital tools and data to improve service delivery in the country. The leading role of the MDIGI and the CTIE are basal conditions for Luxembourg to move in this direction.

This strong political mandate and environment for service transformation is backed by the advanced level of digitalisation of Luxembourg's society and economy reflected in above-average indicators on digital skills and internet penetration within Europe and globally. Developing more inclusive and responsive government services is critical to continue making Luxembourg an attractive country for investors and foreign workforce. Consequently, cross-border and mutual recognition of services and digital enablers (such as digital identity) are a growing concern for MDIGI and the CTIE.

The cornerstone of the public service agenda is the centralised informational service delivery platform GUICHET.LU; and its transactional version MYGUICHET.LU (available in both web and mobile formats). Together, they serve as single entry point for citizens, businesses and migrants to access government services online, and are recognised as a consolidated brand for service delivery in the country. While the online experience of users is consistent across ministries and administrations when accessing a service

through GUICHET.LU, on-site services remain largely operated according to institutional procedures and culture which may provide a different experience to users between channels and across public institutions. This experience is influenced by the strong paper-based mindset still observed across ministries and administrations, and the subsequent limited awareness and capacities to rethink processes and services based on a meaningful understanding of user needs.

Philosophy for public service design and delivery

The service design and delivery agenda builds upon the leadership and capacity of the MDIGI and the CTIE. Together, and in coordination with ministries and public sector organisations, have set provisions in the Electronic Governance Strategy 2021-2025 that call for a paperless administration while remaining inclusive to maintain and cultivate in-person service delivery channels. Establishing a common vision and rationale for user-driven service design and delivery is urgent for Luxembourg to accelerate the transition towards a digital-by-design public sector. The recently launched High-Committee for Digital Transformation and the existing Inter-ministerial Committee for Digitalisation can serve as a space for the Ministry and the CTIE to further permeate the vision expressed in the strategy and make sure ministries and administrations are aligned to achieve this ambition.

Along with a concerted vision for transforming public services, it was observed that ministries and administrations do not have a common culture, practice and capacities to research and understand user needs. Despite the role of the CTIE in helping close this gap, further efforts are needed to make ministries and administrations capable of conducting user research as opposed to dominant top-down and interpretative approaches to identifying user needs. Such capacities are needed for Luxembourg in the challenge of accelerating the digitalisation of the public sector and to adequately rethink services and rationalise underpinning processes from an end-to-end perspective (from the moment a need emerges until is solved).

Finally, for ministries and administrations to embed and cultivate a culture around user needs, they need to be open to experiment, iterate and learn. The review process revealed that most ministries and administrations are not aware of and equipped to adopt agile management approaches in their digitalisation processes and the transformation of their services. Promoting agility and digital innovation are pivotal for public sector institutions to think out of the box to meet their digital needs either developed in-house, in collaboration with the CTIE or outsourced to the private sector. The ongoing work of the Govtech Lab to create a concrete space of experimentation, agility and innovation can be a catalyst for a more collaborative and agile approach in addressing the digital needs of ministries and administrations and can empower them to increase collaboration within and outside the public sector.

Key enablers to support better public service design and delivery

The work of the MDIGI and the CTIE to materialise the goals of the Electronic Governance Strategy 2021-2025 and the sustainability of its initiatives would require fostering public sector capacities to manage digital transformation projects in accordance with central principles and infrastructure. Conversely, the MDIGI and CTIE would require cultivating the ecosystem of digital standards, guidelines and building blocks to for ministries and administrations to operate more autonomous way. With this regard, developing a public service standard for Luxembourg can be a cornerstone in the process of expanding the digital transformation of service delivery as well as balancing the implementation role between the leading entities (MDIGI and CTIE) and ministries and public sector institutions.

From an operational perspective, the CTIE makes available, reliable and trusted digital infrastructure that supports the digitalisation of public services. Building on a long-standing experience and tradition of IT service provision, the CTIE currently operates and provides access to data centres, digital identity, base registries, and digital notification systems, among others. The review process revealed that further efforts

can be done to advance towards a Government as a Platform approach with the implementation of a toolbox of common enablers and components that ministries and administrations can easily reuse (OECD, 2020[6]). Advancing in this direction would contribute to empowering and equipping ministries and public sector institutions towards the expected more autonomous approach for digital-by-design government services.

Actions to promote digital inclusion are a key asset for the digital transformation of government services in Luxembourg. The principles for an inclusive digital transformation stated in the Strategy are backed with concrete plans that create an ecosystem of initiatives and guidance for ministries and administrations to contribute to their implementation with the purpose of ensuring wide access to and benefits from digitally enabled services.

Public service provision and its consistency across digital channels (web and mobile platforms managed by the CTIE) is complemented by the availability and likely expansion of on-site delivery by ministries and administrations. However, in-person delivery remains influenced by institutional preferences and culture, which may provide a different experience to users across ministries and public sector institutions, hindering efforts for an inclusive and coherent service approach in the country.

Proposals for action

In light of the key assessments elaborated above, which draw on the main findings and analysis included in Chapter 5 of this review, the Luxembourg government could consider implementing the following policy recommendations:

14. **Strengthen the strategic vision to inspire a user-driven and omni-channel service design and delivery approach across ministries and public sector institutions.** The following measures should be considered:
    a. Develop a dedicated omni-channel service delivery action plan that complements the existing Electronic Governance Strategy 2021-2025 to promote same quality and convenience of services across online and offline channels for the entire public sector, including municipalities.
    b. Develop a service standard that establish common principles and procedures for the entire public sector to guide the process of designing and delivering public services.
    c. Establish a comprehensive communication approach to channel the goals and actions of the MDIGI and the CTIE for the digital transformation of public services to ministries and public sector institutions that complement existing high-level co-ordination mechanisms.
15. **Foster agile mindset and culture to support service transformation around user needs.** The following measures should be considered:
    a. Invest more in the uptake of digital public services by cultivating a user-driven culture in the public sector and better addressing user needs and concerns (e.g. transparency, privacy, security, accessibility).
    b. Increase awareness of ministries and administrations about the possibilities of digital transformation to rethink and simplify user journeys that help shift away from the strong existing paper-based mindset.
    c. Leverage the experience of the Govtech Lab to share lessons and best practices among ministries and public sector institutions about collaborative and agile methodologies, including insights and good practices to advance the use of innovative procurement mechanisms.
    d. Establish communities of services that bring together civil servants working on or interested in service design and delivery to share their lessons, best practices, considerations. Use this community to prepare and validate the service standard.

e. Implement a standardised user satisfaction methodology and measurement across the public sector to promote equal quality and convenience of public services for both online and offline delivery channels.

f. In line with recommendation 7, build on the development of the National Interoperability Framework (NIF) and other standards to enable an end-to-end service delivery approach and the rationalisation of services according to user needs and their journeys.

g. In line with recommendation 12, promote proactive delivery of services building on data sharing among ministries and public sector institutions and the use of advanced data analytics techniques.

16. **Increase the autonomy and capacity of ministries and public sector institutions to digitalise their services.** The following measures should be considered:

    a. Conduct a study to assess the capacities of ministries and administrations for digital transformation and service design and delivery

    b. Build on the progress achieved through GUICHET.LU and MYGUICHET.LU to mandate ministries and public sector institutions to develop institutional roadmaps for the digitalisation of public services with concrete KPIs to monitor progress and assess impact.

    c. Continue to invest in the existing advisory service of the MDIGI/CTIE to accompany ministries and administrations in the process of digitalising their services and underpinning processes across different channels and according to central standards and guidelines.

    d. Leverage digital investments mechanisms, such as funding, to ensure ministries and public sector institutions adopt and comply with central digital standards and infrastructure.

    e. Promote that ministries and public sector institutions progressively incorporate digital talent that support business-oriented issues rather than technical profiles only.

    f. Building on the work of the CTIE, establish a Government as a Platform policy that helps equip ministries and public sector institutions with resources and tools to scale a whole-of-government transformation in a more autonomous way. Along with the recommendation 14b on service standard, this may include common digital public tools and accompanying guidance such as digital identity, digital notifications, and digital payments.

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2 Contextual factors and institutional models for digital government in Luxembourg

This chapter analyses the setting that underpins the governance of Luxembourg's digital government transformation, focusing on contextual factors and institutional models. The first two sections deep dives into the overall political and administrative culture and structure, followed by the socio-economic factors and technological context. The third section looks at the macro-structure and leadership surrounding the digital government agenda in Luxembourg. The last section reviews the existing arrangements and mechanisms for co-ordination and collaboration on digital transformation of the public sector in Luxembourg.

Introduction

Governing digital for a coherent and sustainable transformation

In the wake of the COVID-19 pandemic, being digital became a necessity to enable the continuity of activities in the public sector, economy and society. At the same time, the imperative of having a digital government surfaced as a top priority on political and policy agendas worldwide. The role of digital governments in driving a digital transformation that is people-driven, human-centred, inclusive, equitable and sustainable became a question that the public asked, and leaders had to answer and fulfil.

In this context, public governance is at the core in the efforts to attain this outcome: the legal and administrative structures, the institutional arrangements and mechanisms, and the policy instruments and tools to enable the change and shape the impact of what "being digital" involves. It is clear that a mature digital government is not one that is driven by adopting digital technology and data, but is one that uses them strategically as means to serve citizens and businesses better. Maturity also entails the ability of digital governments to respond to the rapidly changing context and adapt processes and services to deliver transparently, proactively and based on user needs.

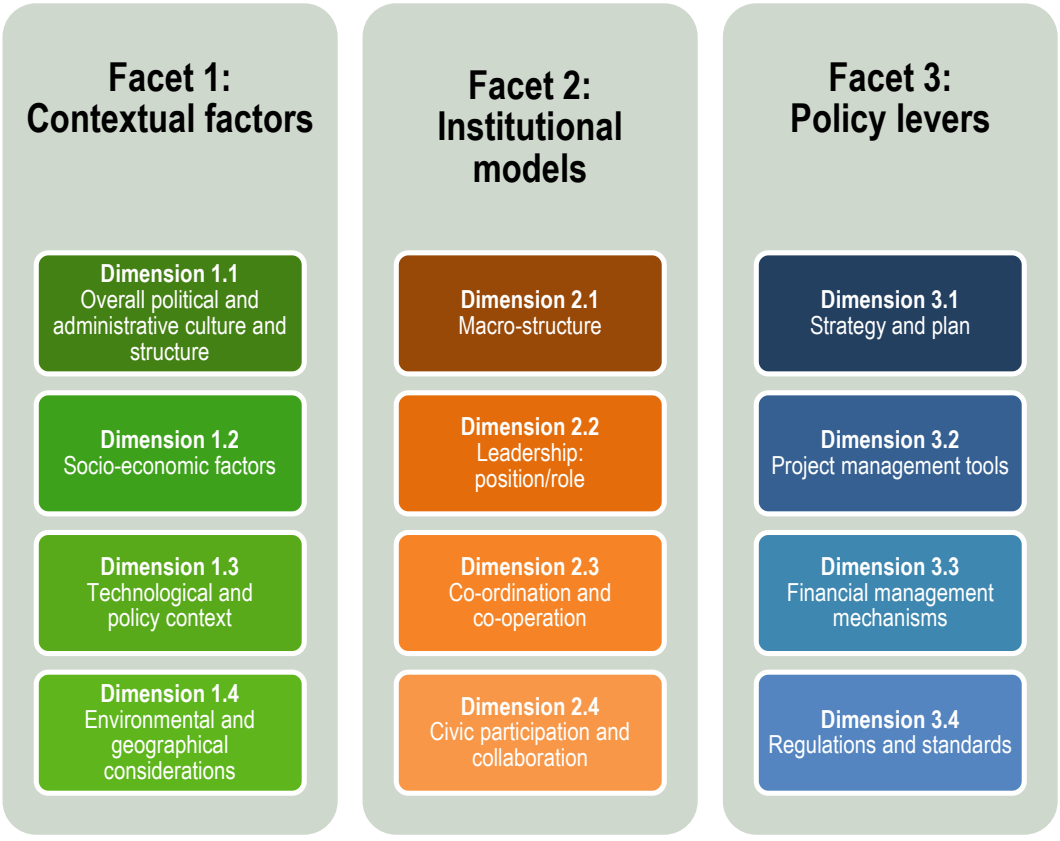
Establishing a sound governance framework that suits the context and institutional setting of the country is, therefore, the first fundamental step towards securing the effective implementation of digital government policies. Building on the cumulative knowledge, experience and practices of OECD member and non-member countries in this area, the E-Leaders[1] Handbook on the Governance of Digital Government was produced to establish a robust framework of analysis and a self-assessment toolkit with policy questions and recommendations to support governments in their digital transformation journey.

Designed in line with the OECD *Recommendation of the Council on Digital Government Strategies* (2014[1]) and the OECD Digital Government Policy Framework (2020[2]), the **OECD Framework on the Governance of Digital Government** presents three critical governance facets (OECD, 2021[3]) (see Figure 2.1):

- *Facet 1: Contextual Factors*, which covers country-specific characteristics to help define the most suitable governance principles, arrangements and mechanisms according to the political, administrative, socio-economic, technological, policy and geographical context;
- *Facet 2: Institutional Models*, which covers the formal and informal arrangements and mechanisms of different parameters (e.g. structure, set-up, approach, leadership, responsibilities, co-ordination, collaboration) to guide the design and implementation of digital government policies and achieve a sustainable digital transformation of the public sector;
- *Facet 3: Policy Levers*, which covers policy instruments (i.e. strategy, project and financial management, regulations, standards) to support the coherent implementation of digital government strategies and use of digital technologies and data across policy areas and levels of government.

Figure 2.1. The OECD Framework on the Governance of Digital Government

The three governance facets and each of their four dimensions



Note: Facets refer to the fundamental features of governance. Dimensions are the main elements that make up each facet. Sub-dimensions are the sub-elements that form each dimension.
Source: OECD (2021[3]), *The E-Leaders Handbook on the Governance of Digital Government*, OECD Digital Government Studies, OECD Publishing, Paris, https://doi.org/10.1787/ac7f2531-en.

This chapter will be analysing the governance of Luxembourg's digital government transformation in four main sections based on the first two facets – *Facet 1: Contextual Factors* (Figure 2.2) and *Facet 2: Institutional Models* (Figure 2.3). *Facet 3: Policy Levers* will be addressed in Chapter 3 along with digital talent and skills in the public sector.

Figure 2.2. The OECD Framework on the Governance of Digital Government – Contextual Factors

The dimensions and sub-dimensions of Facet 1: Contextual Factors

Dimension 1.1 Overall political and administrative culture and structure

- Sub-dimension 1.1.1 Power structure: Federal or decentralised vs. decentralised systems
- Sub-dimension 1.1.2 Geopolitical situation and international/cross-border relations
- Sub-dimension 1.1.3 Political continuity, stability and support for the digital transformation agenda
- Sub-dimension 1.1.4 Degree of legalism and form of democratic governance
- Sub-dimension 1.1.5 Current legislations and regulations on digital rights maturity
- Sub-dimension 1.1.6 Concentration vs. dispersion of administrative functions

Dimension 1.2 Socio-economic factors

- Sub-dimension 1.2.1 Overall economic climate
- Sub-dimension 1.2.2 Maturity of the private sector and digital industry
- Sub-dimension 1.2.3 Digital talent and skills in the public sector and population
- Sub-dimension 1.2.4 Level of public trust
- Sub-dimension 1.2.5 Diversity
- Sub-dimension 1.2.6 Cross-border mobility

Dimension 1.3 Technological and policy context

- Sub-dimension 1.3.1 Coverage and level of development of ICT/digital infrastructures
- Sub-dimension 1.3.2 Technological/e-government heritage and/or legacy within the public sector
- Sub-dimension 1.3.3 Integration of ICT/digital into governance and business processes
- Sub-dimension 1.3.4 Government-specific technological innovations

Dimension 1.4 Environmental and geographical considerations

- Sub-dimension 1.4.1 Local/regional variances
- Sub-dimension 1.4.2 Environmental and geological risks and hazards
- Sub-dimension 1.4.3 Priority for environmental protection and the green transition

Note: Facets refer to the fundamental features of governance. Dimensions are the main elements that make up each facet. Sub-dimensions are the sub-elements that form each dimension. The following analysis is based on these sub-dimensions.
Source: OECD (2021[3]), *The E-Leaders Handbook on the Governance of Digital Government*, OECD Digital Government Studies, OECD Publishing, Paris, https://doi.org/10.1787/ac7f2531-en.

The first section of the analysis will focus on the overall political and administrative culture and structure in Luxembourg (including sub-dimensions on the country's power structure; the political continuity, stability and support for the digital transformation agenda; the degree of legalism; and the concentration/dispersion of administrative functions), and how these characteristics impact the governance of digital government in Luxembourg. The second section will study the socio-economic factors and technological context of Luxembourg (including the maturity of the private sector and digital industry; the level of digital talent and skills in the public sector and population; the level of public trust; diversity and mobility) and their role in shaping digital government maturity in the country.

The rationale for understanding and assessing the country context for the governance of digital government is that the experiences of various countries have shown that countries may benefit from having a governance model that takes into consideration the contextual factors that are unique to them. These factors shape the way governments design and implement policies for digital government, such as digital talent and skills, data-driven public sector and public service design and delivery. The following analysis will address conditions at a macro-level, which is helpful to gain a comprehensive understanding of what could be challenges or drivers for the digital transformation of the public sector.

Figure 2.3. The OECD Framework on the Governance of Digital Government – Institutional Models

The dimensions and sub-dimensions of Facet 2: Institutional Models

Note: Facets refer to the fundamental features of governance. Dimensions are the main elements that make up each facet. Sub-dimensions are the sub-elements that form each dimension. The following analysis is based on these sub-dimensions.
Source: OECD (2021[3]), *The E-Leaders Handbook on the Governance of Digital Government*, OECD Digital Government Studies, OECD Publishing, Paris, https://doi.org/10.1787/ac7f2531-en.

The third section of the analysis will evaluate the macro-structure and leadership for the digital government agenda in Luxembourg (including the institutional set-up of the "organisation-in-charge"; institutional approach to digital government; roles and responsibilities of the "organisation-in-charge"; and the leadership on digitalisation across public sector organisations). The last section will review the existing co-ordination and co-operation arrangements and mechanisms in Luxembourg's public sector that have a part in improving the coherence and sustainability of the digital transformation (including high-level co-ordination; and organisational and technical co-operation).

The rationale for understanding and assessing the institutional models for Luxembourg's digital government is to see how the government Luxembourg lines up with the principles in Pillar 1 and 2 of the OECD *Recommendation of the Council on Digital Government Strategies* "Openness and Engagement" and "Governance and Co-ordination". These principles encourage governments to be open, transparent and inclusive in their processes and operations, and to engage with stakeholders from the public sector, private sector and civil society. They also call for secure and stable leadership, commitment and organisational frameworks for inter-ministerial and inter-agency co-ordination and co-operation. All with the aim of ensuring that the implementation of any digitalisation strategy and plan for the public sector can result in tangible and lasting results across the different levels and sectors of government. Additional considerations with regards to the governance arrangements for data are covered in Chapter 4 and on public service design and delivery in Chapter 5.

Overall political and administrative culture and structure

Each country has its distinctive political and administrative characteristics, which implicate various opportunities and challenges for policy design and implementation. From the level of centralisation vs. decentralisation of the political system, and the degree of concentration vs. dispersion of administrative functions to the geopolitical situation and the political continuity and stability—all these contextual factors determine how governments can best approach their policies and programmes.

Political system and agendas in Luxembourg

The Grand Duchy of Luxembourg is a parliamentary democracy in the form of a constitutional monarchy. The Grand Duke, as the head of state, embodies the independence and continuity of the state (The Government of the Grand Duchy of Luxembourg, 2021[4]). In accordance with the Constitution and the laws of the country, the Grand Duke exercises sovereign power, holds the executive power and assures the execution of the laws. In practice, the executive power is exercised by the government, which is led by the Prime Minister and consists of several members of the cabinet with the title of minister or minister delegate (European Union, n.d.[5]; The Government of the Grand Duchy of Luxembourg, 2020[6]).

The legislative power of Luxembourg is exercised by the Chamber of Deputies, a unicameral parliament composed of 60 members or deputies who are elected for a five-year term. The Chamber of Deputies votes on bills presented by the government, or on bills submitted on a parliamentary initiative by one of more deputies (The Government of the Grand Duchy of Luxembourg, 2019[7]). The Council of State is appointed as an independent consultative body that advises the Chamber of Deputies and the government in the legislative procedure (The Government of the Grand Duchy of Luxembourg, 2020[8]). The Grand Duke enacts the laws (The Government of the Grand Duchy of Luxembourg, 2021[4]). In the most recent three decades, the government of Luxembourg has largely demonstrated political continuity and stability albeit some changes to the political leadership and coalitions (Table 2.1).

Table 2.1. List of governments in Luxembourg between 1992 and 2022

Government	Prime Minister	Start of term	End of term	Coalition
Santer-Poos II	Jacques Santer	9 December 1992	13 July 1994	CSV, LSAP
Santer-Poos III	Jacques Santer	13 July 1994	26 January 1995	CSV, LSAP
Juncker-Poos	Jean-Claude Juncker	26 January 1995	4 February 1998	CSV, LSAP
Juncker-Poos	Jean-Claude Juncker	4 February 1998	7 August 1999	CSV, LSAP
Juncker-Polfer	Jean-Claude Juncker	7 August 1999	31 July 2004	CSV, DP
Juncker-Asselborn I	Jean-Claude Juncker	31 July 2004	23 July 2009	CSV, LSAP
Juncker-Asselborn II	Jean-Claude Juncker	23 July 2009	4 December 2013	CSV, LSAP
Bettel-Schneider I	Xavier Bettel	4 December 2013	5 December 2018	DP, LSAP, DG
Bettel-Schneider II	Xavier Bettel	5 December 2018	Incumbent till 2023	DP, LSAP, DG

Note: CSV is the Christian Social People's Party. LSAP is the Luxembourg Socialist Workers' Party. DP is the Democratic Party. DG is the Green Party (Déi Gréng).
Source: Author's elaboration.

On the digital transformation agenda, the government led by Prime Minister Xavier Bettel has continued to demonstrate strong commitment in setting out objectives for digitalisation of the public sector for the two legislative periods under his leadership. The government declaration presented in 2013 by the prime minister to the parliament sets out the development and promotion of the ICT sector as a goal, building on the image of being the "European Trusted Information Centre" that Luxembourg has gained. Related to this is also the goal of protecting critical infrastructure and raising risk awareness – which includes developing a coherent and global strategy to augment the digital competencies available in the country,

and advancing the digitalisation of public services for citizens to benefit for accessing them online (The Government of the Grand Duchy of Luxembourg, 2018[9]).

The coalition agreement of 2018-2023 similarly emphasises the importance of digitally transforming the economy and the public sector, in which the Ministry for Digitalisation (MDIGI) was created for the purpose of improving the daily lives of people and simplify administrative processes. It also highlights the government's pledge to adapt the existing legal frameworks and modify co-ordination and management mechanisms to support the process of digitalisation in the country (The Government of the Grand Duchy of Luxembourg, 2018[10]).

With parliamentary elections soon taking place in 2023, it is possible that the political agenda and priorities may change given the continuing COVID-19 pandemic, economic challenges and the recent destabilising security situation in Europe. Several government stakeholders have also expressed their concern for a possible change in the political support of the digital government agenda during the OECD peer review mission and workshops. With the MDIGI being a relatively young ministry, it would be important for the government of Luxembourg to continue securing the long-term sustainability of digital government policies and programmes.

Political and administrative structure in Luxembourg

The political and administrative structure in Luxembourg is characterised by a relatively high level of centralisation with a municipal level of decentralisation (European Commission, 2018[11]). The public administration of Luxembourg is organised into three districts, 12 cantons and 102 communes, of which 12 have a city status with Luxembourg City being the largest (Figure 2.4). While these divisions are for territorial and administrative purposes, the 12 cantons do not have administrative competencies whereas the 102 communes are the smallest administrative entities managed by municipalities (The Government of the Grand Duchy of Luxembourg, 2019[12]). The municipalities have administrative responsibilities and considerable autonomy in managing municipal interests (i.e. registration, utilities, transport, health, social welfare, sports, regional economic development and tourism, housing, culture, education), and liaise directly with the central government on the administration of national policy (European Committee of the Regions, n.d.[13]).

Figure 2.4. Administrative divisions of Luxembourg

3 districts, 12 cantons, 100 communes

Note: The three districts are indicated by the different colours (blue, red, yellow). The borders of the three districts are in blue, the 12 cantons are in red, the 100 communes are in yellow.
Source: map.geoportail.lu, http://g-o.lu/3/XNX7 (accessed on 24 August 2022).

This political and administrative structure in Luxembourg could present as an opportunity or pose a challenge to advancing the digital government agenda depending on how the government uses it to its advantage. Considering the small size of Luxembourg, the centralisation and concentration of functions at the national level can benefit high-level policy development and co-ordination and facilitate a coherent definition and adoption of common policy instruments to enable a sustainable digital transformation. The government of Luxembourg has rightly identified this opportunity and is focusing efforts in this area now.

The challenge comes with the municipal level of decentralisation, as achieving alignment and coherence from national to regional and local levels will require designing ways to improve co-operation between the central government and the municipalities. This will be covered in greater detail later in the section “Co-ordination and collaboration within the public sector and ecosystem”. The government of Luxembourg can also devise creative and agile processes to balance and reap the advantages of both centralisation and decentralisation like in the case of **Estonia** (Box 2.1) – which presents a similar political and administrative structure: a strongly centralised government.

Box 2.1. Estonia's centralised political and administrative structure and decentralised digital and data governance approach

Estonia has a centralised power structure, as a parliamentary representative democratic republic with the Prime Minister as the head of government. The country is divided into 15 counties and the central government benefits from extensive executive power across the territory, favouring efficient and coherent digital government policies. The development of e-Estonia is based on the Principles of the Estonian Information Policy, adopted by the parliament in 1998. Based on this policy, the government initiated a digital transformation to increase the efficiency of its processes and services.

The country's digital government strategy is unique: its design and architecture is largely centralised, but its approach is decentralised. To work with agility, one of the principles of Estonian e-governance is decentralisation – every ministry, administration and agency chooses its own database and system. A law was also passed stipulating that the same information should not be asked twice, i.e. the once-only principle. Building on these foundations, Estonia became the first in the world to interconnect decentralised components of state and public sector databases at a national level through a core data exchange infrastructure, X-Road Europe, supported by a solid robust data governance framework that enables integration and interoperability across the data systems.

Source: OECD (2021[3]), *The E-Leaders Handbook on the Governance of Digital Government*, OECD Digital Government Studies, OECD Publishing, Paris, https://doi.org/10.1787/ac7f2531-en; e-estonia (2018[14]), "e-Estonia guide", https://e-estonia.com/wp-content/uploads/eestonia-guide-2018.pdf; OECD (2019[15]), "Case Study 8: Estonia e-government and the creation of a comprehensive data infrastructure for public services and agriculture policies implementation", in *Digital Opportunities for Better Agricultural Policies*, OECD Publishing, Paris, https://doi.org/10.1787/510a82b5-en.

As a founding member of the European Union (EU), Luxembourg has been a Member State since 1958, a member of the Schengen area since 1995 and a member of the euro area since 1999 (European Union, n.d.[5]). In this context, Luxembourg is in a significantly stable, open and rules-based geopolitical situation – and its legal and regulatory frameworks are influenced by the EU's legislations and policies. These include the Electronic Identification and Trust Services Regulation (Regulation (EU) 910/2014), the General Data Protection Regulation (Regulation (EU) 2016/679), Cybersecurity Act (Regulation (EU) 2019/881), Open Data Directive (Directive (EU) 2019/1024), Proposal for a Data Governance Act (COM/2020/767), Proposal for an Artificial Intelligence (AI) Act (COM/2021/206) and the series of EU eGovernment Action Plans (2006-2010; 2011-2015; 2016-2020) to name a few.

On 8 December 2020, ministers of all EU Member States signed the Berlin Declaration on Digital Society and Value-Based Digital Government, which calls for governments to take a pioneering role in driving a value-based digital transformation for European societies (European Commission, 2020[16]). With the EU being a leading global standard-setter on digital policies that embeds fundamental human rights and human-centred values, Luxembourg stands to gain significantly in having a high level of digital rights maturity backed by legislations, regulations and guidelines.

Yet, with a civil law system, the government of Luxembourg would need to ensure that it can overcome the possible legal challenges in innovating and securing the policy agility needed to promote the digitalisation of the public sector. Principle 12 of the OECD *Recommendation of the Council on Digital Government Strategies* calls for governments to "ensure that general and sector-specific legal and regulatory frameworks allow digital opportunities to be seized by reviewing them as appropriate, and including assessment of the implications of new legislations on governments' digital needs as part of the regulatory impact process (OECD, 2014[1])." It is crucial for legislations and regulations to be in place to enable and promote the transformation. This will be covered in greater detail in Chapter 3.

In sum, the political and administrative contextual factors in Luxembourg are inclined to favour digital government development positively. With relatively strong political support for the digital agenda, a small country and a centralised structure, the government has the potential and capacity to transform cohesively, effectively, with agility and speed. A fairly stable, open and rules-based geopolitical situation also provides a good legal basis for advancing the digital agenda in line with the EU's vision "A Europe fit for the digital age". Yet, political continuity for the public sector digital transformation agenda should not be taken as the status quo and efforts will be required to promote the administrative change needed in order to respond to new needs in the digital age.

Socio-economic factors and technological context

Economic, societal and technological contextual factors are also important for understanding how the governance of digital government can benefit from and further economic and social development. For instance, indicators such as the overall economic climate, demographics, the level of maturity of the private sector and digital industry, the level of digitalisation and the use of digital technologies in society, are key in shaping expectations and in informing how public sector organisations can better meet the specific needs of citizens and businesses in the context of improving their standards and ways of living and working.

Socio-economic factors

The economy of Luxembourg has historically demonstrated solid growth, low inflation and low unemployment. Over the COVID-19 crisis, the economy grew 6.5% in 2021 and is projected to expand by 3.7% in 2022 and 3.1% in 2023 with the support of stronger consumption and investment (OECD, 2021[17]). As a service-oriented economy focused on high-value technology, Luxembourg's service sector represents more than 80% of its gross domestic product (GDP). General government expenditure constituted 42.3% of Luxembourg's GDP in 2019, which is comparable to the 40% OECD average and 46.6% OECD-EU average (OECD, 2021[18]).

Luxembourg's GDP per capita is 56% higher than the 50th percentile of OECD member countries (OECD, 2021[19]) and is the highest among EU Member States and the Schengen countries (European Union, n.d.[20]; eurostat, 2021[21]). However, income inequality is higher than in most advanced economies (OECD, 2021[22]). Luxembourg's performance on the United National Human Development Index (HDI) also demonstrates very high and improving human development over the past two decades but significant loss due to inequality (UNDP, 2020[23]; UNDP, 2020[24]). Luxembourg's human development-impacted inequality mainly derives from inequality in education and income, when compared to the OECD average or other very high HDI countries (Table 2.2).

Table 2.2. Luxembourg's inequality-adjusted HDI for 2019 relative to selected countries and groups

	IHDI value	Overall loss compared to HDI value (%)	Human inequality coefficient (%)	*Inequality in life expectancy at birth (%)*	*Inequality in education (%)*	*Inequality in income (%)*
Luxembourg	0.826	9.8	9.6	3.4	6.3	19.0
Austria	0.857	7.0	6.9	3.7	2.9	14.1
Iceland	0.894	5.8	5.6	2.4	2.8	11.7
OECD	0.791	12.1	11.8	5.5	7.6	22.2
Very high HDI	0.800	10.9	10.7	5.2	6.4	20.4

Source: UNDP (2020[24]), "The Next Frontier: Human Development and the Anthropocene – Briefing note for countries on the 2020 Human Development Report – Luxembourg", *Human Development Report 2020*, https://hdr.undp.org/sites/default/files/Country-Profiles/LUX.pdf.

These data insights are also in line with the main findings identified in the OECD *Economic Survey of Luxembourg* that revealed a huge need for the labour market to rebound and be revitalised, and that the government can do more to ensure inclusive and sustainable growth and development in the country Box 2.2 presents a deeper analysis of Luxembourg's economic context and selected recommendations that are also relevant to consider in the context of the OECD *Digital Government Review of Luxembourg*, to support the development of a digital government ecosystem that is bolstered by a vibrant and mature digital economy and society.

Box 2.2. Key Policy Insights – Reviving productivity growth and innovation in Luxembourg

The OECD *Economic Policy Reforms* report found that to favour a strong recovery from the COVID-19 crisis, the government of Luxembourg will need to improve the education system and enhance educational outcomes; and facilitate inclusive labour market participation of groups that are vulnerable to digitalisation (e.g. young, low-skilled workers) (OECD, 2021[19]; OECD, 2019[25]). This is an important factor for the government to consider when developing public services that are digital by design and ICT/digital skills for civil servants of tomorrow and the society.

Already for two decades before the COVID-19 crisis, Luxembourg has been experiencing relatively sluggish productivity growth, especially in the service sector. The most productive businesses have struggled to innovate and stagnated while the weaker ones fell further behind by 40% in productivity levels. R&D investment levels remain low by international standards. Moreover, skill shortages impact productivity outcomes by reducing businesses' capability to operate at potential capacity and diminish returns on investment, including in digital technologies.

Importantly, businesses in Luxembourg face ICT skill shortages. Luxembourg's economy depends significantly on foreign and cross-border workers, of which the former makes up 28% and the latter makes up 45% of the workforce (luxtimes, 2018[26]). Despite the share of ICT specialists and graduates being higher than the EU average, there has been a shrinking share of ICT graduates since 2020 (European Commission, 2022[27]). In this context, the government has the challenge of having to constantly train, attract and retain highly skilled workers in ICT sector (including foreign and cross-border ICT specialists), and foster collaborations and synergies with the private sector for further innovation, research and development. This will be discussed in further detail in Chapter 3.

The following are two policy recommendations set out in the OECD *Economic Survey of Luxembourg* in line with the objective of reviving productivity growth and stimulating innovation:

Lessening current skill shortages and anticipating future ones

In 2018, Luxembourg's Employment Development Agency (ADEM) announced a 30% year-on-year increase in reported vacant positions and critical shortages for ICT specialists for the private sector. In 2020, 67% of businesses in Luxembourg reported hard-to-fill vacancies for ICT specialists compared to the EU average of 55% (eurostat, 2021[28]). The following solutions have been adopted:

- Immigration: The government has created favourable immigration schemes for a range of relevant occupations and has organised recruitment events.
- Training: In 2018, only around one-quarter of businesses provide ICT training to their personnel in Luxembourg. The government launched "Digital Skills Bridge" by providing firms experiencing digital disruption with the technical and financial assistance to upskill their personnel.
- Small and Medium Enterprises (SMEs): Luxinnovation supports digital adoption in SMEs by linking them with external experts, thereby supporting smaller businesses that tend to lack the resources to invest in digital talent and skills.

- Skill Foresight Exercises: The government performs studies assessing skill needs focused on current shortages or sectors of interest. Building a structured process that feeds the outcomes of regular foresight exercises into vocational training offers can help to alleviate skill shortages.

Stimulating the innovation engine to push the frontier

While innovation activity in Luxembourg appears to be high with one-third of SMEs reported introducing new or significantly improved products, services or organisational methods in 2018, Luxembourg's weak multifactor productivity growth points to an inability to translate innovation into productivity gains. Making Luxembourg's public administration a frontrunner on the use of new technologies could entail a double dividend through positive demonstration effects for the private sector and large benefits for the public sector itself. The government could also act as a catalyst to arrange partnerships between firms with valuable but confidential data and AI start-ups with the competence to draw value from it.

Note: Updated with recent data and analysis as indicated in the sources.
Source: Adapted from OECD (2019[25]), *OECD Economic Surveys: Luxembourg 2019*, https://doi.org/10.1787/424839c1-en.

Luxembourg's economic context demonstrates the indispensable role that the government plays in shaping and driving the digitalisation agenda for the country, and that first becoming a mature digital government is essential to achieve that intended effect. When digital transformation is guided and managed properly by the government, all stakeholders in the country (i.e. public sector, private sector, civil society) should be able to reap tangible benefits in economic and social development, and see positive performance in productivity, inclusiveness, equality, labour market participation and well-being.

The employment in the government of Luxembourg as a percentage of total employment stands a little over 12%, and among the lowest with OECD member countries, signalling that the country has a relatively small public sector in terms of workforce. This is albeit its comparatively high annual average growth rate for government employment, at over 3% (OECD, 2021[29]). This, all the more, calls for a digital government that is lean, agile, efficient and effective.

As regards demographics, Luxembourg is one of the least populous countries in the EU with a population of 634 730 people (European Union, n.d.[20]). A landlocked country with Belgium, Germany and France as its neighbours, the society, culture and languages of Luxembourg are highly heterogeneous and diverse. While Luxembourgish is the national language, Luxembourgish, French and German are the administrative and judicial languages of Luxembourg (The Government of the Grand Duchy of Luxembourg, 2019[30]). Furthermore, foreigners make up 47.2% of the population and more than 170 different nationalities are a resident (The Government of the Grand Duchy of Luxembourg, 2022[31]).

In the process of digitally transforming the public sector, the government of Luxembourg is paying careful attention to the diverse needs, preferences and cultural norms of these population groups, and efforts should continue in the same direction during the implementation of the national digital government strategy. This may include tailoring the communication and engagement strategy when designing and delivering new public services that are digital and data-driven.

For instance, with 197 200 commuters coming into Luxembourg to work (STATEC, 2021[32]), and a wide diversity of nationalities as residents, Luxembourg sees high mobility across its borders. This increases the necessity in establishing robust, interoperable and inclusive digital identity solutions and public services that can be accessed and used easily within and across EU borders – and the government of Luxembourg has stepped up to meet this demand by being the second highest performing EU country providing cross-border services in the eGovernment Benchmark 2022 (European Commission, 2022[33]). This will be discussed in greater detail in Chapter 5.

The citizens of Luxembourg enjoy a high quality of life and high levels of trust in government (OECD, 2019[34]; OECD, 2020[35]), given efficient public systems such as healthcare and transport and one of the lowest levels of perceived corruption in the world. However, while trust in government ranks at the top-performing tier among OECD member countries, trust in others (i.e. people in general) ranks at the bottom-performing tier (OECD, 2020[35]). This presents an important role for the government of Luxembourg to strengthen trust among stakeholders.

Building on the high trust in government, the government is openly engaging the public in policy making and implementation processes, especially in areas such as digitalisation of services that involve a participatory and collaborative approach. In February 2022, the MDIGI launched the "Zesumme Vereinfachen" platform, an initiative that allows all citizens to be involved in administrative simplification. On ZESUMME-VEREINFACHEN.LU (zesumme-vereinfachen.lu), citizens are able to follow projects, submit ideas or proposals, vote for proposals, take part in surveys and participate in workshops. Users can access this platform across all devices and in the three languages of Luxembourg and English (The Government of the Grand Duchy of Luxembourg, 2022[36]). This ensures a transparent and inclusive participation, and forges an effective civic space where people are inclined to work together and with the government.

Technological and policy context

Finally, technological contextual factors specifically look at the country's past, current and prospective technological development and the use of technology in the public and private sectors – from infrastructure and innovation to e-government heritage and legacies. These factors give a sense of why the current governance approaches to digital government are in place, and what kind of challenges and opportunities these present such that governments can advance their transformation.

In line with Luxembourg's high level of economic and social development, the ICT infrastructures are also fairly developed. Presently, it ranks 11th among EU Member States in "Connectivity" of the 2022 Digital Economy and Society Index (European Commission, 2022[27]). The government is also in the course of implementing targeted policies on fibre, broadband, 5G and the Internet of Things (IoT) to enhance connectivity and productivity in the country (European Commission, 2022[27]). This includes the recent ultra-high-speed Broadband Strategy 2021-25.

Based on the data from the OECD Going Digital Toolkit (2022[37])[2] and the 2022 Digital Economy and Society Index (European Commission, 2022[27]), Luxembourg performs very well in coverage and access: 96% of households are covered by a fixed very high capacity network (VHCN); 98% of the population is covered by at least a 4G mobile network; 97.4% of households have broadband connection; 87.9% of businesses have broadband at 30 Mbps or more (the indicator with the largest percentage growth from 2018 to 2021); and there is even a lack of disparity in broadband uptake between urban and rural households. However, there is room for advancement in the connectivity of devices: only 11.7 per 100 inhabitants possessing machine-to-machine (M2M) SIM cards below the OECD average of 26.9, and this number had decreased by 45.8% from 2018 to 2020. This measure of connectivity is important as a foundation for the IoT and its sensors to function.

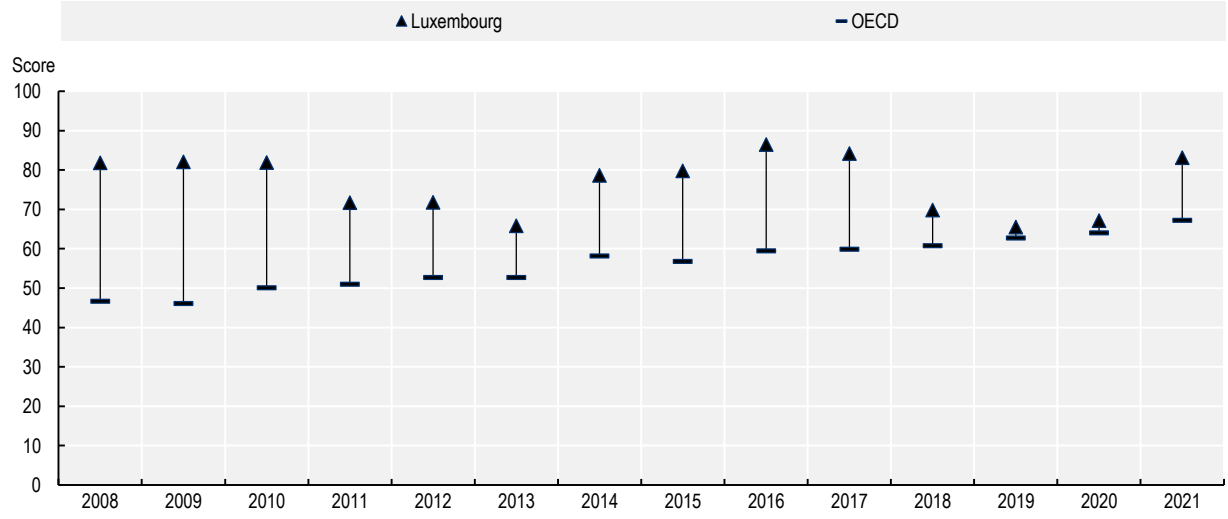
Concurrently, the government of Luxembourg is actively promoting the uptake and integration of strategic digital technologies (e.g. AI, IoT, Blockchain, virtual reality [VR], high-performance computing [HPC] etc.) into its public governance and business processes (The Government of the Grand Duchy of Luxembourg, 2019[30]; The Government of the Grand Duchy of Luxembourg, 2021[38]; European Commission, 2022[27]). However, in spite of these recent policies to stimulate digital transformation in the public sector and economy, the uptake of digital government services in Luxembourg has been fluctuating over the past decade based on data from the OECD Going Digital Toolkit (2022[37]) (Figure 2.5) *vis-à-vis* the OECD average that has been increasing steadily. In addition, this indicator has not been moving in tandem with

the gradual increase in ICT/digital coverage and Internet access across Luxembourg that has been discussed earlier.

Likewise, the eGovernment Benchmark 2022 found that Luxembourg experiences a medium level of penetration (79%) in the context of a high level of digitalisation (87%) – which indicates that there is still space to expand the number of online users in Luxembourg accessing public services despite recent efforts and progress to expand coverage and use of internet within the country (European Commission, 2022[33]; European Commission, 2021[39]). One notable factor identified in the OECD Going Digital Toolkit that may help to explain this challenge is the considerable increase in payment privacy and security concerns by Internet users which prevented them from engaging in online transactions from 2017 to 2019 (OECD, 2022[37]) – the same time period that saw a sharp drop in the uptake of online public services.

Figure 2.5. Uptake of digital government services in Luxembourg

Share of individuals (aged 16-74 years) using the Internet to interact with public sector organisations



Note: Measured interactions range from simply communicating with the government and obtaining information from government websites to interactive procedures where completed forms are downloaded and sent via the Internet. Excludes manually typed emails. Interactions with public sector organisations refers to public services and administration activities at the local, regional or national level.
Source: OECD (2022[37]), "OECD Going Digital Toolkit: Luxembourg", OECD Paris, http://goingdigital.oecd.org/countries/lux (accessed on 15 June 2022); OECD (2019[40]), *Measuring the Digital Transformation: A Roadmap for the Future*, OECD Publishing, Paris, https://doi.org/10.1787/9789264311992-en.

Luxembourg is no doubt leading among European and OECD member countries in laying the vital foundations for digital government maturity. Among countries in Europe, Luxembourg ranks 3rd in the eGovernment Benchmark 2022 and scores highly on user-centricity and cross-border services (Table 2.3). Across the world, Luxembourg ranks 33rd in the United Nations E-Government Survey 2020 and is considered a very high performer on the Online Services Index (OSI) and the E-Government Development Index (EGDI) (Table 2.4).

Table 2.3. European Union eGovernment Benchmark 2022: Luxembourg's performance

	User-centricity	Transparency	Key enablers	Cross-border services	Overall maturity
Luxembourg's score	94.5	88.3	75.6	90.1	87.1
EU27+ average score	90.3	62.8	71.7	58.5	70.8

Note: Score ranges from 0 to 100. EU27+ encompasses 36 European countries, i.e. the 27 EU Member States, Albania, Iceland, Montenegro, North Macedonia, Norway, Serbia, Switzerland, Turkey and the United Kingdom.
Source: European Commission (2022[33]), *eGovernment Benchmark 2022: Synchronising Digital Governments - Background Report*, https://ec.europa.eu/newsroom/dae/redirection/document/88516 (accessed on 15 June 2022).

Table 2.4. United Nations E-Government Survey 2020: Luxembourg's performance

	Rank	E-Government Development Index (EGDI)	E-Participation Index (EPI)	Online Services Index (OSI)	Human Capital Index (HCI)	Telecommunications Infrastructure Index (TII)
Luxembourg	33	0.8272	0.7024	0.7647	0.8097	0.9072

Source: UNDESA (2020[41]), "UN E-Government Survey 2020", https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020 (accessed on 15 June 2022).

These are significant improvements compared to the OECD Digital Government Index 2019 where Luxembourg ranked 6th among EU27+ countries and 13th among OECD member countries – and was below the OECD average for being data-driven and acting as a platform (see Table 2.5).

Table 2.5. OECD Digital Government Index 2019: Luxembourg's performance

	Digital by design	Data-driven	Government as a platform	Open by default	User-driven	Proactiveness	Composite score
Luxembourg's score	0.53	0.31	0.39	0.64	0.45	0.37	0.54
OECD average score	0.45	0.36	0.45	0.53	0.38	0.34	0.50

Note: Score ranges from 0 to 1. OECD member countries that did not take part in the Digital Government Index (DGI) are Australia, Hungary, Mexico, Poland, Slovakia, Switzerland, Turkey and the United States.
Source: OECD (2020[42]), "Digital Government Index: 2019 results", *OECD Public Governance Policy Papers*, No. 03, OECD Publishing, Paris, https://doi.org/10.1787/4de9f5bb-en.

While the socio-economic and technological context in Luxembourg is shown to be conducive and supportive for digital transformation in the public sector, it has revealed that the government of Luxembourg can enhance these advantages and benefits even further by taking action in the following areas: improving stakeholder participation (especially with users, citizens and businesses), being user-driven and proactive besides being user-centric, operating as a platform and being data-driven – which will be discussed in the chapters to come.

Macro-structure and leadership on the digital government agenda

With the context around Luxembourg's digital transformation having been assessed, it is apropos to look at the institutional models that make up its governance to steer the digital government agenda. A clear, effective and agile institutional model for digital government is essential for a sustainable digital transformation of the public sector in the long run. It sets out the macro-structure for how the public administration sets-up and approaches this comprehensive and cross-cutting process of modernisation and reform. It also provides a solid foundation for institutionalising and clarifying organisational and personal leadership for it to be effective, and the arrangements and mechanisms for co-ordination and co-operation in the public sector.

The Ministry for Digitalisation in Luxembourg

The government of Luxembourg comprises 24 ministries, led by typically one or more minister and minister delegate. In Luxembourg, MDIGI is responsible for leading and co-ordinating digital government policies in collaboration with other public sector organisations at the central level of government. Established under the Grand-Ducal decree of 5 December 2018 (Box 2.3), MDIGI is a young ministry but has a strong political mandate under the current government led by Prime Minister Xavier Bettel. It is currently headed by the prime minister and the minister of state who also serves as the minister for digitalisation, and a minister delegate for digitalisation.

As a line ministry, the MDIGI's mission and remit cover the promotion and implementation of ICT and digital strategies in the public sector and at the national level – in collaboration and in consultation with other ministries and government agencies. For example, the MDIGI shares a number of competences with the Ministry of the Economy and the Department of Media, Connectivity and Digital Policy (SMC) of the Ministry of State (ME) on the *Digital Luxembourg* initiative, the monitoring and promotion of the ICT sector, the development of digital infrastructure and the strategies for emerging technologies like AI and 5G.

Apart from these shared competences, MDIGI solely oversees strategic tasks relating to the digital development of the public sector (i.e. administrative procedures, digital inclusion, information exchange, high-level co-ordination, the Government IT Centre [CTIE]) – which will be further elaborated below.

The experience reflected in the E-Leaders Handbook on the Governance of Digital Government show that governments largely either opt for the "organisation-in-charge" to be at the centre of government (i.e. under the presidency or the prime minister's office) (e.g. Chile, France, the United Kingdom), under a co-ordinating ministry (e.g. Italy, Slovenia), a line ministry (e.g. Colombia, Estonia, Greece) or government agency (e.g. Australia, Portugal, Sweden).[3] Among these diverse possibilities, governments need to most crucially ensure that the "organisation-in-charge" of digital government is able to steer the agenda and effect change vertically and horizontally based on organisational stability, legitimacy, accountability mechanisms and strong relations with other public sector organisations (OECD, 2021[3]).

Box 2.3. Grand-Ducal decree of 5 December 2018 establishing the ministries: Ministry for Digitalisation

I. Responsibilities relating to the digital agenda falling within the competence of the Minister for Digitalisation

1. Implementation of the "Digital Lëtzebuerg" Action Plan and monitoring of the ICT sector (competence shared with the Minister for the Economy and the Minister for Communications and Media).
2. Promotion of the ICT sector (competence shared with the Minister for the Economy).
3. 3. Digitalisation of administrative procedures.
4. Digital transformation of public administration.
5. High Committee for Digital Transformation.
6. Development and implementation of an Internet of Things plan.
7. Development of digital infrastructures (in consultation with the Minister for Communications and Media).
8. Development of a national strategy in the field of artificial intelligence (in consultation with the Minister for Communications and Media and with the Minister for the Economy).
9. Implementation of the national 5G Strategy and development of pilot projects (in consultation with the Minister for Communications and Media).
10. Digital inclusion.
11. Government Information Technology Centre (CTIE).
12. Promotion and organisation of the automation of state administrations, in particular with regard to the collection, transmission and processing of data.
13. Search for synergies between the various state administrations and optimisation of their information exchange.
14. Assistance to the various state administrations in the execution of day-to-day IT work and management of fixed and mobile communication systems.
15. Electronic filing with the state.
16. Daily management of the government conference centre (Senningen Castle, in consultation with the Minister of State).

II. Responsibilities relating to administrative simplification and better regulation falling within the competence of the Minister for Administrative Reform

1. Cross-cutting measures: Harmonisation of public consultation procedures – Simplification of authorisation procedures.
2. Simplification measures targeting specific legislative and regulatory provisions.
3. "Town Planning and Environment" facilitation unit.

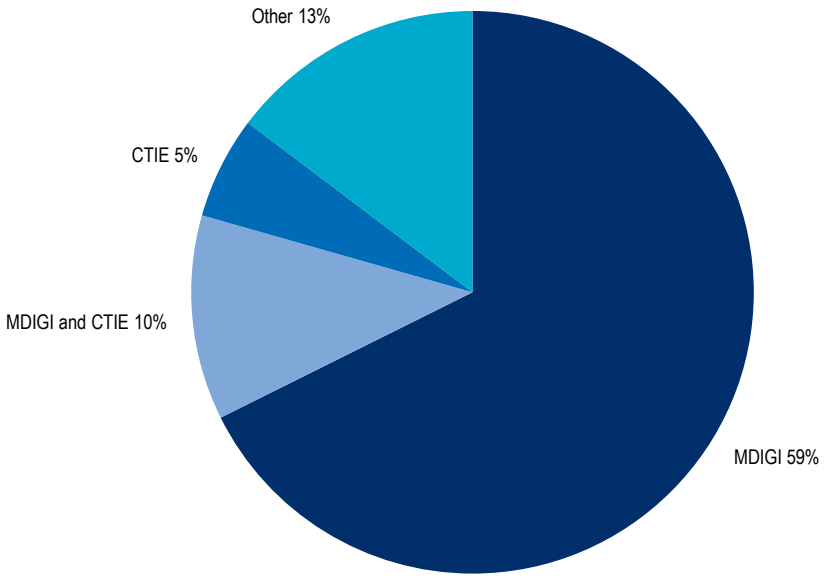
Note: The text is translated from French.
Source: The Government of the Grand Duchy of Luxembourg (2018[43]), Grand-Ducal Decree 5 December 2018 establishing the Ministries, https://legilux.public.lu/eli/etat/leg/agd/2018/12/05/a1099/jo (accessed on 15 June 2022).

Findings from the OECD Digital Government Survey of Luxembourg, administered in the context of this review, reveal that the leadership and co-ordinating role of the MDIGI on digital government is recognised

by the majority of ministries and administrations surveyed – 87 % responded yes to the question “Is there a public sector organisation (e.g. division, unit, agency) responsible for leading and co-ordinating decisions on digital government at the central level of government?”. Out of these, 59% responded that MDIGI is the one responsible for this role while 10% mentioned that it is both MDIGI and CTIE, and 5% said that it is the CTIE.

However, 13% of ministries and administrations gave varying responses to what they thought were “organisation(s)-in-charge” of digital government in Luxembourg, which included popular answers such as the Department of Media, Connectivity and Digital Policy (SMC) as part of the Ministry of State (ME), the Ministry of Culture (MC) and the Digital Luxembourg initiative that is overseen by SMC.

Figure 2.6. Perceived organisation-in-charge of digital government in Luxembourg



Note: Based on the responses of 39 government stakeholders to the question “If yes, please specify the name of the organisation.” after having responded “Yes” to the question “Is there a public sector organisation (e.g. division, unit, agency) responsible for leading and co-ordinating decisions on digital government at the central level of government?”
Source: OECD (2021[44]), *Digital Government Survey of Luxembourg: Ministries and Administrations* (unpublished).

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During the OECD peer review mission, there was also a general recognition among public sector organisations that the newly-established MDIGI leads the strategy and implementation of the public sector digitalisation agenda – but some stakeholders were more familiar than others on its purpose, scope and responsibilities, depending on how closely they work with the MDIGI. In fact, public sector organisations tended to express greater familiarity with CTIE as the long-standing administrative body that develops and supports the use of the IT products and services for Luxembourg’s public sector organisations.

While this shows that there is an agreement among government stakeholders that MDIGI plays a key leading and co-ordinating role on digital government, at present, public sector organisations were inclined to view CTIE as the direct go-to partner should they want to digitalise certain processes or services. During the OECD peer review mission and capacity-building workshops, a broad consensus was gathered on the importance of further clarifying and communicating with public sector organisations about what MDIGI is

doing, aims to achieve, and importantly, how it can support and work with other government stakeholders in their digitalisation journey.

CTIE can trace its roots back to when its affiliate institute was created in 1974 (The Government of the Grand Duchy of Luxembourg, 2008[45]). As the technological arm of MDIGI, CTIE is responsible for G2G[4] IT solutions for Luxembourg's ministries and administrations – such as network and communication infrastructure, hosting, private cloud (infrastructure as a service [IaaS]), platform (platform as a service [PaaS]), generic and customised software solutions (software as a service [SaaS]), secure document generation, individualised mass printing, office automation, telephony and infrastructure security. CTIE also plays central role in the management of G2C[5] and G2B[6] portals and platforms: GUICHET.LU (guichet.lu) and MYGUICHET.LU (myguichet.lu). Its remit is set out in the law of 24 November 2015 amending the amended law of 20 April 2009 establishing the CTIE (The Government of the Grand Duchy of Luxembourg, 2015[46]) (see Box 2.4).

Box 2.4. Mission of the Government Information Technology Centre (CTIE)

According to the Law of 24 November 2015, the Government Information Technology Centre's (CTIE) mission is to:

- Promote and organise in a rational, co-ordinated way the **automation** of the state's administrations, particularly with regard to the collection, transmission and processing of **data**;
- Assist the various state administrations in carrying out **ordinary IT work**, and to manage fixed and mobile **communication systems**;
- Manage electronic, IT and security **equipment** appropriate to the accomplishment of its attributions;
- Administer the state's common IT **network** and **electronic messaging**;
- Ensure IT **security** and respect for the legal provisions regarding the protection of persons in respect of the processing of **personal data**, within the limits of its attributions;
- Produce and personalise secure administrative **documents** and process the corresponding **biometric data**;
- Acquire and manage IT and office **equipment** for the state's administrations;
- Manage a **support centre** for the internal and external users of the information systems managed by the centre;
- Map the **processes** of the state's administrations and their **interoperability**, and keep the maps up to date;
- Provide **organisational** support to the state's administrations and accompany them in their plans for reorganisation;
- Seek synergies among the state's various administrations and optimise their **exchanges of information**;
- Co-ordinate the **Internet presence** of the state's administrations;
- Set up and operate **platforms for exchanges** with citizens and businesses;
- Set up and operate **collaboration platforms** linking together all the state's agents;
- Set up and co-ordinate a **network of regional physical front offices** offering citizens a one-stop point of contact, whatever their administrative procedures;
- Make available a **knowledge base** bringing together all the attributions of the state, accessible through the various public-service channels;

- Transmit **official information** between governments, international bodies and the State's administrations, according to the security directives in force;
- Plan, set up, manage, operate and ensure the availability of the **systems of communication and classified information** allowing political consultation and the exchange of information to the government's advantage;
- Exercise, within the scope of its attributions, the function of national distribution authority, with responsibility for managing the **cryptographic** equipment of national and international bodies;
- Exercise the function of **central registry**, which is the national entity responsible for organising the reception, accounting, distribution and destruction of classified items;
- Provide the government with a secure infrastructure and the administrative, logistic, electronic communications and information processing resources necessary for **crisis management**;
- Provide the government with a national and international **conference centre**;
- Operate the government's **postal service**.

Source: The Government of the Grand Duchy of Luxembourg (2021[47]), The CTIE: Remit, https://ctie.gouvernement.lu/en/l-administration/Attributions.html (accessed on 15 June 2022).

While it is understandable that public sector organisations are in the habit of consulting CTIE as the first point of contact for implementing IT solutions, reinforcing the strategic role of MDIGI in promoting and implementing a transformation that is not just from analogue to electronic, but one that involves a system-wide change in mindset, culture and ways of working will be highly beneficial. As mentioned in the beginning of this chapter, digital transformation should not be technology-driven but value -, result- and people-driven, holistic, horizontal and coherent throughout the public sector.

In this sense, the government of Luxembourg has taken a step in right direction by establishing MDIGI in 2018. With the COVID-19 crisis putting back into focus the value and importance of governing digital well, MDIGI is presented with a golden opportunity to take on the full leadership and responsibility for advancing the digital government agenda *de facto* and *de jure* – with the support of CTIE on IT project implementation. However, given that a significant number of public sector organisations are in the habit of "relying" on CTIE for their digital transformation, it would be advantageous in this context to change the paradigm of how public sector organisations work with MDIGI and CTIE.

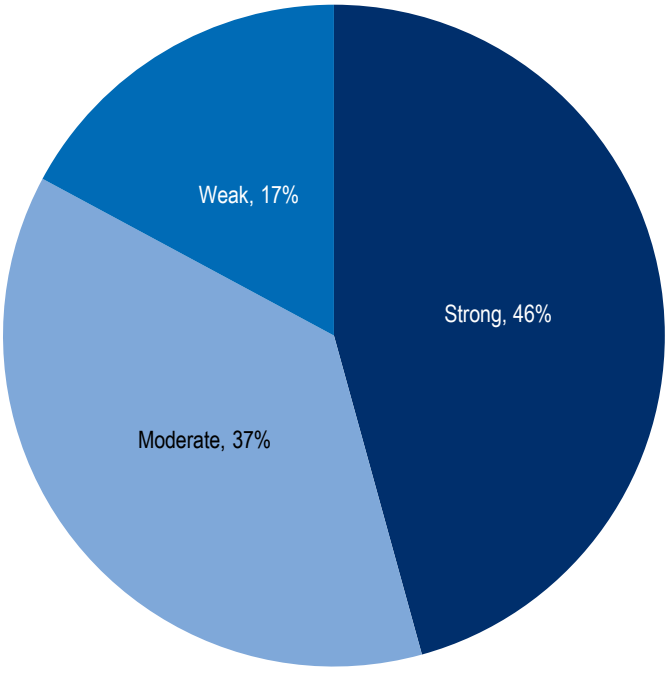
For instance, the mindset that CTIE is the administrative body that helps with IT solutions and that it should assist public sector organisations entirely with their implementation can be changed to one that sees MDIGI as the first point of contact and consultation for formulating their institutional digitalisation strategy in line with the Electronic Governance Strategy 2021-2025, the CTIE's service offerings, and the organisation's capacity. This exercise would be most effective when undertaken on the basis of shared leadership and responsibility with the public sector organisation, meaning that MDIGI should purposefully encourage and empower all ministries and administrations to be accountable for their own digital transformation and to partner with, rather than be fully reliant on, the CTIE for resources and supporting the change. This point is further substantiated with the fact that the Electronic Governance Strategy 2021-2025 was proposed and approved by all the ministries in Luxembourg that are members of the Inter-Ministerial Committee for Digitalisation and by the Government Council in 2021. As such, this mechanism for strategic co-operation promotes shared leadership and responsibility for the digital government agenda.

Despite all ministries having a representative in the Inter-Ministerial Committee for Digitalisation, four of the 39 ministries and administrations surveyed in the OECD Digital Government Survey of Luxembourg indicated that they do not know if Luxembourg has a national digital government strategy. Out of 35 that do know, 46% of them see the national strategy as strongly relevant for them at the organisational-level,

37% view the relevance as moderate and 17% indicate the relevance as weak (OECD, 2021[44]) (Figure 2.7).

This highlights a key opportunity for MDIGI and the ministry representatives in the Inter-Ministerial Committee for Digitalisation to direct efforts into better communicating, sharing information and engaging with their respective administrations on the vision, objectives and real relevance of the Electronic Governance Strategy 2021-2025 for them. With this knowledge, public sector organisations and their civil servants can be better positioned and empowered to formulating and implementing their institutional digitalisation strategy that is, at the same time, coherent and aligned with the national one. Table 2.6 shows that 39% of ministries and administrations do not yet have a formal institutional digital strategy and 33% will stand to benefit from consulting with MDIGI and CTIE about their institutional digital strategy.

Figure 2.7. Perceived relevance of the national digital government strategy for ministries and public sector organisations



Note: Based on the responses of 35 government stakeholders who answered yes to question 1.1.2 “Does your central government have a national digital government strategy?“ and question 1.1.3 “If yes, rank the relevance that the national digital government strategy has for your institution (e.g. mandates, alignment and relevance of the central strategy’s goals with your institutional goals, etc.).”
Source: OECD (2021[44]), *Digital Government Survey of Luxembourg: Ministries and Administrations* (unpublished).

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Table 2.6. Availability of a formal digital strategy within ministries

	Does your ministry or administration have a formal digital strategy to support your institution's operations and broader policy and service delivery objectives?			
Response	Yes, a stand-alone digital strategy in line with broader institutional and policy goals.	Yes, but not a stand-alone strategy. The digital strategy is integrated as a component of other national broader strategies, e.g. as a specific sub-strategy, action plan or similar.	No, there is no formal strategy. However, some digital initiatives are usually integrated in our ministry's operational, policy or service delivery strategies.	No
Percentage of ministries and administrations	23%	33%	39%	5%

Note: Based on the responses of 39 government stakeholders to question 1.2.1 "Does your ministry or administration have a formal digital strategy to support your institution's operations and broader policy and service delivery objectives?"
Source: OECD (2021[44]), *Digital Government Survey of Luxembourg: Ministries and Administrations* (unpublished).

Looking ahead as the government of Luxembourg advances in its digital maturity, it is paramount for MDIGI to lead and co-ordinate well with other ministries and administrations to mobilise a whole-of-government digital transformation that is coherent, integrated and effective – especially leveraging the Inter-Ministerial Committee for Digitalisation that MDIGI and CTIE presides over. Strengthening the mandate and role of MDIGI as the organisation-in-charge of this purpose on the one hand, while clearly informing, consulting and engaging with government stakeholders on how digital government could be understood as a shared imperative on the other hand will, therefore, be beneficial to that effect.

The Government Chief Information Officer (CIO) in Luxembourg

Clear and stable leadership is also instrumental in reinforcing the governance of digital government. Good leadership sets out a vision, creates an environment that supports digital transformation and actively champions the extensive change involved (OECD, 2021[48]). In Luxembourg, the government CIO is the director of CTIE and together with the government counsellors of MDIGI, all of them sit in the cabinet of the MDIGI. The leadership of CTIE, MDIGI and other ministries work together closely and frequently, for example in the Inter-Ministerial Committee for Digitalisation (more on high-level co-ordination will be discussed in the next section).

Experience drawn from the E-Leaders indicate that the perception of the government CIO is to focus on strategic and system-wide decision-making. The government CIO can be purely an administrative role (e.g. the **United States**), shared with a ministerial role (e.g. **Colombia**) or one that reports to a minister (e.g. **New Zealand**) (OECD, 2021[3]) (Box 2.5).

Box 2.5. Government CIOs in the United States, Colombia and New Zealand

United States

The United States' government CIO is the Federal CIO and the administrator of the Office of Electronic Government that is part of the Office of Management and Budget. The Federal CIO oversees federal technology spending, federal IT policy and strategic planning of all federal IT investments. The CIO Council is the principal interagency forum that gathers the Federal CIO, the Deputy Federal CIO, the Federal Chief Information Security Officer and all the CIOs of the various government departments and agencies to improve agency practices related to the design, acquisition, development, modernisation, use, sharing and performance of federal information resources.

Colombia

Colombia's government CIO is the Head of Digital Government at the Ministry of Information and Communication Technologies who has the function of planning, organising, co-ordinating, managing and controlling the use of IT and digital technologies. Colombia's CIO is a leader that is charged with generating strategic value through the management of digital and IT; is part of a network with the National Digital Commission, national sectoral, entity and territory CIOs; and acts on various structures in the branches, sectors, territories, Directive Committee and IT officers.

New Zealand

New Zealand's government CIO has the title of Government Chief Data Officer (GCDO) and is also the Chief Executive of the Department of Internal Affairs. The GCDO is positioned as the functional leader for the use of ICT/digital in government and is responsible for enabling ICT-enabled transformation across government agencies to deliver better services to citizens – specifically: (i) setting digital policy and standards; (ii) improving investments; (iii) establishing and managing services; (iv) developing capability; and (v) system assurance.

Source: OECD (2021[3]), *The E-Leaders Handbook on the Governance of Digital Government*, OECD Digital Government Studies, OECD Publishing, Paris, https://doi.org/10.1787/ac7f2531-en; U.S. The Chief Information Officers Council (n.d.[49]), "Purpose and Vision: What We Do", https://www.cio.gov/about/vision/ (accessed on 15 June 2022); New Zealand Government (2020[50]), https://www.digital.govt.nz/digital-government/leadership/government-functional-leads/government-chief-digital-officer-gcdo/ (accessed on 15 June 2022).

In the case of Luxembourg, the government CIO is very active in strategic decision-making and policy implementation linked with digital government. Besides being the director of CTIE and a member of the MDIGI cabinet, the current government CIO in Luxembourg is also the president of the Inter-Ministerial Committee for Digitalisation (shared presidency with the MDIGI), and the president of the Government's Sectoral Committees for Interoperability (CSI) under the National Committee for Interoperability (CNI). At the same time, the government counsellors of MDIGI collaborate with the government CIO in defining, developing and implementing the digital government agenda.

However, findings from the OECD peer review mission indicate that there is untapped potential for MDIGI to also incorporate an administrative leadership role of empowering and creating opportunities for greater alignment and sharing among CIOs across the public sector of Luxembourg. To address this gap, MDIGI and CTIE are currently developing an Advisory Service for Digitalisation to support ministries and administrations in setting up their own digitalisation strategy in line with the goals of the Electronic Governance Strategy 2021-2025. The process includes a Digital Maturity Assessment.

To fully secure a robust and stable leadership, it is important for the leadership of the "organisation-in-charge" to be able to operate in an environment that is conducive to its consistency and sustainability. This includes strong institutional co-ordination and collaboration mechanisms as mentioned above, and the hierarchical importance and legal basis (e.g. legislation, decree) of these positions would need to sufficiently empower the function to lead the digital government agenda beyond political cycles. As MDIGI matures with time, continuing to cement a strong relationship and alignment in governance and leadership between MDIGI and CTIE will be consequential for promoting long-lasting and tangible digital transformation of the public sector.

Co-ordination and collaboration within the public sector and ecosystem

Co-ordination, co-operation and collaboration are three key processes that favours coherence and supports the effective design and implementation of policies. Institutionalised arrangements and mechanisms that support these processes help to mitigate policy siloes, gaps and inaction, while encouraging exchanges of know-how, practices and skills. Achieving a public sector culture that supports sound co-ordination, co-operation and collaboration is, therefore, chief for good public governance and cultivating a dynamic digital government ecosystem.

Principles 5, 6 and 7 of the OECD *Recommendation of the Council on Digital Government Strategies* (2014[1]) spotlight the significance of promoting inter-ministerial co-ordination and collaboration, and engagement and co-ordination of relevant agencies across levels of government to pursue the digital government agenda. Drawing on the experiences and practices of OECD member and non-member countries (OECD, 2021[3]), governments typically rely on three forms of co-ordination:

- **High-level co-ordination** that brings together ministers and secretaries of state to ensure that the leadership of public sector organisations are aligned in the implementation of the national digital government strategy and its policies *vis-à-vis* other policy strategies and areas of reform;
- **Organisational and technical co-operation** that harmonises the tactical and operational aspects of implementation across public sector organisations, thereby building horizontal alignment and coherence within and across levels of government;
- **Civic collaboration** that covers the open engagement and participation of relevant public, private and civil society stakeholders in the digital government to ensure an inclusive, equitable and sustainable digital transition.

High-level co-ordination within the public sector

First, a little over a year after the establishment of MDIGI in February 2020, the government of Luxembourg agreed on the implementation of digital governance for the public sector comprising an Inter-Ministerial Committee for Digitalisation and a High Committee for Digital Transformation.

The Inter-Ministerial Committee for Digitalisation was established to co-ordinate ministries in the development and implementation of strategy and initiatives for digital government and the digitalisation of public services until 2025. It also aims to strengthen the governance of digital government and improve the coherence and cohesion of digital transformation in the public sector, in line with the Electronic Governance Strategy 2021-2025. Under the leadership and co-presidency of MDIGI's first government advisor and the government CIO, it brings together representatives of all ministries on a high-level platform for horizontal co-ordination on digital government strategies and action plans, sharing best practices and creating synergies among the ministries and administrations in Luxembourg.

The High Committee for Digital Transformation that is under the mandate of MDIGI is not yet operational due to delays related to the COVID-19 crisis. It is envisioned to bring together the minister for digitalisation, minister delegate for digitalisation, other ministers relevant for the development of digital government on one side, and the private sector, labour unions, non-governmental organisations and IT experts or public research representatives on the other side – to discuss national digital transformation, which includes digital government, economy, skills and society etc. The High Committee for Digital Transformation is planned to be launched by September 2022. Making this committee fully operational in the short term would be beneficial for the right and timely implementation of the Electronic Governance Strategy 2021-2025 as several initiatives require strong partnerships and involvement of external stakeholders.

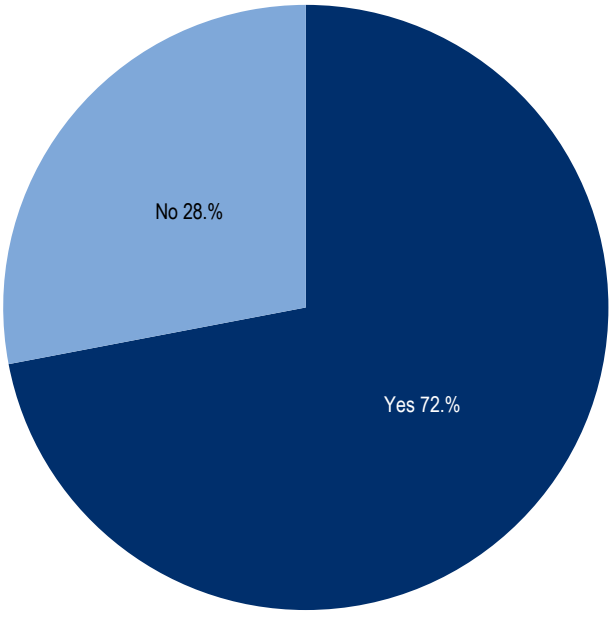
Second, with digital inclusion being one of the four strategic axes for MDIGI, the Inter-Ministerial Working Group for Digital Inclusion was created in 2019 comprising representatives from 18 ministries to discuss the development of the National Digital Inclusion Plan 2021-2025 that was adopted in September 2021.

Co-ordinated by MDIGI, the Inter-Ministerial Working Group for Digital Inclusion took stock of current government actions on digitalisation and digital inclusion, thereby producing a catalogue of projects that various public sector organisations are intending to implement to promote digital inclusion. The National Digital Inclusion Plan 2021-2025 will be evaluated annually by MDIGI and the Inter-Ministerial Working Group for Digital Inclusion (Chronicle.lu, 2021[51]).

These are two more prominent high-level co-ordination bodies amongst other inter-ministerial co-ordination committees, advisory committees and working groups that have been set up to work on priority areas like AI, technology and ethics. Yet, as relatively new initiatives, findings from the OECD peer review mission demonstrated that much still needs to be done to truly formalise and maximise the value of high-level political and administrative co-ordination and translate this into tangible institutional co-operation at the organisational and technical levels to reap the results.

The results of the OECD Digital Government Survey of Luxembourg (2021[44]) also denote that more can be done to institutionalise and make inclusive these co-ordination bodies as 36% of government stakeholders that responded are not aware of any formal public sector body for institutional co-ordination. Of the 64% that do know of at least one, 46% are part of these co-ordination bodies while the remaining 18% are not (Figure 2.8).

Figure 2.8. Ministries and public sector organisations represented in a body for inter-institutional co-ordination on digital government policies



Note: Based on the responses of 39 government stakeholders to question "If yes, does your institution participate as a member of such co-ordination body?" after having answered yes to "Is there a formal public sector body in place to enable inter-institutional co-ordination between ministries and administrations responsible for the implementation of digital government projects (e.g. steering committee, board of government CIOs?"
Source: OECD (2021[44]), *Digital Government Survey of Luxembourg: Ministries and Administrations* (unpublished).

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Moreover, out of 46% of the surveyed government stakeholders that know of a formal co-ordination body and participate in it, less than one-third of this group found it to be an effective mechanism in reflecting their institutional needs and priorities while more than two-thirds appraised it to be moderately effective (OECD, 2021[44]). Currently, the Inter-Ministerial Committee offers its members the possibility to present their new projects, exchange on their needs, developments or simply request more information on subjects of interest. This working process can be developed further into communities of practice or discussion sessions on how members can better co-ordinate on specific projects or solutions in the pipeline.

Another reason is that while the co-ordination body aims to identify institutional digitalisation needs and address them, government stakeholders find that the priorities for implementation defined by MDIGI and CTIE are not as clear as they would like them to be. One more salient reasoning pointed out that given the diverse group of stakeholders involved, the applicability to specific policy areas and the follow-up supervision was relatively limited.

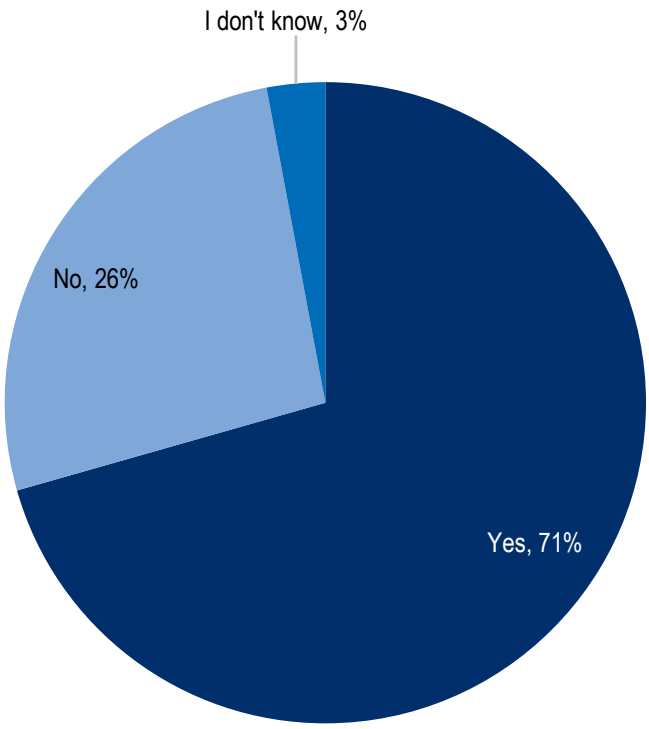
Furthermore, among the government stakeholders that know of the national digital government strategy, 57% of surveyed public sector organisations did not participate in the formulation of the strategy, 26% said that they did while 17% were not sure (OECD, 2021[44]). These aforementioned points underline that the arrangements and mechanisms for high-level co-ordination in the government of Luxembourg can hugely benefit from becoming more open and clearer in the engagement of public sector organisations from the outset of designing any policy, and setting in place accountability mechanisms to ensuring follow-up action that is coherent and aligned yet tailored to individual policy areas.

Organisational and technical co-operation within the public sector

As regards organisational and technical co-operation, the government of Luxembourg has made noteworthy advances in the governance of interoperability at the national and sectoral levels in 2021. The CNI comprises representatives of relevant sectors and seven CSI: legislative power; central government; judiciary; municipalities; education sector; health sector; social security sector – all of which manage and organise themselves autonomously. MDIGI has additionally set up the Competence Centre for Interoperability (CCIOP), which provides support to the secretariats of the CNI and CSI, and co-ordinates activities and initiatives related to the National Interoperability Framework (The Government of the Grand Duchy of Luxembourg, 2022[52]).

MDIGI has also done well in co-operating with a large number of ministries and administrations –71% of surveyed government stakeholders indicated that the representative responsible for leading and co-ordinating digital government policies in their public sector organisation (e.g. CIO, digital ambassador, IT personnel) is doing so with MDIGI while 29% do not or are not sure (OECD, 2021[44]) (Figure 2.9).

Figure 2.9. Ministries and public sector organisations having a body or role responsible for co-ordinating digital government policies with the Ministry for Digitalisation



Note: Based on the responses of 34 government stakeholders to question 1.3.3 "Is there an individual or team within your ministry or administration responsible for leading and co-ordinating digital government policies with the leading public sector organisation on digital government at the central level?"
Source: OECD (2021[44]), *Digital Government Survey of Luxembourg: Ministries and Administrations* (unpublished).

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Looking ahead in advancing governance maturity, the government of Luxembourg could consider formalising these institutional working relationships in order to expand the reach and impact of MDIGI. The current way of working in the public sector of Luxembourg relies largely on informal, ad-hoc and existing internal networks – a cultural fact given the relatively small size of the government and longstanding organisational structures and roles within the public sector. While this can be beneficial to rapidly advance on specific initiatives, it can limit strategic alignment and communication between MDIGI and other public sector organisations. In order to truly facilitate horizontal co-operation at the organisational and technical levels throughout the public sector, the government of Luxembourg could aim at making accountability, ownership, inclusiveness, transparency and stakeholder engagement at the heart of all co-operation mechanisms. These institutional mechanisms could focus on harmonising the thinking, culture and approaches behind the public sector digital transformation agenda.

One effective way is to embed these suggested institutional mechanisms for better alignment and communication in the Inter-Ministerial Committee for Digitalisation. This can ensure that information and the awareness of opportunities for co-operation is properly passed on from the ministerial representatives in the Inter-Ministerial Committee for Digitalisation to civil servants working in their own or other ministries and administrations that they can collaborate with. This in turns strengthen the knowledge and capacity to take concrete action on digitalisation at the institutional level. Another current example is a special working

group that has been set-up to develop and implement the once-only principle with thematic groups. This can serve to raise awareness and foster co-operation on these technical issues.

Collaboration with the digital government ecosystem

Finally, building on Luxembourg's relatively strong level of digital maturity, the government can consider creating more opportunities for open exchange and engagement with relevant stakeholders in the broader digital government ecosystem comprising citizens, civil society and the private sector – thereby creating space for accountability, ownership, innovation and agility across various entities and sectors, and enabling a system-wide digital transformation of the public sector, economy and society.

Efforts to inform, consult and engage with these stakeholders at the central and municipal levels can be ramped in tandem with the roll out of the National Digital Inclusion Plan 2021-2025. In regards to the private sector, the MDIGI can look towards increasing its engagement with stakeholders such as the Luxembourg Chamber of Commerce and Luxinnovation to boost the development of its GovTech ecosystem. The recent establishment of the GovTech Lab is a good initiative in this light. It is a common project managed between MDIGI and CTIE, which has the goal of promoting the culture of open innovation and a co-creative approach to the digitalisation of public services by finding creative and novel solutions from the market.

To manage all these efforts, the government of Luxembourg can benefit from setting up a formal body that strategises, organises and promotes collaboration with the digital government ecosystem to undertake initiatives such as the "Zesumme Vereinfachen" platform and the GovTech Lab's events and activities (Box 2.6). The High Committee for Digital Transformation in Luxembourg has this mission to manage this collaboration with stakeholders in the digital government ecosystem. The undertaking of the above-mentioned initiatives will, therefore, be assured with the creation of this strategic co-ordination governance body by September 2022.

Box 2.6. Collaborative initiatives with civil society and the private sector in Luxembourg

"Zesumme Vereinfachen" Platform

In February 2022, the MDIGI launched ZESUMME-VEREINFACHEN.LU (zesumme-vereinfachen.lu) as a continuation of the programme Einfach Lëtzebuerg from March 2016. Zesumme Vereinfachen is an online participation platform where all citizens, businesses and organisations can directly share their opinions, suggestions and ideas on how administrative simplification and the digitalisation of public services should be pushed forward through new processes and initiatives.

This platform collects public contributions in order to continuously adapt, develop and redesign existing and planned administrative procedures and public services in accordance with user needs, demands and preferences, and in collaboration with ministries and administrations. Users can suggest points for improvements and future developments. These proposals can then become new projects.

Currently, the platform has two projects:

- Collection of feedback on the MYGUICHET.LU (myguichet.lu) app through user participation in a satisfaction survey, specific feedback on existing features, and ideas or preferences on the development of future features;
- Receiving proposals for simplifying existing administrative procedures on the GUICHET.LU (guichet.lu) portal, which entails a write-up, technical details or plans, examples and videos.

The GovTech Lab

Since its establishment, the GovTech Lab has conducted and is planning events aimed at facilitating exchanges and collaborations between the public and private sectors: from social events to hackathons and focused workshops to generate ideas for innovative solutions in specific areas.

The GovTech Lab relies on two tools to launch call for solutions with market players:

- Innovation partnerships, as a new approach to public procurement by developing solutions that do not exist in the market;
- SpeedUP, which allows for the rapid implementation of existing solutions in the market.

In 2022, the GovTech Lab launched as well a pilot project for ministries and administrations to share ideas or propositions on how to further develop the digitalisation of public services. Through "*Meng Iddi zielt!"* (*My idea counts!)* Ministries and administrations can participate in challenges launched by the GovTech lab on how to further develop public services.

Zesummen Digital

In line with the National Digital Inclusion Plan 2021-2025, available on Luxembourg's official portal for digital inclusion zesummendigital.public.lu, the government of Luxembourg is undertaking a series of sustainable actions to ensure that digitalisation is an economic and social lever for all. These actions include regular consultation and information sessions, digital skills training organised by various organisations and businesses, the establishment of digital public spaces with WIFI access, home assistance services, ICT tool rentals or ICT products and services offers.

Source: Information provided by MDIGI; The Government of the Grand Duchy of Luxembourg (2022[53]), "Let's simplify together! For digital public services that make your life easier.", https://www.zesumme-vereinfachen.lu/ (accessed on 15 June 2022); The Government of the Grand Duchy of Luxembourg (2022[54]; [55]), "Agenda" and "Call for solution", https://govtechlab.public.lu/en/agenda.html and https://govtechlab.public.lu/en/call-solution.html (accessed on 15 June 2022); The Government of the Grand Duchy of Luxembourg (2022[56]), "Actions", https://zesummendigital.public.lu/en/actions.html (accessed on 15 June 2022).

Such initiatives have also been undertaken in other OECD member countries, including **Finland**, **Spain** and the **United Kingdom** that demonstrates the government of Luxembourg's strong awareness and capacity to engage with external stakeholders **(**Box 2.7**)**. Namely, Spain's City Observatory is similar to Luxembourg's "Zesumme Vereinfachen" Platform, and the United Kingdom's activities to support co-design with users are also similarly planned to be done by the GovTech Lab and the Zesummen Digital in Luxembourg.

Box 2.7. Similar good practices in OECD member countries

Finland

Finland regularly involves the whole digital government ecosystem including the private sector on the development of public services from legislation to service design and delivery. The government of Finland had put out an open letter on the Further Digitalisation Project to collect ideas from the whole digital government ecosystem including the private sector on the development of public services. Finland's Act on Information Management in Public Administration 906/2019 was developed openly on Google Docs for the private sector and civil society to contribute. The adoption of AI in the public sector was conducted through public-private-people partnerships (PPPP) to ensure the design of citizen-centric services based on AI.

Spain

The Madrid City Council of Spain developed and implemented a permanent deliberative body called City Observatory in 2019 comprising randomly selected citizens who are nonetheless representative of the population. It holds the mandate to propose and address solutions for societal well-being through regular meetings. The proposals are received through an online platform "decide.madrid". Over the years, the function and composition of City Observatory was reorganised and now comprises politicians and civil servants.

United Kingdom

The United Kingdom's Open Policy Making Toolkit is a manual that contains information, tools and techniques for policy makers to design more open and user-led policies. It supports policy makers in open policy making that is agile, includes co-design with users, relies on open data and user research, and shows how to measure its impact and success. "Co-designing with users" demonstrates how to work with users to understand their pain points and deign policies, products and services that solve their problems. This direct engagement with users, who would largely be citizens, ensures that the people who are most impacted are involved, consulted and share ownership of the process. The engagement can take the form of workshops, hack days and idea jams.

Source: OECD (2021[3]), *The E-Leaders Handbook on the Governance of Digital Government*, OECD Digital Government Studies, OECD Publishing, Paris, https://doi.org/10.1787/ac7f2531-en.

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Notes

[1] The E-Leaders refers to the OECD Working Party of Senior Digital Government Officials, which was established to foster knowledge sharing and peer-to-peer learning to support policy makers around the world in advancing digital government policies' design and implementation for the benefit of economies and societies. It serves as a safe space for international co-operation, in collaboration with OECD member countries and invited non-member countries, based on their experiences of "what works and what does not work" to overcome policy challenges, seize policy opportunities and improve policy impact.

[2] The OECD Going Digital Toolkit helps countries navigate digital transformation, which affects many aspects of the economy and society in complex and interrelated ways. This policy instrument is based on a framework of seven policy dimensions: 1) access to communications infrastructures, services and data; 2) effective use of digital technologies and data; 3) data-driven and digital innovation; 4) good jobs for all; 5) social prosperity and inclusion; 6) trust in the digital age; and 7) market openness in digital business environments. The Toolkit maps a core set of indicators to each of the seven policy dimensions and provides a benchmarking exercise for OECD member countries and key partners. For more information, see: https://goingdigital.oecd.org/.

[3] See: https://www.oecd.org/fr/gov/a-to-z-public-governance.htm for the definitions of public governance terms.

[4] G2G stands for government to government.

[5] G2C stands for government to consumer.

[6] G2B stands for government to business.

3 Policy levers, talent and skills for digital government in Luxembourg

This chapter first discusses the policy levers needed to enhance the governance of digital government and capacity for implementation of public sector digitalisation in Luxembourg. The policy levers include the strategy and plan for digital government, project and financial management tools and mechanisms, and lastly, regulation and standards. Drawing on the OECD Framework for Digital Talent and Skills, this chapter also discusses the work environment, skills and activities to establish and maintain a workforce that can support Luxembourg's digital government maturity.

Introduction

Analysing Luxembourg's contextual factors and institutional models (in Chapter 2) is important as the foundation and framework for governing the public sector digital transformation process. Equally essential is taking stock of the public sector capacity for digital transformation, manifested through policy tools, talent and skills that the organisation-in-charge, the leadership and other stakeholders can leverage and engage with to ensure a coherent, effective and sustainable digital transformation. This chapter covers a preliminary analysis of Luxembourg's existing policy levers on the one hand, and approach to talent and skills fit for the digital age on the other hand – in order to identify areas to improve public sector capacity for digital transformation.

Policy levers

Under the OECD Framework on the Governance of Digital Government, policy levers are "hard or soft instruments that policy makers can leverage to enable system-wide change in the public sector from strategy to implementation and delivery" (OECD, 2021[1]). They range from the development and implementation of the strategy and plan to tools and mechanisms for project and financial management, and regulations and standards as the legal and normative basis for guiding change and actions in line with fundamental values and rights (see Figure 3.1).

This framing of policy levers draws on Pillar 3 of the OECD *Recommendation of the Council on Digital Government Strategies* (2014[2]) "Capacities to Support Implementation" in which the provisions call for clear business cases, capacities to manage and monitor projects, procurement of digital technologies based on an assessment of existing assets, and general and sector-specific legal and regulatory frameworks that allow digital opportunities to be seized. The provisions of Pillar 1 "Openness and Engagement" are taken into consideration where applicable to allow the participation of stakeholders in the strategy development, management, financing and regulatory processes.

Policy levers set the foundation on which key enablers for digital government and data are built on and realised, such as interoperability, digital identity and digital signatures. Using policy levers strategically can improve the overall efficiency and effectiveness in policy design, implementation and transformation, by ensuring alignment, streamlining efforts and fostering synergies of digital government projects across the public sector and ecosystem.

Figure 3.1. The OECD Framework on the Governance of Digital Government: Policy levers

The dimensions and sub-dimensions of Facet 3: Policy levers

Dimension 3.1 Strategy and plan

- Sub-dimension 3.1.1 Autonomy and alignment with other policy strategies
- Sub-dimension 3.1.2 Collaborative and inclusive development
- Sub-dimension 3.1.3 Action plan and investment plan
- Sub-dimension 3.1.4 Monitoring and impact assessment

Dimension 3.2 Project management tools

- Sub-dimension 3.2.1 Value proposition – business cases
- Sub-dimension 3.2.2 Agile project management
- Sub-dimension 3.2.3 Procurement of ICT/digital technologies

Dimension 3.3 Financial management mechanisms

- Sub-dimension 3.3.1 Budgeting/budget threshold
- Sub-dimension 3.3.2 Co-funding

Dimension 3.4 Regulations and standards

- Sub-dimension 3.4.1 Regulatory frameworks
- Sub-dimension 3.4.2 Standards, principles and guidelines
- Sub-dimension 3.4.3 Regulatory co-operation with industry players

Note: Facets refer to the fundamental features of governance. Dimensions are the main elements that make up each facet. Sub-dimensions are the sub-elements that form each dimension. The following analysis is based on these sub-dimensions.
Source: OECD (2021[1]), *The E-Leaders Handbook on the Governance of Digital Government*, OECD Digital Government Studies, OECD Publishing, Paris, OECD Publishing, Paris, https://doi.org/10.1787/ac7f2531-en.

Strategy and plan

The digital transformation of the public sector is a cross-cutting, intensive, complex, long and continuous journey that involves the whole-of-government and support from the private sector and civil society. The government of Luxembourg demonstrates that it understands what is required to mobilise resources towards the goal of having a public administration that "[makes] people's lives easier" (The Government of the Grand Duchy of Luxembourg, 2021[3]) and has the political will to achieve this goal as it created a specific line ministry for this purpose in December 2018, the Ministry for Digitalisation (MDIGI).

From the outset, what is needed to support the governance of this process in any country is a national digital government strategy and its accompanying plans for a specified time frame, a specific vision, goals and objectives that have corresponding delineated actions that should be implemented by different parts of the public administration and broader public sector. This strategy should also be well aligned with other policy strategies (e.g. technology, innovation, openness, integrity, green transition, education, and well-being) yet prominent to the extent that it is still seen as a priority on the political and policy agenda of the government. Given the nature of digitalisation touching on all policy areas, this systemic thinking and culture is crucial to foster policy coherence and cohesion. One way to do so is to involve stakeholders in the development of the strategy, plans and their implementation. Collaboration across the public sector, with the participation of the private sector and civil society builds shared responsibility and ownership for this pivotal agenda.

With this regard, the mission and initiatives of the MDIGI are framed through four strategic axes (see Box 3.1). In alignment with these axes, the priorities and strategic actions needed to materialise this vision are reflected in the Electronic Governance Strategy 2021-2025 (The Government of the Grand Duchy of Luxembourg, 2021[4]) that was drawn up by the Ministry for Digitalisation and the State Information Technology (IT) Centre (CTIE), and adopted by the Government Council in February 2021 (see Box 3.2). After the adoption, the MDIGI and CTIE established a roadmap with concrete actions for its implementation as well as within and with the Inter-ministerial Committee for Digitalisation.

Box 3.1. The Ministry for Digitalisation's Four Strategic Axes

The Ministry for Digitalisation has set itself the goal of successfully achieving digital government. For this purpose, its mission is driven by four strategic principles that inform actions, initiatives and policies.

1. Developing eGovernment

Based on the objectives stipulated in the government's coalition agreement, the Ministry for Digitalisation has major ambitions for the digitalisation of the State's administrations. The goal is to facilitate processes for citizens and companies by providing them with digital government services, which are user-friendly, innovative and accessible to all. In parallel, the Ministry intends to accelerate the State's technological innovation for the benefit of its citizens and companies through initiatives such as events, challenges or hackathons on technological innovation.

2. Advancing administrative reform

The government has been committed to administrative reform and simplification for several years now and much progress has already been made. However, the simplification of administrative formalities and procedures is continually evolving. Drawing on technological advances in particular, the Ministry for Digitalisation intends to carry on the government's commitment to provide a simple and predictable framework for citizens and companies in their relations with the State. Within the administrative simplification framework, the Ministry is also relying on an "open innovation" and "collaborative innovation" approach.

3. Promoting digital inclusion

One of the Ministry's main areas of focus concerns digital inclusion, the process of making digital technology accessible to all individuals and providing them with the necessary digital skills to additionally leverage their social and economic inclusion. This mission reflects the government's commitment to include all citizens in the digital transformation of our society and, in turn, counteract the threat of an eventual digital divide.

4. Integrating new technologies

The adoption of new technologies accompanies and accelerates the digital transformation of our society. The Ministry for Digitalisation intends to boost digitalisation and innovation in the public sector by promoting technologies such as big data, blockchain, artificial intelligence, Internet of Things, data anonymisation, and many others.

Note: The text provides a short summary. For the full text, see the sources directly.
Source: The Government of the Grand Duchy of Luxembourg (2021[5]), "'Strategic axes: Four strategic axes for a common goal'"; The Government of the Grand Duchy of Luxembourg (2021[4]), "'Electronic Governance 2021-2025' strategy".

Box 3.2. Key Areas of Focus in the Electronic Governance Strategy 2021-2025

High quality online public services

The Strategy highlights a number of principles to be complied with when public services are digitalised, so that citizens and businesses can be offered public services that meet their needs:

- Promote transversal digital accessibility (i.e. cross-border accessibility; accessibility for all skill levels; cross-media accessibility)
- Develop user-centred services (i.e. rely on citizen participation and the private sector to create new online services; personalised online services)
- Attractive online public services (i.e. simple, fast and consistent online procedures; ergonomic and attractive interfaces; end-to-end digital experience for administrative interactions)
- Invest in citizen's trust in the state (i.e. a global overview of citizens' interactions with the authorities; a consolidated online government information policy; highest personal data protection; quality and guaranteed availability of online services)

Towards a fully digital administration

The Strategy analyses the essential conditions required by the central civil service administration to meet society's needs efficiently.

- Facilitate the transition to an efficient paperless administration (i.e. dematerialised and collaborative organisational flows; good quality data; in-depth knowledge of cases and more efficient processing)
- Have an IT environment favourable to new modes of working (i.e. teleworking and staff mobility)
- Have a competent, agile and reliable central IT partner (i.e. skills; agility; availability and confidentiality)

The six principles for the development of an efficient e-administration

- Once only
- Digital by default
- Inclusiveness and accessibility
- Openness and transparency
- Trustworthiness and security
- Interoperability and standardisation

Note: The text provides a short summary. For the full text, see the sources directly.
Source: The Government of the Grand Duchy of Luxembourg (2021[5]), "Strategic axes: Four strategic axes for a common goal"; The Government of the Grand Duchy of Luxembourg (2021[4]), "Electronic Governance 2021-2025' strategy".

This strategy and the mission of the MDIGI follow a path of top political priority awarded to digitalisation in Luxembourg. For example, the "Digital Luxembourg" Initiative that was launched further back in June 2014 by the Government Council. The "Digital Luxembourg" is an overarching digitalisation project for Luxembourg with the aim of promoting the IT, information and communication technology (ICT) and high-technology sectors in the government, economy and society. "E-administration", "e-government services" and "e-skills" were among many of the focus areas in the Strategy (The Government of the Grand Duchy of Luxembourg, 2014[6]).

Digital Luxembourg was created in October 2014 as a multi-disciplinary government initiative through which various ministries and administrations could work with public, private and academic players to consolidate the work in IT and ICT, and drive digitalisation across various policy domains (The Government of the Grand Duchy of Luxembourg, 2021[7]). With the creation of the MDIGI as the entity responsible for policy on digitalisation across sectors in Luxembourg, this initiative shifted its focus to communicating initiatives and activities with the wider digital ecosystem in the country. Today, Digital Luxembourg sits in the Department of Media, Connectivity and Digital Policy (SMC), and co-ordinated by the Minister of Communications and Media (The Government of the Grand Duchy of Luxembourg, 2018[8]).

During the 2021 European Semester and in the context of recovery from the COVID-19 crisis, the government of Luxembourg created the National Plan for a Green, Digital and Inclusive Transition as part of its National Reform Programme. In Section 3.4.3 on "digitalisation", the Plan took stock of Luxembourg's transition to e-government and digital government in recent years and showcased various initiatives taken over the COVID-19 period to further spur digitalisation in the public sector and in different policy areas (The Luxembourg Government, 2021[9]). As part of the Recovery and Resilience Plan, the government of Luxembourg has placed the development of ultra-secure connectivity solutions based on quantum technology within public and private sector, increasing the effectiveness and efficiency of public administrations and digital public services, and improved supervision of the financial market and tax system for a more transparent and equitable economy as three priorities in the third pillar "Digitalisation, Innovation and Governance" (The Government of the Grand Duchy of Luxembourg, 2021[10]).

Similarly, the development of digital government is framed within a set of different strategies that aim to advance the digital competencies of the public sector, namely: the 5G Strategy for Luxembourg published in November 2018, the Public Sector Blockchain created in 2019, the National Interoperability Framework adopted in March 2019, Artificial Intelligence: a strategic vision for Luxembourg created in May 2019, the Data-Driven Innovation Strategy adopted in May 2019 (see Chapter 4), the National Cybersecurity Strategy IV 2021-2025 published in October 2021, and the forthcoming Internet of Things (IoT) plan. It is important to communicate how the national digital government strategy ties in with the other digitalisation strategies or programmes that are technology- or domain-specific listed below. In some cases, such as the National Interoperability Framework, this link is more evident as it is included within the national digital strategy.

In this line, it would be beneficial to illustrate how the Electronic Governance Strategy 2021-2025 is linked with, fits within or exists alongside the AI Vision, the National Plan for a Green, Digital and Inclusive Transition, the Recovery and Resilience Plan and National Plan for Digital Inclusion. This is an important part of the policy making process, to demonstrate how digital government specifically contributes to the broader digitalisation agenda of the country. With the COVID-19 crisis, it is evident that digital government plays a critical role in driving and shaping an inclusive, equitable and sustainable digital transformation of the economy and society, and addressing the governance challenges that come with it (MITD, 2021[11]). The digital government strategy and the broader digitalisation strategies should be linked with robust governance measures and mechanisms (e.g. institutional, policy tools) that build coherence in the design and implementation processes. The visions, priorities and goals should also be complementary and converging in the long-term.

From an institutional perspective, it was noted during the course of this review the diverse capacities and maturity of ministries and administrations when addressing their digital transformation journeys. Going forward, the next iteration of the Electronic Governance Strategy 2021-2025 or the next digital government strategy could advance towards being accompanied with institutional action- and investment plans, and monitoring and impact assessments. In this line, ministries and administrations should progressively become more autonomous in implementing their digital transformation journeys following the standards, principles and priorities set by the MDIGI and the CTIE as national digital government authorities. Similarly, further efforts are needed to reinforce the role of the Inter-ministerial Committee to align ministries and administrations and to communicate in a clearer way the purpose, scope, and relevance of the strategy to them – or make sure that efforts conducted on this matter deliver intended outcomes. This is because 49%

of the surveyed ministries and administrations in Luxembourg considered the Electronic Governance Strategy 2021-2025 "moderate" or "weak" in terms of its relevance for them,[1] and some expressed difficulty in applying it within their organisations – eventually influenced by the fact that several initiatives within the strategy apply mostly to the role and function of the CTIE as centralised IT service provider. Two-thirds of the respondents also indicated that they had not been directly involved in the formulation of the Electronic Governance Strategy 2021-2025.[2] Since not all ministries and administrations were consulted, the key messages of the strategy and their relevance have not reached across the entire government. Together with an improved communication of strategy by the MDIGI and CTIE, ministries and administrations should also consider strengthening their internal communications regarding the importance of the strategy for their operations and services.

Such an approach could possibly overcome the currently fragmented development of digitalisation strategies, as 56% of surveyed ministries and administrations suggested that they have a formal strategy to support their own digital transformation. A favourable outcome would be that each public sector organisation has a degree of autonomy to produce and act on its own digital transformation plan and roadmap that is in line with the national digital government strategy, plan, and roadmap. In this line, the upcoming implementation of a dedicated service from the CTIE to support ministries and administrations in the definition of their own digital transformation journeys (aligned with national standards and priorities) can help close this gap. On the one hand, action and investment plans would serve the purpose of detailing the tactical, operational and financial aspects for the execution and implementation phases of the strategy, specifying the stakeholders involved in relation to each key performance indicator (KPI) and output, and the governance measures and mechanism supporting the process. On the other hand, prioritising a collaborative approach to developing and implementing the strategy can build legitimacy and create buy-in that is critical for activating stakeholders in the public sector and the digital government ecosystem.

Project and financial management tools and mechanisms

Common management tools and mechanisms are an indispensable way to secure capacity for the execution and implementation of the strategy and plans (OECD, 2021[1]). They can be used at all levels of the government to promote coherence, effectiveness and efficiency in the delivery of results for digital government projects and programmes. Standardised business cases, agile project management methodologies, public procurement processes, budgeting and co-funding mechanisms are all key policy levers that can create alignment in the digitalisation process across the public sector.

These project and financial management tools and mechanisms have been adopted widely in several OECD member countries, such as Canada, the Czech Republic, Denmark, France, Israel, Japan, Korea, Mexico, Norway and including Luxembourg (OECD, 2020[12]). Examples collected from the OECD Digital Government Index 2019 demonstrate that using these policy levers allow decision makers to show the benefit of digital government initiatives and grant public investment more easily. They also secure the needed governance processes by indicating the specific roles and responsibilities of all stakeholders who are involved in the projects and programmes, and the duties required of them to fulfil their specific tasks.

In Luxembourg, 51% of surveyed ministries and administrations noted that they develop business cases or similar value proposition assessments for digital government projects;[3] 54% said that there is a standardised model for digital government project management at the central government level;[4] 64% mentioned that there is a specific procurement strategy for ICT/digital technologies for the public sector[5] – and the reasons for the presence or lack thereof were all varied. This firmly validates that there is space to improve the communication (i.e. to raise awareness on their existence), deployment (i.e. to be easily accessible) and application (i.e. to create value from their use) of these standardised policy levers for all public sector organisations. It is expected that future initiatives such as the advisory service for digitalisation to be offered by the MDIGI and the CTIE to ministries and administrations can contribute to close this gap.

With the CTIE as the technical and operational backbone for Luxembourg's digital transformation in the public sector, it plays a primary role in pushing for the advancement of digital government projects. During the OECD peer review mission, a majority of public sector organisations expressed their hopes for the CTIE to pursue its transformation in order to have a greater capacity to fulfil the calling and the demand for digitalisation, from leadership to implementation capacity.

Building on the previous sub-section that suggests setting up KPIs, the CTIE should look towards maximising the full value of the clear view it has on its 800-over projects as well as the long tail of initiatives that are implemented by ministries and administrations and upon which the CTIE does not have current capacity to monitor and oversee. This means creating performance indicators based on this data and designing project management tools that are optimised for the projects. For business cases, that could entail the creation of a common language to be adopted by all stakeholders, rules and guidelines for the whole project lifecycle to be followed by all stakeholders; and requesting for information about potential benefits, risks and uncertainties (OECD, 2019[13]). A significant number of public sector organisations also expressed during the OECD peer review mission that the CTIE's internal work and decision-making processes should be more transparent: such as current project portfolio and pipeline, the prioritisation and selection criteria, and the roadmap and plans for digital government projects. Countries such as Australia, France and Ireland have implemented such systems and made data available in visual, open and machine-readable format to facilitate analysis by stakeholders within and outside the public sector.

Box 3.3. Monitoring and making transparent key digital transformation projects in France

In France, the Direction interministérielle du numérique (DINUM) has established a regular process to monitor key ICT/digital projects in the French administration. The Panorama des grands projets numériques de l'État (Overview of State's large digital projects) oversees digital transformation projects with overall budget over 9M euros or with high strategic relevance for the public sector (impact on users within and outside the public sector, associated risks, etc.).

The Panorama captures updates about the project implementation, progress, estimated costs and duration on a regular basis, upon which DINUM proposes corrective actions to public sector organisations and provides support to secure benefits realisation.

Additionally, DINUM publishes relevant key performance indicators (KPIs) in open and visual formats about progress of implementation, which fosters incentives for increased accountability and social control over ICT/digital expenditure in the public sector.

Source: Direction interministérielle du numérique (2022[14]) *Panorama des grands projets numériques de l'État*, https://www.numerique.gouv.fr/publications/panorama-grands-projets-si/ (accessed on 22 August 2022)

Furthermore, given that nearly all of Luxembourg's public sector IT, ICT and digital resources are concentrated at the CTIE and the pace of project delivery has become a challenge, agility will be a *sine qua non* condition in the long run. An agile approach to project management should also be embedded in these management tools and mechanisms. This calls for an efficient and effective design and execution of projects, such that opportunities are seized, risks are mitigated, and changes are made quickly based on continuous cycle of diagnosis, feedback and iteration (OECD, 2021[1]). Public servants outside the CTIE should have quick and easy access to information and resources on possible opportunities and openings for digital government projects, while CTIE officials are able to respond dynamically in contrast to a "waterfall" approach that encourages tasks to be undertaken in linear, systematic and rigid fashion (Welby and Tan, 2022[15]). In this sense, the work of the GovTech Lab can help tackle cultural resistance and risk aversion to more agile and iterative approaches. Similarly, the pilot initiative "My idea counts" (*Meng Iddi zielt!*) provides a safe space for sharing new ideas or projects that can be piloted through the GovTech

Lab and eventually scaled up for wide deployment across the administration. In this sense, Luxembourg could consider expanding the topics and coverage of the working groups as well as creating communities of practice that foster a bottom-up approach for sharing good practices and identifying common challenges that can be shared with and tackled by the MDIGI and CTIE, similarly to initiatives in the UK and Australia.

Box 3.4. Communities of practice in the UK

With the goal of fostering horizontal collaboration and peer learning, the United Kingdom's Government Digital Services set a community programme for government officials and practitioners working on digital, data and technology projects. Communities of practice are one of the foundational pillars of GDS' Service Standard, which promotes a coherent framework for public sector organisations to digitalise government services.

Communities of practice bring people working on the same thing together. Through a list of existing communities, practitioners across government can share best practice, discuss challenges and develop their capability, helping the government build better services for users and creating a more dynamic and attractive environment for digital transformation professionals and enthusiast to work in.

Within key domains for government digital transformation, existing communities of practice in the UK are addressing issues such as:

- Agile delivery
- Data engineering
- Data science
- Service design
- Digital buying
- Standards and assurance
- User research

Source: Pirot, James (2019[16]), *How digital, data and technology communities of practice can benefit you and your organisation*, https://digitalpeople.blog.gov.uk/2019/08/29/how-digital-data-and-technology-communities-of-practice-can-benefit-you-and-your-organisation/ (accessed on 22 August 2022); Government of the United Kingdom (n.d.[17]), *Communities*, https://www.gov.uk/service-manual/communities (accessed on 22 August 2022)

The government of Luxembourg's current policy on digital government investment similarly requires strengthening its approach to realise benefits. While the CTIE benefits from a flexible budgeting approach, the government of Luxembourg could also look to standardising the use of budgetary or funding policy levers, as well as increasing the availability of performance indicators and spending controls openly to increase the accountability of ministries and administrations in the implementation of relevant ICT/digital projects – leveraging the information available in its IT Quapital Portfolio system and going beyond through setting capacities and collecting data to exert a similar approach for projects that are implemented by ministries and administrations instead. This would help public sector organisations to secure investments more efficiently in line with the objectives and outcomes of Luxembourg's national digital government strategies. Further developing financial management mechanisms should be taken to be an important part of strengthening the leadership and implementation capacities of the Ministry for Digitalisation and the CTIE.

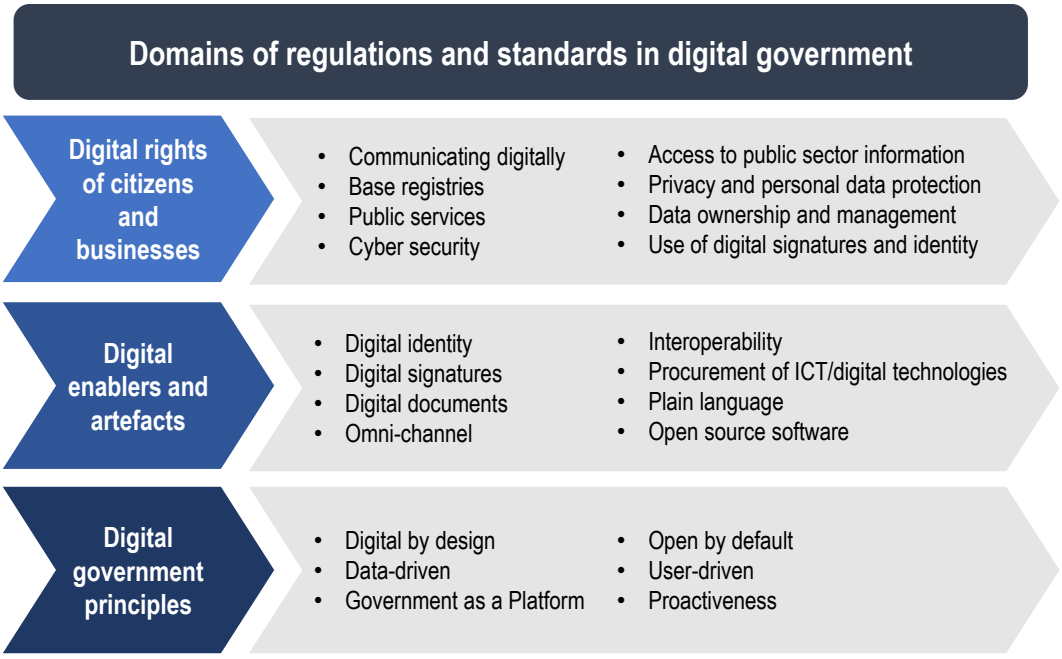
Similarly, further efforts to promote more agile approaches in public procurement are recommended in Luxembourg. The country benefits from the robust European normative instruments that frame the contracting of goods and services in the public sector. This is the case of promoting innovation partnerships, dynamic purchasing systems, competitive dialogues and centralised procurement exercises that are available to all public sector institutions in Luxembourg thanks to the EU Directives 2004/18/EC and 2004/17/EC that have been transposed by the Law on public procurement of 25 June 2009 and the implementing Regulation of 3 August 2009. It is relevant to notice that accelerating the use of these procurement mechanisms can bring significant benefits to Luxembourg to foster a more dynamic IT sector as well as to reduce existing processing times of regular procurement exercises such as open tender procedures. The ongoing implementation of the GovTech Lab goes in this direction by implementing innovation partnerships and competitive dialogue that are expanding the base of digital suppliers and fostering a healthy ecosystem of entrepreneurs and start-ups that can contribute to the mission of MDIGI and CTIE by providing the digital needs of ministries and administrations that, for multiple reasons, they cannot address.

Regulations and standards

Establishing regulations (i.e. binding), standards, guidelines and principles (i.e. non-binding) are elemental to creating an enabling environment for transformation towards a digitally mature government. They provide the legal basis for the policies, governance arrangements and mechanisms for digital government.

In the context of rapid developments and advancements in digital technologies, it is critical for governments to be able to continually review, update and set up a regulatory environment that supports the corresponding changes in the public sector, and broader economy and society. Especially in managing the opportunities and risks that come with these changes (i.e. in relation to ethics, transparency, privacy, security). Within the public sector, there are three broad categories for which important domains of legal and regulatory frameworks should cover: (i) the digital rights of citizens and businesses (OECD, 2019[13]); (ii) the key enablers for a digital government; and (iii) the six key principles encapsulated in the OECD Digital Government Policy Framework (OECD, 2020[18]). This comprehensive approach ensures that digital governments are able to meet the needs and requirements of stakeholders with high accountability and trust (see Figure 3.2).

Figure 3.2. Main categories for key domains of regulations and standards in digital government



Source: Author's elaboration based on OECD (2021[1]), The E-Leaders Handbook on the Governance of Digital Government, *OECD Digital Government Studies*, OECD Publishing, Paris, https://doi.org/10.1787/ac7f2531-en; G20/OECD (2021[19]), G20 Compendium on the use of digital tools for public sector continuity, https://assets.innovazione.gov.it/1628073696-g20detfoecdcompendiumdigitaltools.pdf.

As a European Union (EU) Member State, the government of Luxembourg has made considerable efforts in adopting EU Regulations such as the creating a single digital gateway for access to information (EUR-Lex, 2018[20]), the processing of personal data (EUR-Lex, 2016[21]) to name a few. Yet, public sector organisations commonly pointed out over the OECD peer review mission that there are still some areas for improvement in cementing the legal and regulatory frameworks for domains such as data exchange and sharing, information transfer and the once-only principle. Furthermore, the CTIE does not provide legal and regulatory assistance for the digital products and services that they provide as it is not under its responsibilities. Instead, this is a ministerial task covered through the Commissioner of the Government for Data Protection where ministries and administrations can address their legal requests and questions within the domain of public sector data. In other cases, ministries and administrations need to address these issues internally.

Looking ahead, it is important for the government of Luxembourg to increase its support for the public sector and facilitate the integration of stakeholders (including citizens and businesses) into the digital government ecosystem to foster its development. The launch of the High-Committee for Digital Transformation aims to bring together different actors with the purpose of defining new trends, needs and opportunities for Luxembourg on digital government.

While putting in place the necessary legal and regulatory frameworks is an important step, another area that the government of Luxembourg can deepen its efforts is in the creation of non-binding normative standards to guide the system-wide implementation of the national digital government strategy and plans at an operational-level. Positive advances have been done with the creation of the GovTech Lab by the MDIGI and CTIE to systematise interactions with digital innovators (The Government of the Grand Duchy of Luxembourg, 2022[22]). Nevertheless, as part of the result of the dedicated workshops on service design and delivery as well as on data-driven public sector participants highlighted the need to count on supporting standards that help them become more independent in addressing some critical steps in the digitalisation

of their respective processes and operations. Doing this can encourage the integration, harmonisation and collaboration on digital government projects across the public sector.

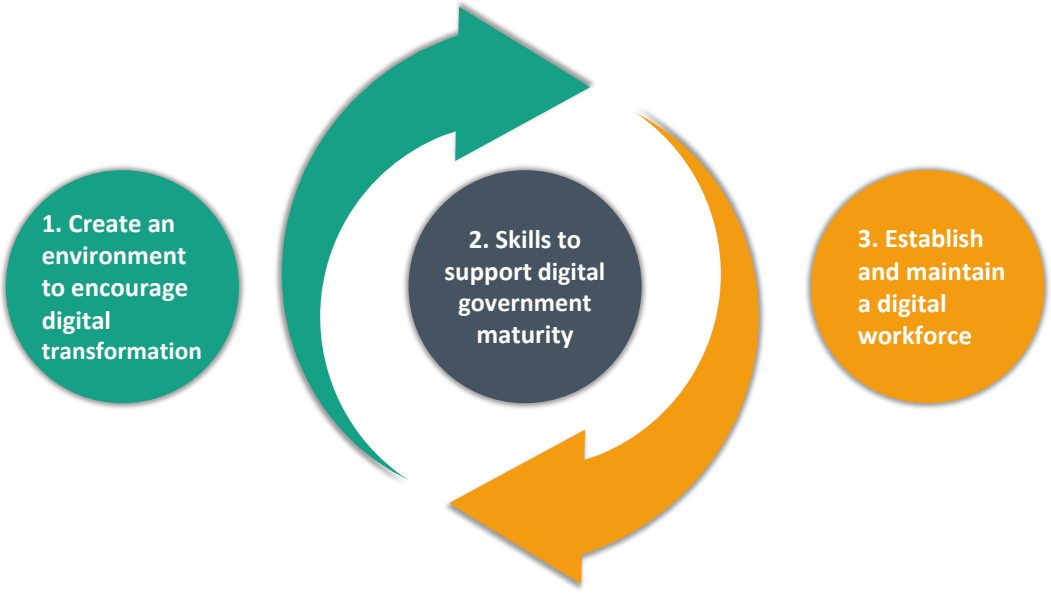
One way to do so is to put in place open and/or common standards such as technology codes of practices, data and interoperability standards, and ethical principles. Access and use of these standards should be friendly and productive for all public sector organisations to use, allowing them to work with their digital resources and build quality digital products and services at pace and scale. This is a feasible way for the CTIE to move towards decentralisation and operating as a platform, rather than continuing to control all digital government projects and allow shadow costs, duplicated efforts and legacy systems to proliferate (see Chapter 5 for more detail on open and/or common tools in the context of service design and delivery).

Essentially, MDIGI and CTIE can take on the onus of building the Government as a Platform, and providing an open toolbox of data, common standards, and good practices in addition to its existing digital solutions – while collaborating with stakeholders to foster uptake and alignment. This would include co-operating with the Inter-Communal Informatics Management Association (SIGI) at the municipal level, exchanging lessons on existing shared services and common standards they have put in place to support the digitalisation of local governments.

Digital talent and skills in Luxembourg

Finally, the last vital component of the capacity to build a sound digital government is having a public sector workforce that is agile, user-driven, collaborative, innovative and adaptable to the rapidly changing contexts. This is because the outcome of public policy and reform hinges on how much the public workforce is able to meet demands and deliver (OECD, 2017[23]). The **OECD Framework for Digital Talent and Skills in the Public Sector** provides a three-pillar analytical framework for what digital leaders and public servants need to do and have in order to attain a digital public workforce that can drive digital transformation in the public sector effectively (Figure 3.3).

Figure 3.3. The OECD Framework for Digital Talent and Skills in the Public Sector



Source: OECD (2021[24]), "The OECD Framework for digital talent and skills in the public sector", *OECD Working Papers on Public Governance*, No. 45, OECD Publishing, Paris, https://doi.org/10.1787/4e7c3f58-en.

The OECD Framework for Digital Talent and Skills in the Public Sector calls for human resource policies and processes that can (i) create the right environment to encourage digital transformation; (ii) develop skills to support digital government maturity; and (iii) establish and maintain a digital workforce. Building all three pillars holistically involves having the awareness of what skills are needed, to having the leadership and vision for creating the right environment and setting out the right scopes and job profiles, and having good strategies for recruitment, training, retention and mobility.

While promoting digital competencies in society is also important for consideration, the scope of this framework and the following discussions in the context of Luxembourg will mainly focus on the public sector, and what can be done at the organisational-, team- and individual-levels. The following sub-sections will look at the policies, practices and initiatives by the government of Luxembourg to establish and sustain a digital workforce in line with these three pillars.

Creating an environment that promotes digital transformation

Having the right environment is foundational for fostering the talent and skills needed for digital government maturity. It plays a key role in determining how agents in the organisation work, interact and deliver. With an environment that is favourable for going and being digital, public servants will find it easier to carry out initiatives that can advance the whole-of-organisation and -government change from the outset.

Creating a conducive environment that promotes digital transformation calls for digital leaders to (pro)actively shape and build an organisational culture that supports the development of digital talent and skills among all public servants inclusively. This entails being keenly aware of what digital skills are required by different job profiles, communicating a clear and understandable vision of the role of digital, championing the benefits of digital government, engaging and endorsing the design and delivery of digital services, and supporting a learning culture and different ways of working (OECD, 2021[24]).

Over the past few years, the government of Luxembourg has been placing increasing emphasis on developing digital talent and skills in the public sector and society. Yet, while the governance for digital transformation in the public sector is clearly shared by the MDIGI and CTIE (see Chapter 2), the ownership of the policy agenda for digital talent and skills is less clear with several actors playing a critical part and contributing to it: the Ministry of Labour, Employment and the Social and Solidarity Economy (MTEESS), the Ministry of Education, Children and Youth (MENEJ), the MDIGI, the Ministry of Higher Education and Research (MESR), the Ministry of Culture (MC), the Department of Media, Connectivity and Digital Policy (SMC), the National Institute for Public Administration (INAP), the National Employment Agency (ADEM), the Chamber of Commerce (CC) and the Chamber of Skilled Trades and Crafts (CDM).

Box 3.5 presents the recent, ongoing and planned strategies and initiatives that these institutions are undertaking with regards to the digital talent and skills agenda.

Box 3.5. List of digital talent and skills initiatives in Luxembourg

Mainly for the public sector

- Launched in October 2020, ADEM's "Future Skills" programme is a 3-month training course on transversal skills (i.e. soft skills, digital skills, project management skills) for job seekers on benefits and is followed by a 6-month compensated temporary occupation in the public sector.
- Launched in November 2020, INAP's Digital Academy provides general and technical training courses for all public servants (on top of a compulsory curriculum for every trainee who joins the public sector) digitally and in-person, flexibly based on users' needs. It includes most of INAP's continuing training courses, with a long-term view to offer additional training in digital literacy, digital leadership and digital skills for IT specialists in the near future.

- From January 2021, INAP rolled out training courses in its AI Academy for decision makers in the public sector, including the general principles of artificial intelligence and assimilating ethical criteria for AI solutions in public sector applications.
- From September 2021, the first edition of a hackathon for senior positions in the public service was created as part of INAP's Digital Academy and the "Digital Leadership Programme" training that was first launched in 2019. It is currently being reviewed and enriched with new content and teaching formats and methodologies.

Including the private sector and society

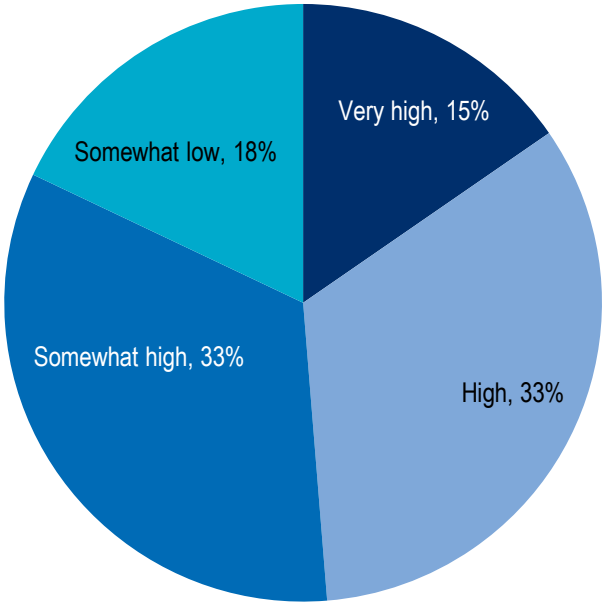
- Through the Digital Luxembourg initiative and since 2019, the flagship "Digital Skills and Jobs Coalition Luxembourg" (DSJC) programme has been steered by CC and CDM with the aim to bring together all digital skills stakeholders and promote digital skills projects.
- Through the Digital Luxembourg initiative, SMC in close co-operation with MTEESS, MENEJ, MESR, MDIGI, the University of Luxembourg and the private sector are co-financing numerous digital skills education and training programmes as part of the "Digital Skills" strategy. It is intended to be cross-functional and a whole-of-government approach.
- Since January 2020, SMC and MESR have been co-operating on an initiative on advanced digital skills with the German Ministry of Education and Research to put out calls for ideas for innovative training courses in artificial intelligence.
- Launched in January 2020, ADEM's "Basic Digital Skills" programme is a 4-week training course on baseline IT skills to improve chances of participants rejoining the labour market.
- Launched in January 2021, INAP's certified "Elements of AI" online training course on the basics of artificial intelligence was made available to public servants, students and professionals from all sectors from February to April 2021. MENEJ and SMC are also part of this initiative.
- In 2021, ADEM's "Digital Skills" programme offered vouchers for digital skills training courses to employees who were on a part-time work scheme or partially unemployed.
- The second phase of the "Future Skills" programme also aims to carry out sector-analyses of labour and skills requirements and offers strategic workforce planning support to companies affected by the digital transition.
- MC is investing in the digital transformation of cultural institutes to support the development of digital skills in line with the Digital Luxembourg initiative.
- Through the Digital Luxembourg initiative, ADEM's "Digital Skills Bridge" initiative aims to help businesses undergoing digital transformation to analyse its human resources needs. After undergoing the audit, the businesses and trade unions formulate a plan with employees to close the needs gaps and can apply for financial support from the government.

Note: This list is not exhaustive.
Source: The Luxembourg Government (2021[9]), "National Plan for a Green, Digital and Inclusive Transition", https://odc.gouvernement.lu/dam-assets/publications/rapport-etude-analyse/programme-national-de-reforme/2021-pnr-luxembourg/2021-nrp-luxembourg-en.pdf; European Commission (2021[25]), "Education and Training Monitor 2021", https://op.europa.eu/webpub/eac/education-and-training-monitor-2021/en/luxembourg.html; Digital Skills and Jobs Coalition Luxembourg (2022[26]), "Digital Skills and Jobs Coalition", European Commission, https://www.digitalcoalition.lu/;The Government of the Grand Duchy of Luxembourg (2021[27]), *Ministère de la Fonction publique - Rapport d'activité 2021*, https://gouvernement.lu/dam-assets/fr/publications/rapport-activite/minist-fonction-publique-reforme-administrative/2021-rapport-activite-mfp.pdf.

While it is extremely noteworthy that there are many initiatives around promoting digital talent and skills in Luxembourg's ecosystem beyond the public sector, findings from the OECD Digital Government Survey of Luxembourg demonstrate a mixed reality in regard to the public sector. Of the 39 ministries and

administrations surveyed on the level of priority given to improving digital skills of public servants in the digital government agenda, 15% indicated a very high priority, 33% indicated a high priority, another 33% indicated a somewhat high priority and the last 18% indicated a somewhat low priority (OECD, 2021[28]) (Figure 3.4).

Figure 3.4. Prioritisation of digital skills and competencies for public servants in Luxembourg



Note: Based on the responses of 39 government stakeholders to question 2.1.1 "How would you score the priority given to improving the digital skills and competencies of public servants in the digital government agenda of your country?"
Source: OECD (2021[28]), *Digital Government Survey of Luxembourg: Ministries and Administrations* (unpusblished).

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Building on the high political and administrative commitment to building up a digital workforce in Luxembourg's public sector and beyond, the government would benefit greatly from consolidating all these initiatives and appointing a public sector organisation to take charge, lead and co-ordinate the digital talent and skills agenda among the many other actors that are playing a part. Looking ahead, it would also be critical to set out a strategy dedicated to developing digital talent and skills in the public sector, and in line with the Electronic Governance Strategy 2021-2025. The public sector organisation in-charge-of this mandate would then have the responsibility to implement and deliver on the strategy.

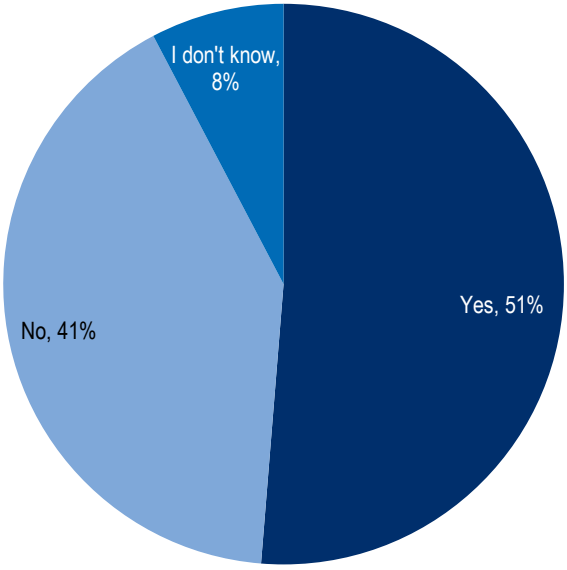
Currently, INAP is looking to further develop a plan to support public servants in upskilling and reskilling based on a study that was carried out in 2020 with the entire Luxembourg civil service and in line with the European Digital Competence Framework for Citizens (DigComp 2.1). The plan will involve stakeholders such as MDIGI, CTIE, Digital Luxembourg and the State Centre for Human Resources and Organisation Management (CGPO) as co-creators of the "Digital Skills" training such that it is aligned with the objectives of the strategy for digital transformation (The Government of the Grand Duchy of Luxembourg, 2021[27]).

Should INAP be the public sector organisation that takes the helm of the digital talent and skills agenda in Luxembourg's public sector, INAP will need to consider adopting a range of initiatives (besides training courses) aimed at creating an environment that truly supports digital transformation. This includes setting out a clear vision with a national strategy on digital talent and skills in the public sector, setting up

mechanisms that foster a learning and innovative culture at the organisational-, team- and individual-level, and empowering public servants to use digital tools and data with a user-driven mindset.

At present, the OECD Digital Government Survey of Luxembourg shows that a large majority of ministries and administrations have in place such initiatives: 51% of the 39 public sector organisations that were surveyed have initiatives aimed at developing communities of practice, providing networking and mentoring, and developing skills and competencies for data and digitalisation for public servants. However, there is the other half that said that there are no such initiatives in their public sector organisation or do not know of such initiatives (OECD, 2021[28]) (Figure 3.5).

Figure 3.5. Institutional initiatives to develop digital skills and competencies for public servants



Note: Based on the responses of 39 government stakeholders to question 2.1.3 "In your ministry or administration, are there any specific initiatives in place aiming at developing communities of practice, providing networking and mentoring, and developing skills and competencies for data and digitalisation for public sector practitioners?"
Source: OECD (2021[28]), *Digital Government Survey of Luxembourg: Ministries and Administrations* (unpublished).

StatLink https://stat.link/hdpb8m

This underlines the message that the government of Luxembourg will need to look towards more consolidation, formalisation and standardisation of practices across ministries and administrations, in terms of equipping employees with the knowledge, tools and awareness to pursue digital transformation. Doing so will then contribute to an environment throughout the public sector that normalises change in the favour of employees and the public good. Box 3.6 presents several initiatives by OECD member countries to clarify the leadership, organisational structures, learning culture and ways of working to support digital transformation in the public sector.

Box 3.6. Digital talent and skills initiatives in OECD member countries

Leadership

In France, initially, senior leaders only attended trainings that were usually short and superficial. To remedy this, the Direction interministérielle du numérique (DINUM) set up a coaching programme with digital professionals to accompany senior leaders. As such, senior leaders and managers had to move past the traditional notions of public service management based on legal compliance or processes, and instead lead digital transformation as an actively engaged, visible and approachable leader.

In the United Kingdom, since 2014, the Department of Health and Social Care has been conducting regular Digital Show and Tell sessions to showcase recent digital projects and explain how they are run. This provides the opportunity for leaders to regularly interact with their workforce and understand the issues they face in the process of being digital.

Organisational structures

In Australia, the government commissioned a review of the public service in 2018 to ensure that it was still fit for purpose for the next decade. The review involved around 11 000 individuals and organisations and over 400 consultations. Findings pointed to the need for service-wide transformation to achieve better outcomes, and a key recommendation was to "streamline management and adopt best-practice ways of working to reduce hierarchy, improve decision-making and bring the right expertise and resources". This meant minimising organisational layers and improving control at lower levels to reflect the changing nature of work that calls for greater flexibility.

In the United Kingdom, the Digital, Data and Technology Profession team in the Central Digital and Data Office focuses on helping the government attract, develop and retain the people and skills needed to support digital government transformation. Its strategy aims to ensure a co-ordinated and holistic approach across all departments by maximising, sharing and building on best practices. Priorities cover workforce planning through analytics, job roles consistency through a common capability framework, pay and reward consistency, training and development for digital, data and technology professions, and a diverse and inclusive culture.

Learning culture and ways of working

In Canada, the School of Public Service Digital Academy was created in 2018 to teach federal public servants the digital skills, approaches and mindset needed to transform public services in the digital age. It brings together partners from different spheres, including government, academia and the private sector, with a focus on collaboration and the sharing of knowledge and experience.

In Slovenia, the Ministry of Public Administration runs "Innovation Training in Public Administration". It aims to change the approach to workflow, problem solving and designing better solutions through effective communication and an improved administrative culture. The objectives include raising awareness of the importance of gaining new skills and knowledge, and alternative ways of working; acquiring competence in creative problem solving that focuses on the user, and different ways of communicating individually and in a group.

Source: OECD (2021[24]), "The OECD Framework for digital talent and skills in the public sector", *OECD Working Papers on Public Governance*, No. 45, OECD Publishing, Paris, https://doi.org/10.1787/4e7c3f58-en; Welby and Tan (2022[15]), "Designing and delivering public services in the digital age", *Going Digital Toolkit Note*, No. 22, https://goingdigital.oecd.org/data/notes/No22_ToolkitNote_DigitalGovernment.pdf.

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Notes

[1] 48.71% of surveyed ministries and administrations responded "Moderate" or "Weak" to the question "Rank the relevance that the national digital government strategy has for your institution (e.g. mandates, alignment and relevance of the central strategy's goals with your institutional goals, etc.)." (OECD, 2021[28])

[2] 66.67% of surveyed ministries and administrations responded "No" or "I don't know" to the question "Did your institution participate in [the exercise of formulating the current national digital government strategy]?" (OECD, 2021[28])

[3] 51.28% of surveyed ministries and administrations responded "Yes, for all projects." or "Yes, but only when the projects meet specific criteria (such as budget thresholds)." to the question "Does your ministry/administration regularly develop business cases or similar value proposition assessments for data, digital and technology projects?" (OECD, 2021[28])

[4] 53.84% of surveyed ministries and administrations responded "Yes" to the question "Is there a standardised model for data, digital and information technology project management at the central government level?" in contrast to "No" or "I don't know." (OECD, 2021[28])

[5] 64.10% of surveyed ministries and administrations responded "Yes, there is a specific ICT procurement strategy for the public sector." to the question "Is there a central strategy covering public procurement of ICT goods and services?" in contrast to "No" or "No, but there is a whole-of-government procurement strategy that covers ICT procurement." (OECD, 2021[28])

4 Treading the path towards a data-driven public sector in Luxembourg

This chapter looks at the current progress in achieving a data-driven public sector in Luxembourg. It examines existing public sector data governance arrangements, how data is applied by the public sector to deliver value, and how data is managed and used by public servants to retain and build trust.

Introduction

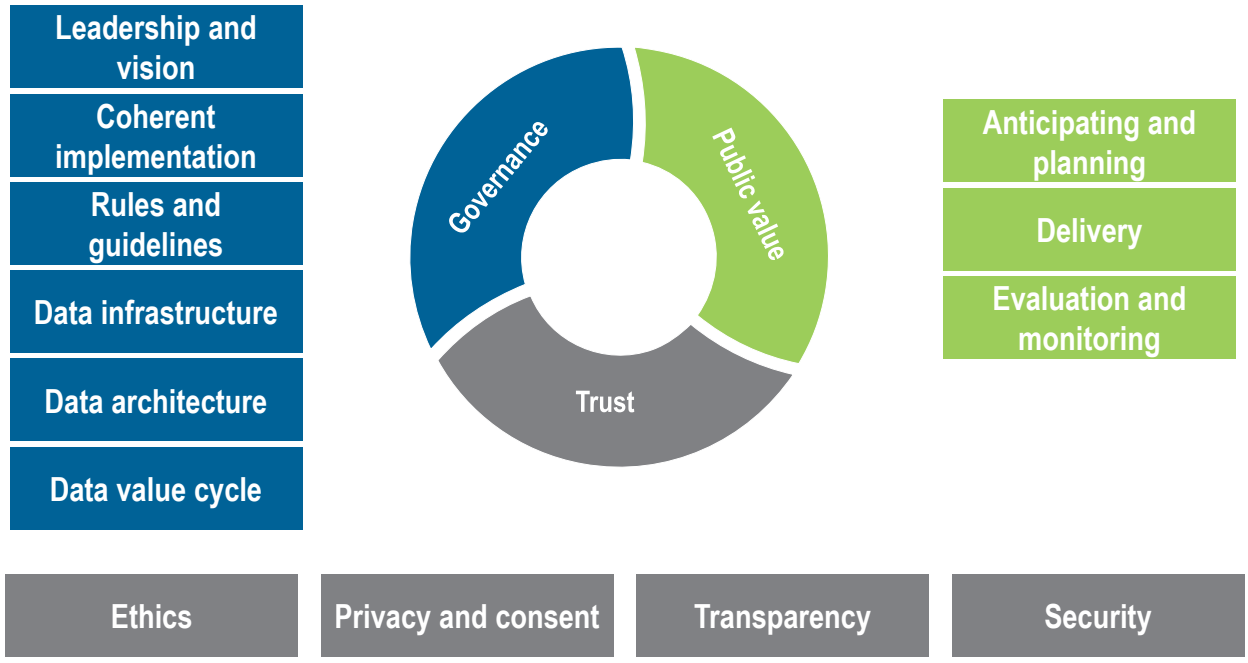
In 1865, the term “business intelligence” was first coined by Richard Miller Devins when describing how a banker beat his competitors by collecting and analysing information in a structured way on relevant business activities. Half a century later, the first technology that would radically improve the ability to collect and store large volumes of information was invented - the magnetic tape (World Economic Forum, 2015[1]). In the 1960s, the concept of cloud data storage was first envisaged, and the theory of a relational database was first presented to the public (ThinkAutomation, n.d.[2]). Another 30 years later, in the 1990s, with the advent of the Internet, data would slowly start to resemble what we see today - easily accessible and shared across the world. It was in this same decade that the founders of Google Search came up with their mission to "organise information on a global scale with the aim of making it accessible and useful to everyone" (Google, n.d.[3]).

The access and sharing of data is today estimated to generate social and economic benefits of between 0.1% and 2.5% of gross domestic product (GDP) (OECD, 2019[4]). Data generated and held by the public sector, from sensitive data in registers to non-personal data such as environmental, mobility, and meteorological data, are extremely valuable assets that if managed, shared and used effectively could bring significant value not only to the public sector itself, but also to the public. Yet there are also evident risks and high security and privacy standards that need to be met when improving the management and use of data, especially in the public sector. Countries wishing to secure a data-driven public sector (DDPS) should, therefore, adopt a strategic approach to data that seeks to maximise value while limiting potential risks, threats and harms associated to its management.

In 2014, the OECD Council adopted the Recommendation on Digital Government Strategies which includes a provision for governments to support the creation of a data-driven culture in the public sector. In 2021, the Council also adopted the Enhancing Access to and Sharing of Data (EASD) Recommendation (OECD, 2021[5]), which provides the first internationally agreed upon set of principles for how governments can maximise the cross-sectoral benefits of access to and sharing of different types of data while protecting individuals’ and organisations’ rights (OECD, 2021[6]). The adoption of the EASD Recommendation demonstrates the value that countries today see in data, including within the public sector, and the need for a DDPS. Similar types of legal instruments have been developed among other international fora, including in the European Union, with the recent Data Governance Act (European Commission, 2020[7]) and Data Act (European Commission, 2022[8]).

The OECD’s analytical framework for a DDPS published in 2019 aims to support countries’ implementation of DDPS (see Figure 4.1; (OECD, 2019[9])). It summarises the breadth of challenges and opportunities that public sector organisations face in working towards being data-driven, across three areas of focus: 1) data governance 2) applying data to deliver value; and 3) building trust. Data governance includes having the right leadership and a vision for data, tactical capacities, and data infrastructure and architecture. For delivering public value, public sector organisations should apply data strategically in the planning, delivery, monitoring and evaluation phase of public services and policies. Lastly, for a DDPS to promote trust it needs to work on ethics, transparency, privacy and consent, and digital security.

Figure 4.1. OECD analytical framework for a data-driven public sector

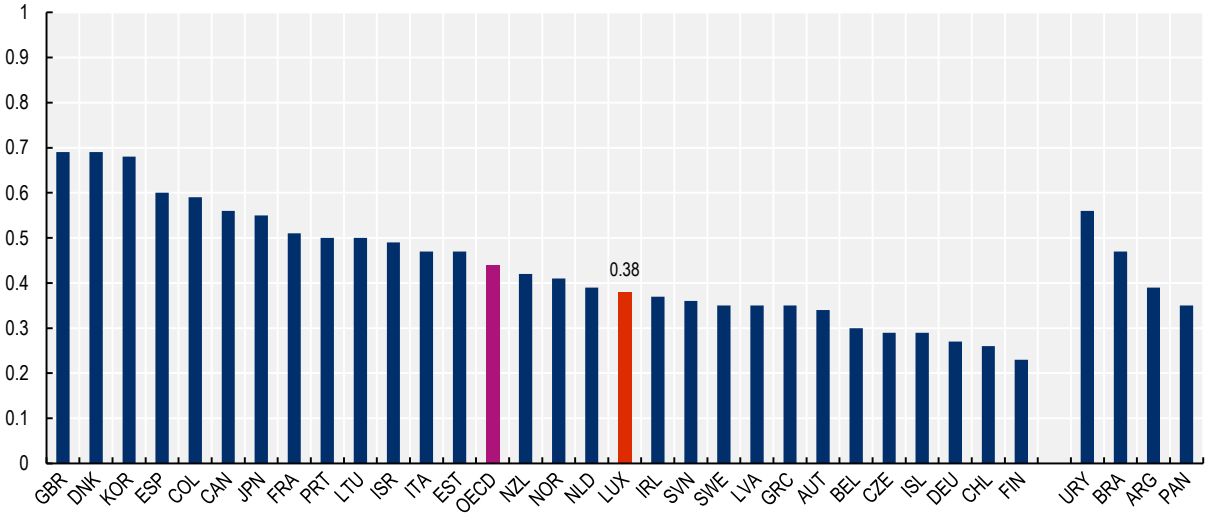


Source: OECD (2019[9]), *The Path to Becoming a Data-Driven Public Sector*, OECD Digital Government Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/059814a7-en.

On top of the DDPS framework, the OECD has developed additional policy and measurement tools including the Digital Government Policy Framework (DGPF), the Good Practice Principles for Data Ethics in the Public Sector, the Digital Government Index, and the Open, Useful and Re-usable data Index (OURdata Index). In 2020, the first OECD Digital Government Index was launched. The DDPS dimension of the Index included an assessment of the extent to which countries manage and use data to inform the design, delivery and monitoring of public policies and services. As part of this, it assessed the availability of public sector data strategies, institutional roles, requirements for data sharing, standards, and more. According to the overall results, DDPS was the dimension where OECD member countries had developed the least out of the six areas assessed. Luxembourg ranked below the OECD average, at 17 out of 29 countries (see Figure 4.2) (OECD, 2020[10]) and performed least well in DDPS compared to the other assessed dimensions.

Building on the above-mentioned Recommendations and tools developed by the OECD to support and assess the DDPS-level maturity of public sector organisations, this chapter looks at the current state of becoming a DDPS in Luxembourg, focusing on the three areas of the DDPS framework. The first section looks at the current data governance in the Luxembourg public sector, including leadership, strategy, data infrastructure and architecture. The second section looks at how ministries and administrations are applying data strategically to deliver value. The final section looks at how data is managed and used to retain and build trust in the public sector.

Figure 4.2. OECD Digital Government Index – Data Driven Public Sector

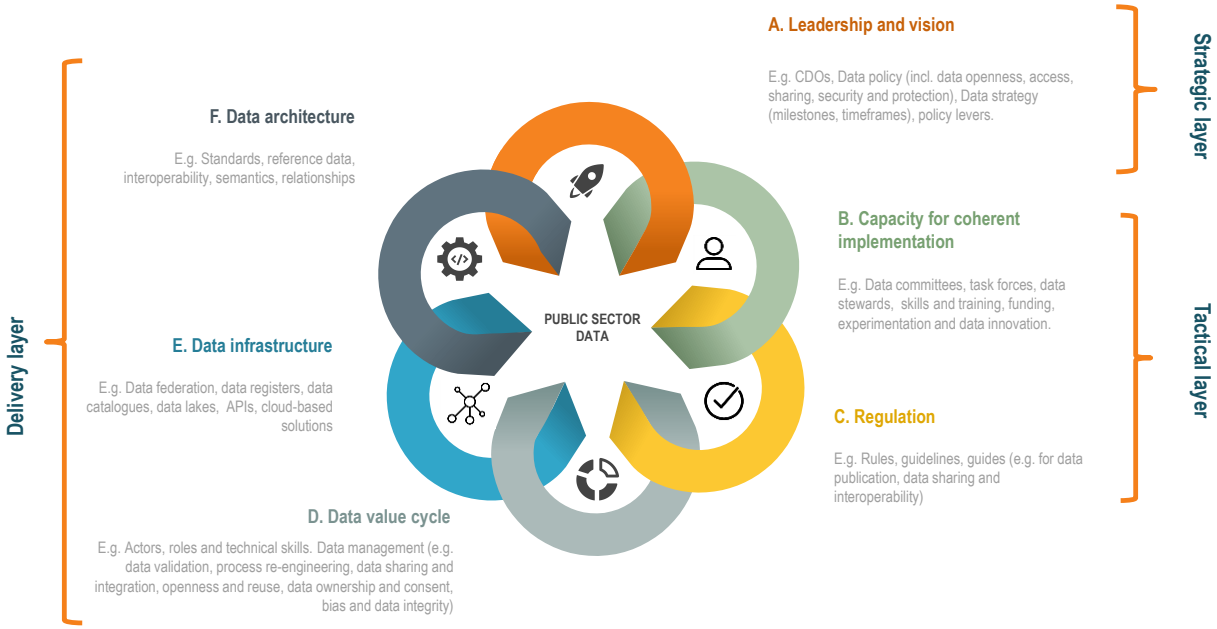


Source: OECD (2020[10]), "Digital Government Index: 2019 results", *OECD Public Governance Policy Papers*, No. 03, OECD Publishing, Paris, https://doi.org/10.1787/4de9f5bb-en.

Data governance in Luxembourg

Data governance can be described as the set of people, policies, rules, frameworks and processes that help organisations manage and use data effectively to support their mission and objectives. While there is no single, commonly used definition of data governance, existing approaches (DAMA International, 2017[11]; Knight, 2021[12]) describe data governance as exercising "control" over the "management of data" or being a "system of decision rights and accountabilities" for data management. Data governance can be seen as framing and steering data management towards trusted value creation.

Figure 4.3. OECD model framework for data governance in the public sector



Source: OECD (2019[9]), *The Path to Becoming a Data-Driven Public Sector*, OECD Digital Government Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/059814a7-en.

The model framework for data governance in the public sector developed by the OECD has three layers (strategic, tactical, and delivery) and six sub-layers (2019[9]). While the framework is broad, it is not exhaustive and there are components not covered that would need to be considered by organisations as they build a data governance programme or framework, depending on the context in which they operate.

Strategic leadership and vision

As a first step, governments should define leadership and a vision for what it wants to achieve with data, and how this should be achieved. Having the right leadership and a strategy is the foundation for effective prioritisation, the steering and consolidation of efforts, and the promotion of a data-driven culture in the public sector. Without knowing what the government wants to accomplish, how it will be accomplished, and who is accountable for effective implementation, few data-related initiatives are likely to succeed.

The Electronic Governance Strategy 2021-2025 stresses the importance of good quality data, data protection, and the once-only principle for digital government transformation, though it does not chart out a high-level course of action with concrete objectives for implementation. An internal roadmap has been created by the Inter-ministerial Committee for Digitalisation to support the implementation of the strategy, with actions such as the development of base registers and authentic sources, a central API gateway, a new document and case management system, and the operation of a central Business Intelligence (BI) platform.

The work on data in Luxembourg is largely influenced by EU-level policies and is seen as transversal to several entities and ministries. Although there is currently no dedicated public sector data strategy in place, data is treated separately in a mix of different strategies, including the open data strategy under the Ministry of State (ME), the data-driven innovation strategy under the Ministry of the Economy (MECO), and the Electronic Governance Strategy and GovCloud Strategy under the Ministry for Digitalisation (MDIGI). The development of actions relevant to DDPS also include the National Interoperability Framework (NIF), which is a framework that includes high-level principles and guidelines for the public sector, and that defines essential elements necessary to have a coherent, clear and structured base for interoperability in the Luxembourg public sector, which is strictly linked to data.

During the peer review mission and workshop, one of the identified challenges relating to data governance was the lack of a coherent and comprehensive vision for data across the public sector – as still reflected in the fragmented approach towards establishing a public sector data strategy. Less than half of the surveyed ministries and administrations agree that there is clear policy guidance on the governance and use of data.[1] Box 4.1 shows how other OECD member countries, in this case **France** and **Ireland**, have developed dedicated strategies for data in the public sector as ways to address the issue.

Box 4.1. Public sector data strategies in France and Ireland

France

In April 2021, the French Prime Minister outlined a "public policy on data, algorithms and source codes" in a letter to all ministers and prefectures. The circular asked each Government ministry to develop their own 2–3-year roadmaps with the support of the Inter-ministerial Digital Directorate (DINUM). The fifteen ministry-level roadmaps were published in 2022 and present the ambitions and challenges related to each ministry's policy area, and concrete priority actions moving forward.

Ireland

The Irish Public Service Data Strategy 2019-2023 by the Department of Public Expenditure and Reform sets out a detailed vision with goals and actions across 13 strategic themes to deliver a more joined-up approach to how data is used and managed within the public service. It aims to put in place a series of measures to improve how data is governed, managed and re-used in a secure, efficient and transparent manner. The 13 strategic themes span from protection and legislation to governance and standards, to geospatial data, to records management.

Source: Direction interministérielle du numérique (DINUM) (2021[13]), *Cadre interministériel d'administration de la donnée*; Department of Public Expenditure and Reform (2018[14]), *Public Service Data Strategy 2019-2023*.

DAMA (2017[11]) suggests that, to be successful, a data strategy "*(…) must come from an understanding of the data needs inherent in the business strategy: what data the organisation needs, how it will get the data, how it will manage it and ensure its reliability over time, and how it will utilise it*." As presented, the purpose of developing a stand-alone data strategy is not for it to be added on top of the core business operations of the public sector. To the contrary, it should support the public sector's main mission and objectives. By formulating a stand-alone data strategy, in consultation with affected parties, there is a greater chance that data management and better use of data will be taken seriously. A strategy could help increase legitimacy and build ownership across ministries and administrations for DDPS implementation.

Figure 4.4 shows a template based on Knight (2019[15]) for the process of developing a public sector data strategy: 1) identify the mission and objectives of the public sector; 2) assess the current state of DDPS; 3) propose a future state; and 4) develop an implementation roadmap.

Figure 4.4. Process for developing a public sector data strategy

Source: Based on Knight (2019[15]), *Developing a Data Strategy Template*.

Linked to the lack of a coherent and comprehensive vision for data across the public sector, almost 50% of surveyed ministries and administrations in Luxembourg could not answer whether there is a central body or function responsible for data across the public sector, or not. According to the Grand-Ducal Decree that established the current ministries and their responsibilities, the Ministry for Digitalisation (MDIGI) is responsible for promoting and organising the "automation of administrations, particularly with regard to the collection, transmission and processing of data", and also for "searching for synergies between the various

State administrations and optimising their exchanges of information." (The Government of the Grand Duchy of Luxembourg, 2018[16]). The Government IT Centre (CTIE) which currently operates under the MDIGI, has also these same two responsibilities according to the Law of April 20, 2009 (The Government of the Grand Duchy of Luxembourg, 2009[17]).

MDIGI is co-ordinating the implementation of the Electronic Governance Strategy 2021-2025, the GovCloud strategy, and the NIF that cover important elements of DDPS. Other ministries leading strategies or policy areas relevant to DDPS include mainly the ME and MECO, but also the Ministry of Finance (MFIN) (see Table 4.1). The ME, via Service Information and Press (SIP), is responsible for open data. The MECO is responsible for co-ordinating the implementation of the country's High Performance Computing project and the data-driven innovation strategy with the latter primarily targeting the use of data by the private sector. The MFIN is leading the co-ordination of the work on the public sector geospatial data infrastructure via the Land Registry and Topography Administration (ACT).

Table 4.1. Strategies and policy areas relevant to a data-driven public sector in Luxembourg

Policy area	Strategy (if applicable)	Year of adoption	Ministry lead
Artificial intelligence	Artificial Intelligence: a strategic vision for Luxembourg	2019	MDIGI, ME
Digital Government	Electronic Governance Strategy 2021-2025	2021	MDIGI (CTIE)
Open Government Data	Open Data Strategy	2017	ME
Data-driven innovation	The Data-Driven Innovation Strategy for the Development of a Trusted and Sustainable Economy in Luxembourg	2019	MECO
Cloud technology	GovCloud Strategy	2016	MDIGI (CTIE)
Geospatial data infrastructure	Implementation of the EU Directive INSPIRE [2007/2/CE]	2007	MFIN

Source: Based on information provided by the Ministry for Digitalisation and information available at gouvernement.lu.

Across OECD member countries, the exact form of central leadership for data once it is defined does vary – it may it be an agency (e.g. Agency for Digital Government in Sweden) or a body situated directly under the centre of government (e.g. DINUM in France, Central Digital and Data Office in the United Kingdom).

Tactical capacities for implementation and regulation

For improving tactical capacities for DDPS, public sector organisations need dedicated resources including institution-level leadership and strategies, co-ordination mechanisms, data-related skills, regulations and guidelines to implement coherently the common vision for DDPS while aligning it with their own mission and objectives.

Few ministries and administrations in Luxembourg currently have a strategy for data, and 46% neither indicate any plans for pursuing this in the near future.[2] Few organisations also indicate having a dedicated role of function responsible for data stewardship (e.g. a Chief Data Officer, Data Steward), or plans for such. During the capacity-building workshop on data, participants raised several challenges that could be tied to the absence of institutional leadership and strategic plans for data, including:

- a lack of data ownership and stewardship among ministries and administrations;
- a lack of consistency in the management of data, which in turn affects data quality;
- a limited public sector culture for data sharing.

Increasing the ownership and accountability of ministries and administrations for their data would be a necessary step towards making public sector data management more consistent, and thereby improving the quality and interoperability of data. Similarly, it would help foster a public sector culture of data sharing which is currently limited. Achieving a culture for data sharing is done by lowering the perceived costs of exchanging data (risks, less control, fear of failure, resources) while increasing the perceived benefits (efficiency, working towards a common goal, saving resources, better policies and services). Developing ministry-level strategies, roadmaps or plans for data would be beneficial to promote coherent implementation of any vision and guidelines outlined at the central level, to increase awareness, and build ministry-level tactical capacities while adjusting objectives to the ministries' and administrations' mission and strategy. The Ministry for Digitalisation has currently a pilot project to test a new service called 'Advisory Service for Digitalisation' that allows ministries to request maturity assessments of their digital development, and support in the development of ministry-level strategies in line with their ambitions and as support to the implementation of the Electronic Governance strategy 2021-2025. This service could be extremely valuable also for progressing coherently in the area of data.

Apart from leadership and strategy, ministries and administrations need to co-ordinate and collaborate effectively around data-related projects, standards and tools for data management and use to allow for coherent implementation and interoperability of data and processes. One of Luxembourg's strengths is the fact that the CTIE is one of very few IT providers, and as such a valuable resource in developing common, interoperable data-related tools and services across the public sector. The Luxembourg government has recently taken further steps to support collaboration and co-ordination by establishing the Inter-Ministerial Committee for Digitalisation, the National Committee for Interoperability (CNI), and the central government Sectoral Committee for Interoperability (CSI). With the NIF having the most concrete objectives relevant to DDPS at this stage, the role of the CNI and the central government CSI to support ministries and agencies in working together towards interoperability of data will likely be very important. During the peer review mission, other co-ordination mechanisms that administrations have referred to as supporting them in working together around data were the Coordination Committee for Luxembourg's Geographical Data Infrastructure (CC-ILDG) and the Technical Group for Geographical Data Infrastructure (GT-LDG).

In addition to co-ordination and collaboration mechanisms, ministries and administrations need the right skills and talent to support better management and use of data. Box 4.2 presents the general concepts that public servants should be trained in to understand DDPS and manage and use data with trust as described in the OECD Framework for Digital Talent and Skills in the Public Sector (OECD, 2021[18]). During the capacity-building workshop on data, participants raised that there is currently, and in general, a lack of human resources and skills among ministries and administrations for managing data consistently. Some ministries and administrations are better equipped than others. Ensuring the right skills includes working with universities to build skills among the young population, becoming an attractive workplace for people with data-related skills, improving data literacy among middle-management, and upskilling and reskilling people who already work with data in government. The Digital Academy of the National Institute of Public Administration (INAP) is currently integrating new courses regarding digitalisation and many useful subjects to increase and advance the skills for civil servants and could also be a useful resource for providing data literacy training.

Box 4.2. What it means for a public servant to…

…know about data-driven public sector:

- Is aware of the individuals or organisations that are responsible for the data agenda
- Understands the priority, roadmap and strategy for taking the steps to establish a data-driven public sector
- Is familiar with the governance arrangements for access to and sharing of data
- Builds on their knowledge over the trustworthy use of data to be confident in their legal and ethical obligations for the treatment of data
- Recognises opportunities for how interoperability, the Once Only Principle and access to transactional data can support the better design of services
- Adopts an empirical approach to the use of data for generating public value in terms of Anticipating and planning, Delivery, and Evaluation and monitoring
- Understands the value of Open Government Data to government, and the wider ecosystem.

…be trustworthy in their use of data:

- Understands their responsibilities in the workplace around information security and data handling or processing
- Understands the legal requirements on them as individuals in terms of their handling of data to protect the privacy of citizens
- Is comfortable considering the ethical dimensions associated with the use of digital technologies or data, including knowledge of any relevant instruments such as Good Practice Principles

Source: OECD (2021[18]), "The OECD Framework for digital talent and skills in the public sector", *OECD Working Papers on Public Governance*, No. 45, OECD Publishing, Paris, https://doi.org/10.1787/4e7c3f58-en.

In terms of Luxembourg's regulatory framework for DDPS, it is as discussed previously tied to the EU regulatory framework for the Single Digital Market Initiative. Many of these EU regulations and directives have the explicit aim to support free flow of data with trust across the Union, including notably the General Data Protection Regulation (GDPR), the Single Digital Gateway Regulation, the Open Data Directive, and the proposal for a Data Governance Act. While the Luxembourg government has a robust regulatory framework rooted in the EU regulatory framework, several ministries and administrations have expressed that the current national regulatory framework is not entirely fit-for-purpose in supporting them to exchange and use data.

Non-compulsory guidelines and principles are also important for supporting coherent implementation of DDPS. Luxembourg has made great achievements with the NIF being published in 2019. The framework has 11 principles and 48 recommendations that build on the European Interoperability Framework (EIF) for standardising the approach ministries and administrations take to digitalisation and data (The Government of the Grand Duchy of Luxembourg, 2019[19]). A large share of the principles and recommendations are highly relevant to DDPS (see Table 4.2).

Table 4.2. Relevant recommendations in the National Interoperability Framework

Principle	Recommendation
1. Openness	Publish data as open data by default, unless restrictions (security, data protection, etc.) apply
	Establish procedures and processes to integrate open data into common business processes and working procedures and into the development of new information systems
2.Transparency	Create the necessary transparency about the administrative rules and processes that apply, and about the data, procedures, or services that are available
	Establish catalogues of public data, services, standards, specifications, or reusable solutions and use common and standardised models to establish these catalogues
	Associate relevant metadata with each base register covering, inter alia, a description of its content, service assurance and responsibilities, the type of reference data it stores, relevant access conditions and licences, terminology, a glossary and information on reference data used by other base registers.
3. Reuse, reusability and sharing	Re-use and share information and data when implementing services, except where confidentiality or privacy restrictions apply
	Establish a common pool of reusable services and information sources (authentic sources, open data, etc.) that can be used by different public sector bodies
	Make authoritative sources of information (authentic sources) available to third parties, while implementing access and control mechanisms to ensure their security and confidentiality, in accordance with applicable legislation.
	Clearly communicate the right of access and re-use of open data: Legal regimes, such as licences, that aim to enable access and re-use should be standardised as far as possible.
	Where possible and useful, do not hesitate to re-use external services and information sources when developing services
4. Technological neutrality and data portability	Ensure, where legally possible and without imposing unjustified restrictions, data portability, i.e. the easy transfer of data between services
	Publish open data in non-proprietary machine-readable formats. Ensure that open data is accompanied by high-quality, machine-readable metadata in non-proprietary formats, a description of its content, an explanation of how it is collected, its quality level and the licence under which it is made available. The use of common vocabularies for metadata is recommended.
5. Putting users at the centre	Apply the 'once-only' principle as far as possible and in compliance with the applicable legislation and only ask users for relevant information (data minimisation)
6. Security and privacy protection	Define a common security and privacy framework and establish processes for services to ensure secure and reliable data exchange between public sector bodies and in their interactions with citizens and businesses
	Use trust services, in accordance with EU Regulation 910/2014 of 23 July 2014 on electronic identification and trust services, as mechanisms to ensure the secure and protected exchange of data

Source: Extract of The Government of the Grand Duchy of Luxembourg (2019[19]), *National Interoperability Framework* (translated into English).

Despite the well-developed NIF, a number of surveyed ministries and administrations expressed a lack of concrete guidelines or standards to support the work on data quality, ethics, GDPR-compliance, interoperability, and data sharing. For example, only 40% have access to guidelines that support them in metadata management (OECD, 2021[20]).

Data infrastructure and architecture

The third layer of data governance - the delivery layer - covers the data infrastructure and architecture needed to support the management, sharing, and consumption of data. In Luxembourg, the data infrastructure is relatively centralised to the CTIE, while the data architecture is partly decentralised to the respective ministries and administrations responsible for specific types of data, such as the base registries or national statistics.

Data infrastructure

When it comes to data infrastructure, Luxembourg has a solid reputation in digital security. The country has one of the largest concentrations of secure types of data centres - TIER IV, which has made it a valid option for countries wishing to store sensitive data in another location. In 2017, the Luxembourg government signed a contract with Estonia to host the first so-called “data embassy” and in 2021, the data

embassy of Monaco also opened up its doors following the signing of a bilateral agreement (The Government of the Grand Duchy of Luxembourg, 2021[21]). In addition to the data embassies, Luxembourg has set up its own Gaia-X Regional Hub, co-ordinated by MECO and Luxembourg's national innovation agency, Luxinnovation. The purpose of the Gaia-X project, which was initiated by France and Germany a few years ago, is to provide a secure, federate and digitally sovereign cloud service for public and private sector organisations in Europe (Gaia-X Hub Luxembourg, 2021[22]). Luxembourg has had its own GovCloud strategy and public sector cloud service in place since 2016, managed under the responsibility of the CTIE. The cloud service consists of a private cloud architecture hosted in Luxembourg, which offers secure services to ministries and administrations. Today, the CTIE stores most of the data held by ministries and administrations in Luxembourg, apart from organisations with specific needs such as the National Institute of Statistics and Economic studies (STATEC).

Box 4.3. Luxembourg – host of the world's first data embassy

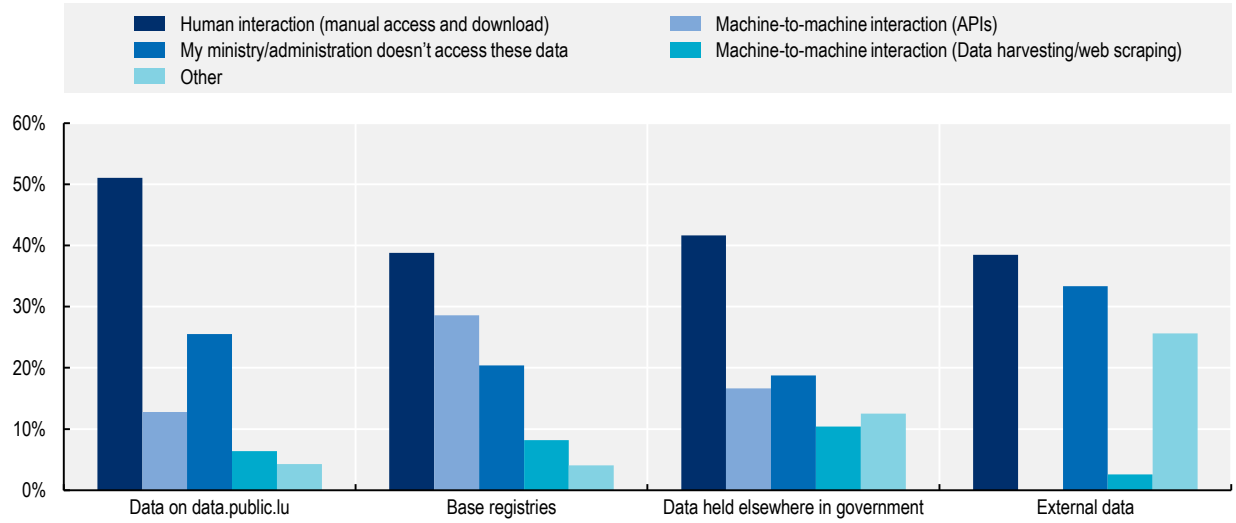
A **data embassy** is an innovative practice of digital diplomacy and security where a country signs an agreement with another, friendly country to store copies of its most sensitive and confidential data in that country. The purpose is to protect the data in the case of cyberattacks and thus reduce the potential impact on essential government services.

In 2017, Luxembourg became the world's first country to host a data embassy after signing an agreement with the government of **Estonia** for them to store sensitive government information in Luxembourg's data centers. In 2021, Luxembourg also opened its second data embassy after signing an agreement with **Monaco**. Luxembourg now hosts a digital twin of the Monegasque sovereign cloud in Bissen.

Source: The Government of the Grand Duchy of Luxembourg (2021[21]), *E-embassies in Luxembourg*, https://luxembourg.public.lu/en/invest/innovation/e-embassies-in-luxembourg.html (accessed on 2 February 2022)

Most surveyed ministries and administrations perceive the existing data storage capacity and IT infrastructure of the government as sufficient. Luxembourg has had a historically strong centralised approach to government IT-infrastructure managed by the CTIE, acting as a service provider to ministries and administrations. CTIE currently provides Infrastructure as a Service (IaaS), Platforms as a Service (PaaS) and generic and customised software solutions - Software as a Service (SaaS) (The Government of the Grand Duchy of Luxembourg, 2021[23]). As a result, ministries and administrations can access a number of common platforms and solutions for storing, processing and analysing data, reducing overall costs and allowing organisations to direct more of their resources to primary tasks. More recently, and as presented earlier, these services include a central BI platform, a new document and case management system, a government API gateway, a national data sharing platform, and a pseudonymisation platform. In addition, a data broker service is expected to be made available in 2022. The development of solutions and tools that support a trusted and more automated flow of data across the Luxembourg public sector is important as several ministries and administrations still access and download data manually, as opposed to machine-to-machine interactions. Examples of where automated sharing of structured data has been implemented include the health and social security domain, and data transmitted from MyGuichet.lu to the back offices of administrations.

Figure 4.5. Methods to which ministries and administration commonly access data



Source: OECD (2021[20]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

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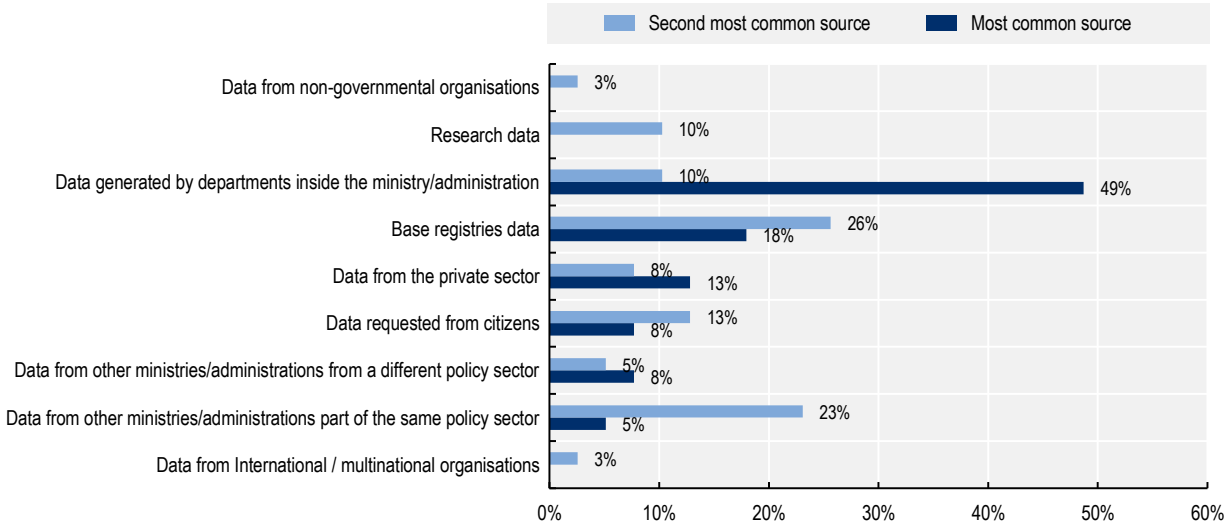
In terms of additionally identified challenges related to data infrastructure, some ministries and administrations have mentioned that they are not always aware of existing platforms or solutions for sharing or analysing data, indicating that the communication between the CTIE and ministries and administrations could be improved.

Data architecture

Data architecture can be seen as the "soft data infrastructure" and the recipe defining the relationships, processes, and concepts for the management and exchange of data between organisations. It includes, among other things, government-wide standards, specifications and semantic rules. Although standards should normally be developed as close to their primary use as possible, to enable interoperability and secondary data use across the government, it is necessary for some standards to be developed based on a common, central framework. In the case of Luxembourg, it is also important for standards to align with standards developed at the EU-level.

Data interoperability and the once-only principle are both a major priority for the Luxembourg government, with several of the NIF recommendations targeting these specific areas. During the capacity-building workshops and peer review mission, the lack of common standards and semantic rules were highlighted as important challenges for enabling data exchange between ministries and administrations, and with external parties. Moreover, improving master data management (management of authentic sources of data held in the base registries) was raised as critical. The development of the Myguichet.lu platform is promoting the standardisation of transactional data submitted by individuals and organisations to specific ministries and administrations via the platform, and re-use of such data.

Figure 4.6. Most common sources of data collected, re-used and analysed by ministries and administrations



Source: OECD (2021[20]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

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For base registries, the relevance of defining and enforcing standards for interoperability purposes is particularly important. As seen in Figure 4.6, base registries are the second most common source of data collected, re-used and analysed by ministries and administrations in Luxembourg. Better exchange and re-use of base registries data would thus be a central aspect of making public services in Luxembourg more seamless and secure while also reducing long-term costs and inefficiencies. The NIF does include important recommendations which refer to the base registries and their interoperability, including metadata management and making data from the registers accessible to third parties.

Currently in Luxembourg there are more than 20 base registries administrated by different public sector institutions. The operational, semantic and technical management aspects of the base registries are primarily the responsibility of the owner of the registry, while partially centralised to the CTIE, as the CTIE is responsible for providing general support and to deliver a joint strategy (European Commission, 2020[26]). The development of a common data architecture framework in Luxembourg with agreed upon standards and rules for base registries is likely something which will have a major impact on the DDPS-maturity of the Luxembourg public sector and the possibility to implement the once-only principle if done properly. Box 4.4 presents an example for how another OECD country has developed such a framework, in this case **Sweden**. Similar frameworks have been developed also by the government in **Denmark** and **Norway**.

Table 4.3. Base registers in Luxembourg

Base register	Administrator
The national registry of natural persons (RNPP)	IT Government Center
Trade and company registry	Luxembourg Business Registers
Land registry	Land Registry and Topography Administration
Municipalities registry	Land Registry and Topography Administration
Database of vaccinations against COVID-19	Health Directorate
Database of infectious diseases	Health Directorate
Registry of professional healthcare practitioner	Ministry of Health
Shared medical file	Agence nationale des informations partagées dans le domaine de la santé (eSanté)
Registrations with social security	Joint Social Security Centre
Central registry of De Minimis Aid	Ministry of the Economy
Register of beneficial owners	Luxembourg Business Registers
Register of trusts and fiduciary contracts	Registration Duties, Estates and VAT Authority
NACE code	STATEC
Database of business permits	Ministry of the Economy
Register of legal persons	IT Government Center
Database of businesses in the food sector	Government Commissariat for Quality, Fraud and Food Safety
Criminal records	Public Prosecutor's Office
Database of nationality	Ministry of Justice
Central register of last wills and testaments	Registration Duties, Estates and VAT Authority
Database of identity cards	Ministry of Home Affairs
Database of certificates of physical fitness	Ministry of Sport
Database of Passports	Ministry of Foreign and European Affairs
Database of Resident permits	Immigration Directorate
Firearms license	Ministry of Justice
Register of educational certificates	Ministry of Higher Education and Research
Database of jobseekers	National Employment Agency
Database of vacant positions	National Employment Agency
Database of road vehicles and their owners and holders	National Society of Automotive Traffic
Database of driving licenses	National Society of Automotive Traffic
Public shipping register	Luxembourg Maritime Administration
Register of drone operators and certified drones	Directorate of Civil Aviation

Source: Information provided by the Ministry for Digitalisation.

Box 4.4. Developing a national framework for basic data – the case of Sweden

Sweden's "National Framework for Basic Data" was developed in 2021 and is attached to the project "Ena" (Swedish for "to unite") for establishing a national, common digital infrastructure for the Swedish public sector.

Agreed principles and guidelines

According to the agreed principles and guidelines, national basic data should 1) give value to society; 2) be effective and easy to use; 3) support the "once-only" principle; 4) follow defined rules; 5) be interoperable with each other; 6) be described; and 7) be treated securely.

Basic data domains covered

1) People; 2) Businesses; 3) Property- and geographical information; 4) Transport; and 5) Health.

Process architecture framework

The process architecture framework covers the process for organisations to follow in identifying and establishing a basic data domain, and in identifying and establishing national basic data.

Information architecture framework

The information architecture framework outlines common rules for developing concept models and information models.

Source: Swedish Agency for Digital Government (2021[27]), *Ramverk för nationella grunddata inom den offentliga förvaltningen*.

In addition, the data broker service which is currently under analysis by the NIF "once-only" working group is looking at how a central data intermediation platform should be implemented and what services it should offer. The data broker would need to define exchange standards and provide data catalogues to support the sharing and re-use of data on the platform.

Open Government Data

In addition to closed or semi-closed data access and sharing arrangements, the publication of open government data can help stakeholders both inside and outside of the public sector extract value from public sector data. The Luxembourg government has for many years been successful with open geospatial data and has a policy to publish all core geospatial data under a Creative Commons Zero (CC0) license (European Commission, 2021[28]). The work on open geospatial data has paved the way for Luxembourg to also make other valuable public sector data available, such as data on public procurement, environment, and transport.

Still, the Luxembourg government's general performance in open data has not lived up to that of the geospatial data. In 2019, Luxembourg ranked 23 out of 34 OECD member countries and 13 out of 21 EU Member States in the OECD OURdata Index. The below-average performance of Luxembourg in open data is also reflected in the EU Open Data Maturity assessment, where it was categorised as a "beginner" in 2021 (European Union, 2020[29]).

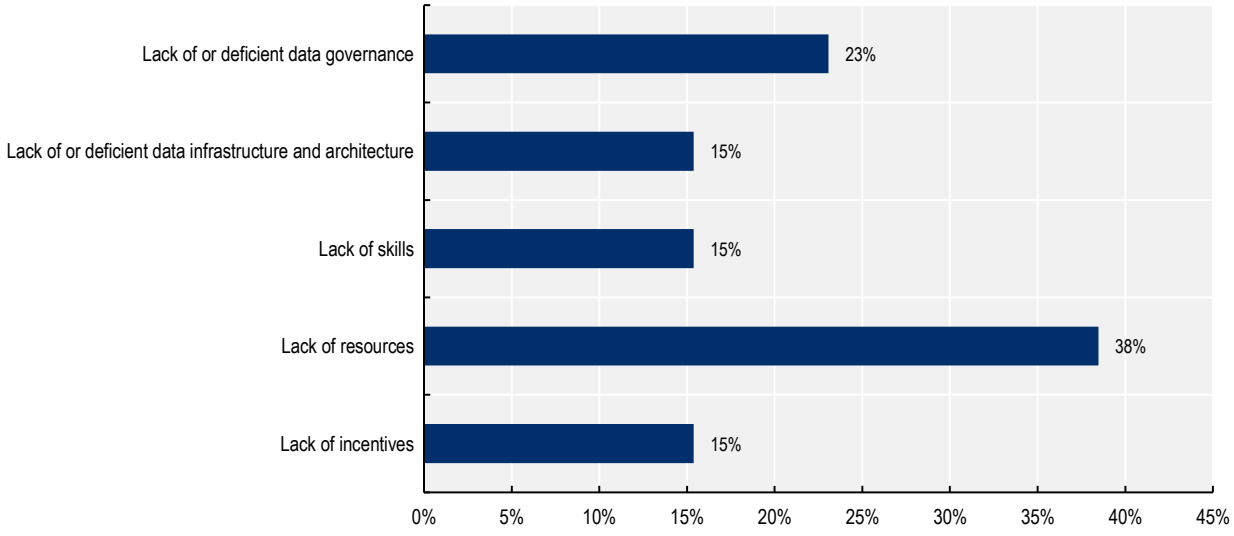
Despite this, Luxembourg has had a dedicated strategy and roadmap for open data in place since 2017, and the central open data portal data.public.lu, managed by SIP. Some reasons why the general performance on open data has not yet lived up to expectations might be linked to the fact that the current open data strategy and roadmap contain few concrete objectives coupled with actions, timeframes, and

roles and responsibilities. SIP is currently working on a new version of the open data strategy together with a concrete 5 year roadmap. These are expected to be published before the end of 2022.

According to ministries and administrations the main barriers for them to publish open data are a lack of resources and deficient data governance (OECD, 2021[20]). Ministries and administrations need to find ways of integrating open data into their daily operations by considering the publication and maintenance of open data as a strategic, long term digital investment and not as a short-term project. While the benefits of open data are sometimes difficult to assess and can be both indirect and direct and spread across multiple sectors and actors, it is certain that greater maturity in terms of sharing data today will increase the advantages of an organisation in terms of digital readiness in the future.

While the SIP provides excellent support from the central level it cannot implement the open data policy on its own. SIP does not have the power to enforce existing principles and policies for open data but can only notify ministries and administrations that they believe they do not comply with them and should act. Therefore, it is the responsibility of ministries and administrations to ensure compliance in practice, which could be more easily achieved if dedicated resources such as contact persons for open data would be appointed and be given proper mandate, skills and resources. Alongside this, the SIP and MDIGI could work together to further promote and supervise the connection of the work on open government data with the overall data-driven public sector agenda. Implementing the DDPS framework will lead to better (and more) open data being published, which in turn will help implement the DDPS agenda. With open data currently being the responsibility of ME and not MDIGI, the ability to further strengthen the link between the two agendas is not straightforward, even though the two organisations are actively collaborating through several government programs spanning across government such as AI4GOV and the National Interoperability Framework.

Figure 4.7. Main barriers for ministries and administrations to publish open data



Source: OECD (2021[20]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

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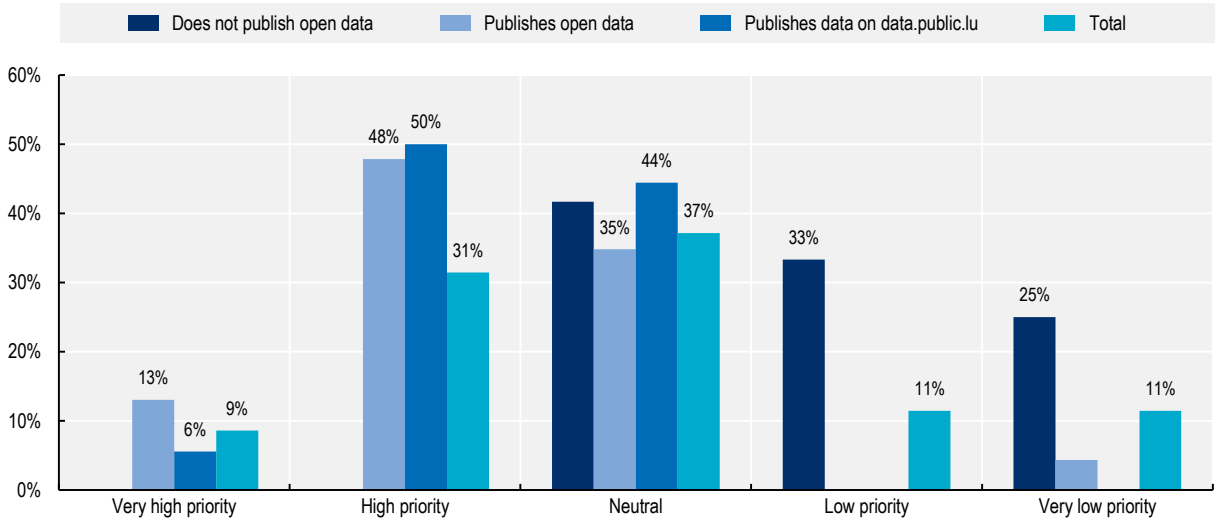
The insufficient resources and enforcement mechanisms related to open data which is common in many countries might explain why only 31% and 9% of ministries and administrations currently see open data as a high or very high priority (see Figure 4.8). Those that see it as a high priority are ministries and administrations who already published open data either via their own channels, or on data.public.lu. With the national transposition of the EU Open Data Directive in place since 2021, SIP becomes better equipped to promote the implementation of existing principles and convey the importance and priority of open data not only for external actors but for public actors too. Even more importantly, it should support ministries and administrations in raising more awareness of the importance of open data inside their organisation and take more ownership and action around this policy area.

Figure 4.8. Level of priority given to open data among ministries and administrations



Source: OECD (2021[20]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

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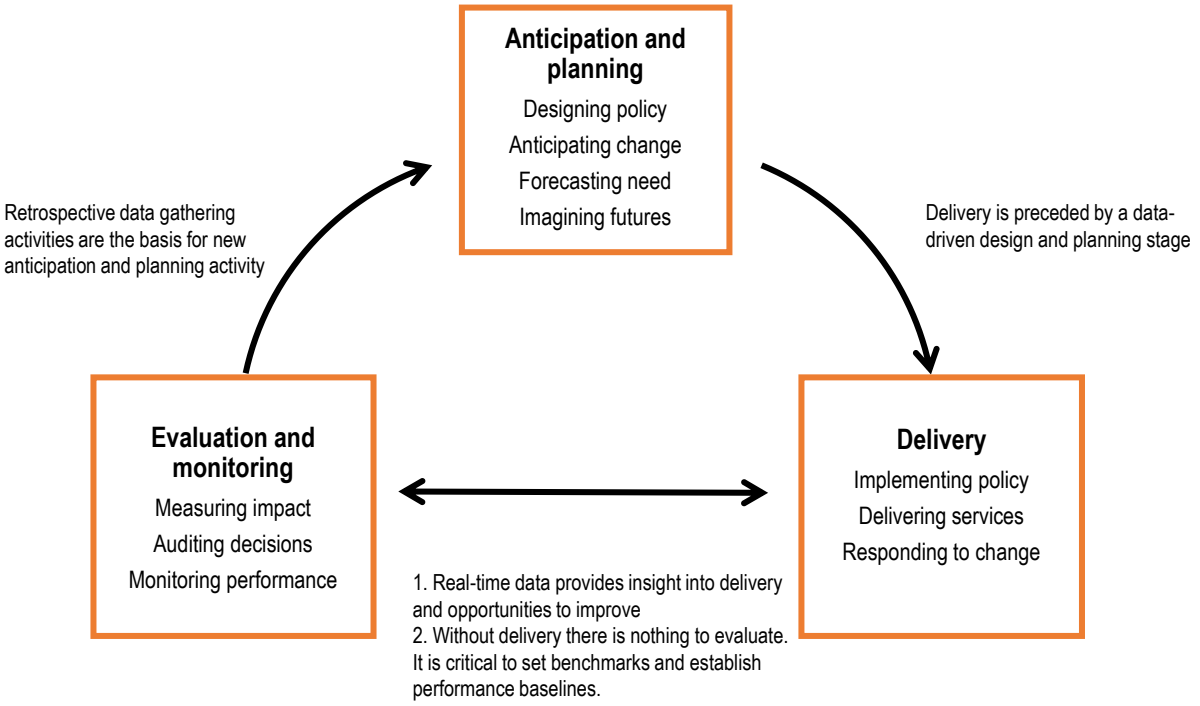
Applying data to generate value

While it has been argued that "data are to this century what oil was to the last one" (The Economist, 2017[30]), data does not possess any intrinsic value. As discussed previously in this chapter, data comes in many shapes and forms and the only thing that can determine its value is if and how it is being used, and the result of that use, which is determined by if and how the data can be accessed and used in the first place. The application of data within the public sector can be thought of as either of the following three actions: anticipating and planning, delivery, and monitoring and evaluation (see Figure 4.9) (OECD, 2019[9]).

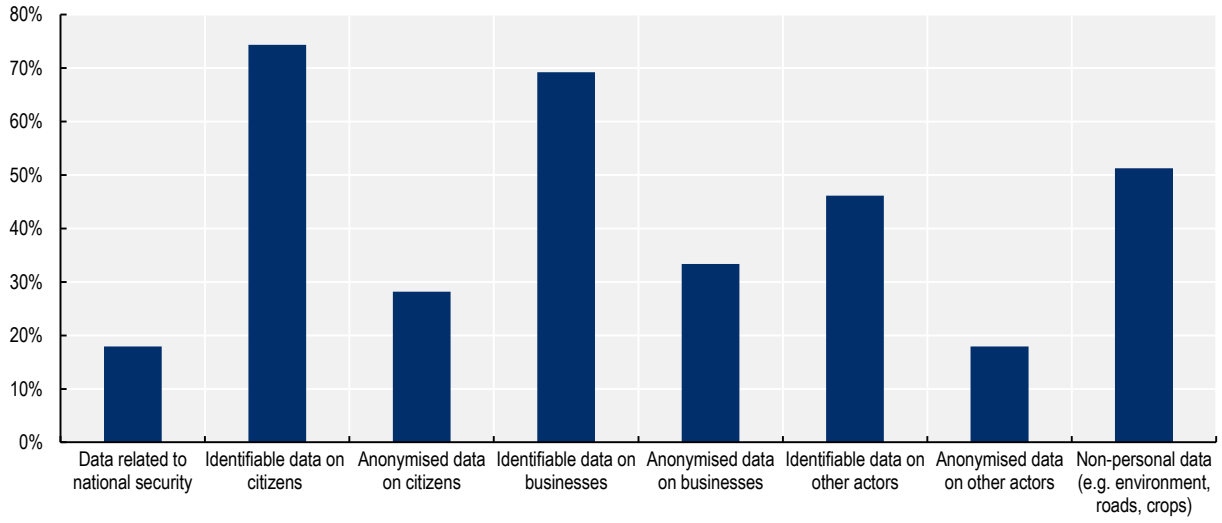
Figure 4.9. How data can be used by the public sector to generate value



Source: OECD (2019[9]), *The Path to Becoming a Data-Driven Public Sector*, OECD Digital Government Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/059814a7-en.

For anticipation and planning, public sector organisations can use data to design better policies, anticipate change, and forecast needs. The value of being equipped to use data to anticipate is particularly important in the context of a global climate crisis and security instabilities. It is moreover important for governments and public sector organisations to use data in the delivery of policies and services - such as in reacting and adapting to change. Finally, public sector organisations should use data as part of monitoring and evaluating their interventions, including to audit decisions, monitor the performance of policies and services, and measure their impact on social, economic, and environmental factors.

Figure 4.10. Type of data that ministries and administrations work with



Source: OECD (2021[20]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

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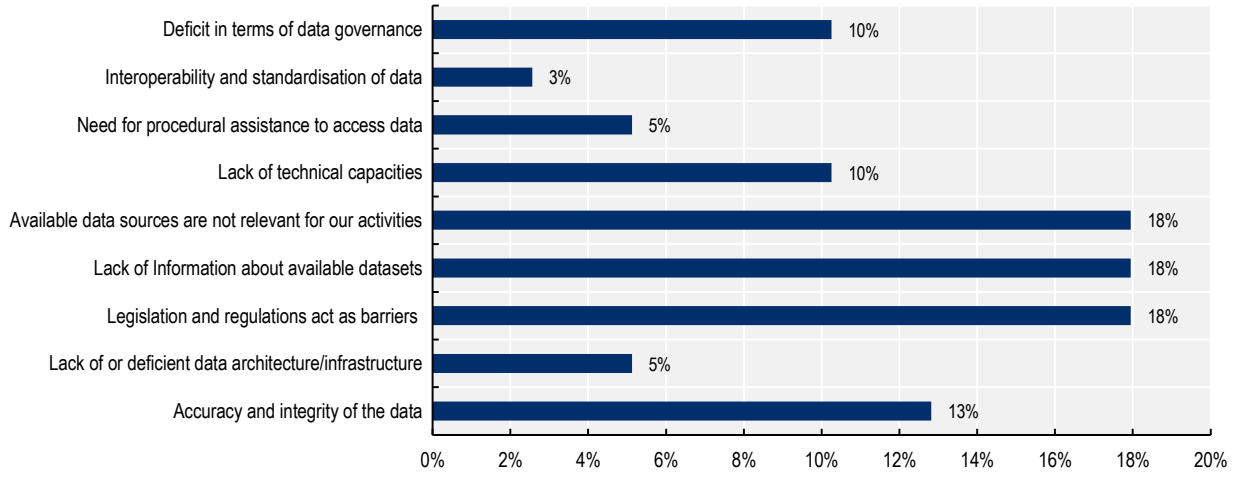
90% of surveyed ministries and administrations in Luxembourg claim to be collecting, processing, and using data on a regular basis (OECD, 2021[20]). A substantial proportion of these data are identifiable data on citizens, businesses, and other actors, but also non-personal data such as data about the environment, infrastructure, or transport. As previously mentioned, base registries are the second most common data source, after data generated by other departments within the same administration or ministry. When it comes to the main reported barriers for ministries and administrations to use data, these include a lack of information about available data, absence of relevant data sources, and a legislation that is slowing down processes, in line with the previous findings.

Figure 4.11. Main barriers to using data among ministries and administrations



Source: OECD (2021[20]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

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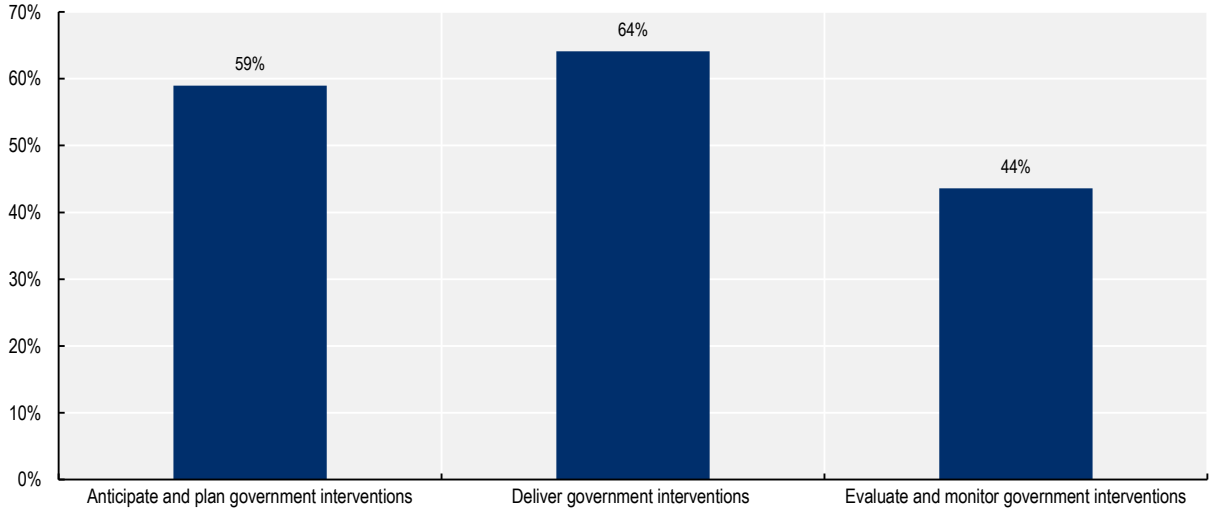
Going back to how ministries and administrations apply the data that they have, a majority claim to use it as part of the anticipation and delivery phase of government interventions (Figure 4.11). Only 44% of ministries and administrations use data to evaluate and monitor government interventions. For those that use data regularly to anticipate and plan interventions (Figure 4.12), almost all apply data to support evidence-based policy making (91%). A large majority also use it to support financial management and budgeting; to forecast needs and probable events; and to support the design and deliver public services. Less than half use data to support regulatory development (including impact assessments), and to develop a deeper understanding of citizen needs for the design of new policies and services.

Figure 4.12. How ministries and administrations use data



Source: OECD (2021[20]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

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Box 4.5. How ministries and administrations in Luxembourg have used data for anticipating and planning, service delivery, and monitoring and evaluation

Transcriptions of texts of articles using AI - Luxembourg National Library

A project proposed by the Luxembourg National Library as part of the AI4Gov initiative is aiming to improve the transcription of article texts by using optical character recognition (OCR). OCR can be seen as an automated data extraction technique taking advantage of AI and which allows for the automated identification of "named entities" (people, places, organisations, and dates) from the article texts. The identified entities later form the basis for a new interactive application that allows dynamic exploration of articles, thereby improving access to the archive of digitalised newspapers and journals.

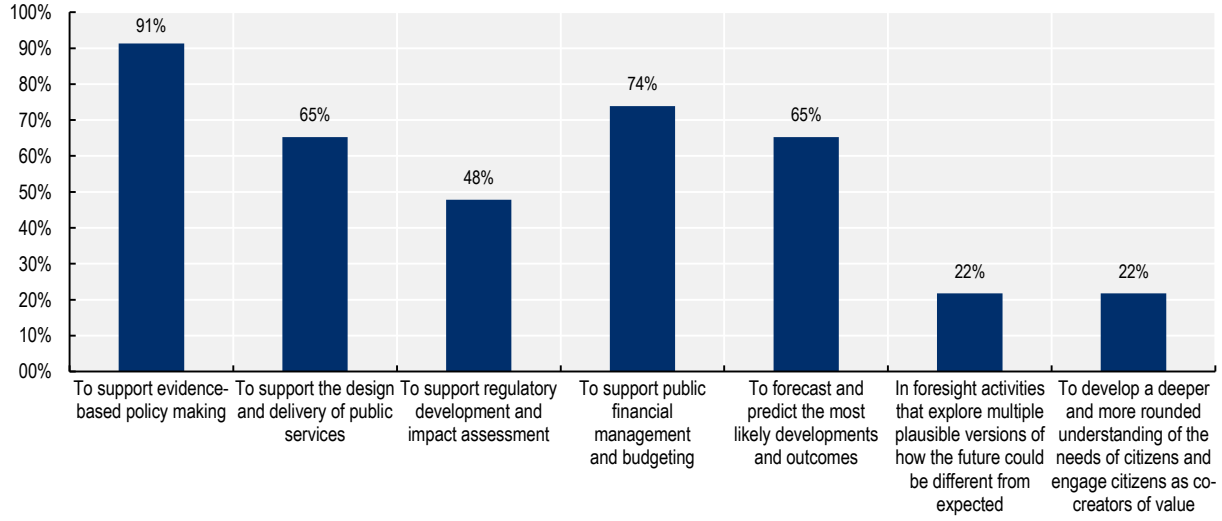
Extopia Project - Land registry and Topography Administration

The Land Registry and Topography Administration (ACT) carries out a yearly overflight to produce a uniform aerial image (orthophotography) for the whole country. In order to guarantee the topicality of the built fabric in the various databases managed by the administration, it is important to know where buildings have been built or demolished, so that updates can be made (in particular with measurements taken in the field) as soon as possible. An AI trained with a set of typical buildings can detect all buildings. This then allows ACT to make an intersection with the currently known state and thus delimit the areas where construction or destruction has taken place. This drastically reduces the manual and tedious tasks of identifying changes at building level, and frees up human resources.

Source: The Government of the Grand Duchy of Luxembourg (2022[31]), *The AI4GOV initiative*, https://gouvernement.lu/en/dossiers.gouv_digitalisation%2Ben%2Bdossiers%2B2021%2BAI4Gov.html (accessed on 15 June 2022); information provided by the Ministry for Digitalisation.

For the ministries and administrations that use data in the delivery of government interventions (Figure 4.14) 92% use it to improve existing public services and to communicate and engage with the public. Around 50% use data to better respond to emergencies and crises, and to free up public servant capacity so they can engage in more important tasks. Finally, a majority of the ministries and administrations that use data to monitor and evaluate interventions use it to evaluate policy interventions and to track operational performance (Figure 4.15). Few use data for auditing and accountability, and to demonstrate return on investment. To improve the use of data to evaluate and monitor government interventions it is essential to use benchmarks and set performance baselines. It is moreover advisable to publish online to the public, ideally as open data, such performance metrics to instil trust and strengthen accountability for the performance of public policies, regulations, and services.

Figure 4.13. How ministries and administrations use data to anticipate and plan interventions



Source: OECD (2021[20]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

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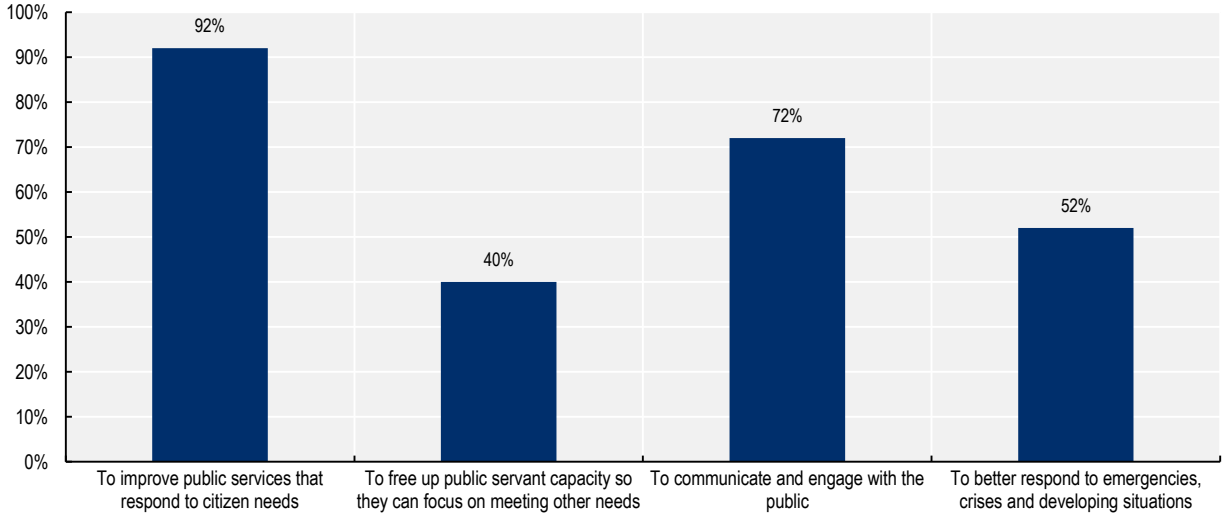
Figure 4.14. How ministries and administrations use data to deliver interventions



Source: OECD (2021[20]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

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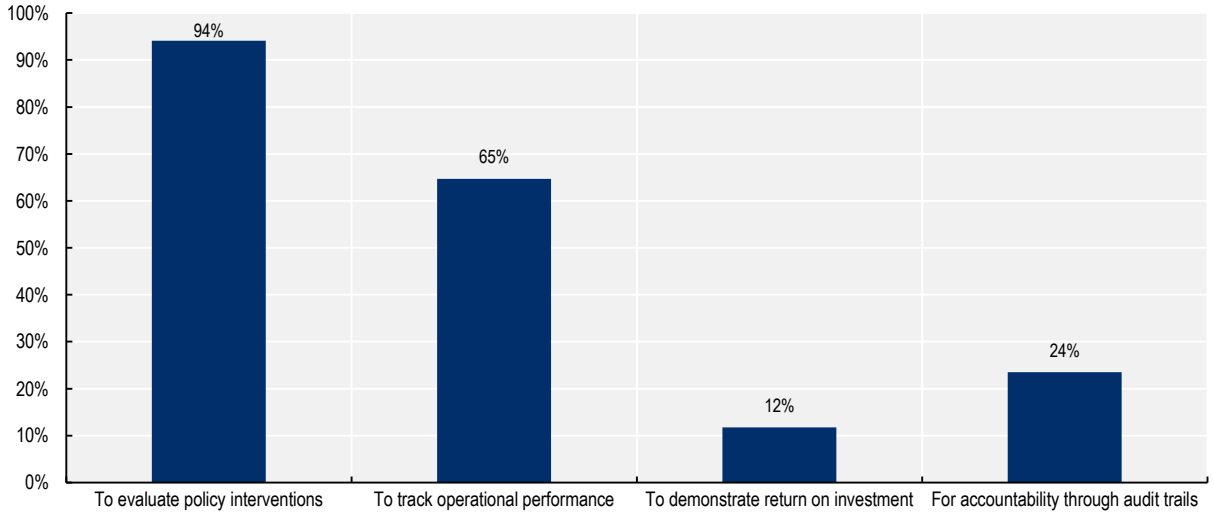
Figure 4.15. How ministries and administrations use data to monitor and evaluate interventions



Source: OECD (2021[20]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

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Besides thinking about the objectives for how data can be used, AI (and other emerging technologies) can be extremely useful systems for ministries and administrations to effectively use large volumes of data in the design and delivery of public policies and services. In 2019, the Luxembourg government launched the national AI strategy "Artificial Intelligence: a strategic vision for Luxembourg" (The Government of the Grand Duchy of Luxembourg, 2019[32]).

Box 4.6. Luxembourg's national AI strategy

Luxembourg's national AI strategy *Artificial Intelligence: a strategic vision for Luxembourg* was elaborated via an inter-ministerial consultation and launched in 2019 by the Prime Minister and Minister for Digitalization Xavier Bettel. The strategy articulates the activities, ambitions and intentions of the Luxembourg government related to the role of AI in Luxembourg and in Europe. It is not indented as a one-off strategy but rather the first edition of the government's policy vision in this area.

AI for the public sector is one of the focus areas of the strategy, where the following actions are highlighted:

- Developing a comprehensive overview of potential projects based on criteria, such as feasibility, necessity and value to create human-centric AI solutions for citizens.
- Engaging with other EU member states in peer-learning while also taking into account the exchange of best practices, experience and data.
- Contributing to the development of AI solutions in order to build more efficient and personalized public administration services that serve all parts of society.
- Supporting Digital by Default with AI tools that can ease its implementation, reinforce customer-oriented services, and provide tailor-made and integrative products/services to better engage Luxembourg's diverse, multilingual and multicultural society.
- Fostering research and innovation that assess AI systems for the public sector; developing expertise combined with civictech applications and disseminating results and questions to the public.

- Studying the creation of a structured public database ecosystem aimed at eliminating technical barriers for AI use cases

Source: The Government of the Grand Duchy of Luxembourg (2019[32]), *Artificial Intelligence: A strategic vision for Luxembourg*, https://gouvernement.lu/dam-assets/fr/publications/rapport-etude-analyse/minist-digitalisation/Artificial-Intelligence-a-strategic-vision-for-Luxembourg.pdf (accessed on 15 June 2022)

Luxembourg's strategic vision for AI has also led to the creation of an AI4Gov inter-ministerial committee, comprised of the MIDIGI and the ME (SMC and SIP). The purpose of the AI4Gov Committee is to encourage ministries and administrations to make better use of AI and data to transform the way they operate and their services. The Committee launched a first call for AI4GOV projects in November 2019, which resulted in a final selection of six proposed projects, of which four were implemented in 2020. The projects range from extraction of topographical objects (ACT), indexing of government photos (SIP), and transcriptions of texts of articles (Luxembourg National Library). By the end of 2020 a new call for proposal was made and a new set of projects have been initiated, including for recruitment procedures (CGPO) and automatic labelling of documents (Central Legislative Service) (The Government of the Grand Duchy of Luxembourg, 2022[31]). In January 2022, a third call for projects was launched by AI4GOV, and in parallel trainings are being organised together with INAP to enhance AI-related competencies in the public sector (Ministère de la Digitalisation, 2021[33]).

Data and trust

Data governance and strategic use of data has little value if citizens, civil servants, and businesses do not trust how the government handles and uses data. While people in Luxembourg have comparatively high confidence in their government, the use of data and data-driven technologies inside the public sector needs to be backed up by an anticipatory approach to managing risks and acting trustworthily with data by considering present and future needs in terms of ethics and transparency, privacy and consent, and digital security. The Luxembourg government has made considerable achievements in this area. However, the peer review mission and workshop revealed some challenges, in particular with regards to promoting awareness around data ethics, and actively supporting public servants and data professionals in ensuring compliance with data protection rules.

Ethics and transparency

Data ethics can be defined as "the branch of ethics that studies and evaluates moral problems related to data, algorithms, and corresponding practices in order to formulate and support morally good solutions" (Floridi and Taddeo, 2016[34]). Data ethics and moral principles are by nature non-binding and should thus complement binding laws and regulations, not substitute them. Data ethical principles may cover issues such as the impact of using data on distinct groups and communities, and the impact of not sharing and using specific data on the same groups and communities. Data quality is moreover something which shapes how the public sector can use and interpret data, which in in turn impacts people and society. During the peer review mission, a lack of consistent data management and low-quality data was raised as one of the biggest issues related to trust and data.

In addition to low quality data, some ministries and administrations find that there is unclear accountability at the national level for trustworthy management and use of data. It was also identified that there is a low level of awareness and understanding of what data ethics means beyond GDPR. Moreover, 30% of ministries and administrations disagrees with there being sufficient guidance or standards for ethical handling and use of data, and 35% believe that there are not sufficient accountability mechanisms for data-driven and automated decision making. In 2020, the OECD (2020[35]) published the Good Practice

Principles for Data Ethics in the Public Sector with the aim to support governments' progress in this area (Box 4.7).

Box 4.7. The OECD Good Practice Principles for Data Ethics in the Public Sector

The Good Practice Principles for Data Ethics in the Public Sector include ten high-level principles to support the ethical use of data in the design and delivery of public policies and services. They are:

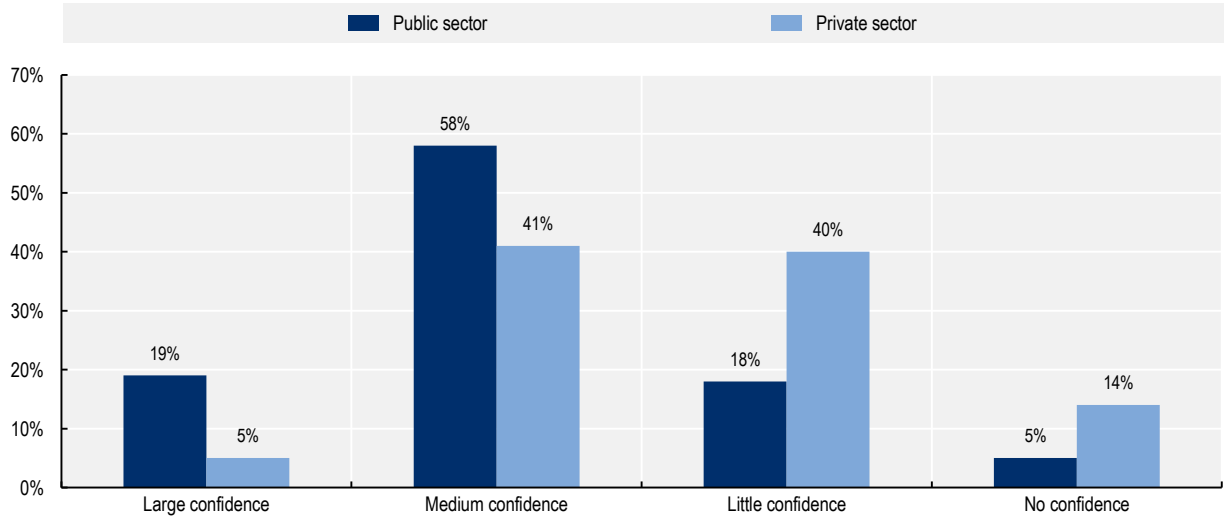
1. Manage data with integrity
2. Be aware of and observe relevant government-wide arrangements for trustworthy data access, sharing and use
3. Incorporate data ethical considerations into governmental, organisational and public sector decision-making processes
4. Monitor and retain control over data inputs, in particular those used to inform the development and training of AI systems, and adopt a risk-based approach to the automation of decisions
5. Be specific about the purpose of data use, especially in the case of personal data
6. Define boundaries for data access, sharing and use
7. Be clear, inclusive and open
8. Publish open data and source code
9. Broaden individuals' and collectives' control over their data
10. Be accountable and proactive in managing risks

Source: OECD (2020[35]), *Good Practice Principles for Data Ethics in the Public Sector*, OECD, Paris, https://www.oecd.org/gov/digital-government/good-practice-principles-for-data-ethics-in-the-public-sector.pdf.

When it comes to emerging technologies in the public sector, in particular AI, the discussion on trust and data is critical. AI has been proven to provide considerable benefits to economies and societies, including by being used in the public sector. A study by Vinuesa et al. (2020[36]) published in Nature estimated that AI technology[3] could help implement 134 out of 169 targets part of the UN Sustainable Development Goals. At the same time, it estimated that if not properly regulated and monitored to avoid gaps in transparency, safety and ethical standards, the use of AI technology could actually inhibit achieving 59 of the targets. As such, the study suggests that the regulatory framework, institutional capabilities for monitoring AI technology use, and efforts for strengthening transparency and ethics needs to be prioritised to avoid the use of AI causing unintended negative effects.

In a study by the Luxembourg Institute of Social and Economic Research (LISER) from 2020 (Poussing, 2021[37]) commissioned by the MDIGI and SMC, 58% of surveyed citizens reported that they have medium confidence in the use of AI by the public sector, whereas only 41% felt the same for the private sector. This shows the success of the Luxembourg government in maintaining trust of citizens in the public sector's use of data and digital technologies as compared to the private sector, something which is not to be taken for granted. Since less than 20% of respondents felt that they had large confidence in the use of AI by the public sector, more could still be done to even further promote trust in the use of data and especially emerging technologies as such use cases are developed. The establishment of the AI Legal and Ethics Working Group under the AI4GOV initiative is a good example of such efforts.

Figure 4.16. Citizens' confidence in the use of AI by the public and private sector in Luxembourg



Source: Poussing (2021[37]), Résultats de la consultation publique relative aux opportunités et aux défis de l'Intelligence Artificielle, https://gouvernement.lu/dam-assets/documents/actualites/2021/04-avril/28-bettel-cdp/Rapport-IA6-final.pdf.

StatLink https://stat.link/0nq9o5

Given that data is the "engine" of AI systems, the Luxembourg could moreover consider aligning this work with the possible development of a data strategy as a foundation to effectively deploy AI in the public sector (Berryhill et al., 2019[38]).

Privacy and consent

Protecting the privacy of individuals remains a central aspect of managing and using data appropriately in the public sector and is an important priority of the Luxembourg government. The legal framework for privacy and consent in relation to personal data in Luxembourg is based on the GDPR. The national implementation of the GDPR established Luxembourg's National Commissioner for Data Protection (CNPD) and laid out the rules for Data Protection Officers (DPOs) to be appointed within ministries and administrations, and their tasks and responsibilities. The Government Commissioner for Data Protection of the State (CGPD) is in charge of coordinating the network of DPOs inside the ministries and shaping central policies to support the implementation of the GDPR by ministries.

During the capacity-building workshop on data, concerns were raised by some ministries that their DPOs were not always available when needed or had the resources to cater fully to their needs as they advance their management and use of data. As ministries work more with data (which is the ambition), there will also be a need for more tailored and attentive support to be able to work with data more without facing unnecessary barriers, including the fear of a GDPR-breach.

On top of GDPR-compliance, as part of new ways of empowering citizens and increasing transparency of the public sector, governments are looking at how they can enable citizens and businesses to be more meaningfully informed and participate in deciding how data about them are being stored, accessed, and used by public sector organisations. In Luxembourg, on the personal space of MyGuichet.lu, private users of public services can see data stored about them from more than 15 authentic sources, and what organisations have accessed their data during the last six months (Box 4.8). For some of these data, users can also request the correction of data that they do not consider accurate, if they have legitimate justifications.

Box 4.8. Personal attributes visible to citizens from authentic sources on MyGuichet.lu

On MyGuichet.lu, users of public services can see personal attributes stored about them from more than 15 authentic sources. These authentic sources are:

- Information on the individual from the RNPP, including parents, and children registered on the same address
- Registration on the electoral lists
- List of public sector organisations that have consulted or updated data of the individual in the last 6 months
- Certificates of residence, registration at reference address, extended residence
- Pay slips and pensions if you are a government or communal employee
- Certificate of physical fitness
- Details of driving license and license points
- Details of the person's vehicles and registration numbers
- Housing aid received
- Land register
- Plots with hunting rights
- Tax credits on notarial deeds
- CovidCheck certificates (EU Digital Covid Certificates) of the individual and its children
- Situation of affiliation to the health insurance fund
- Leave for family reasons
- Bank details given to the health insurance fund

Note: The attributes are not stored on MyGuichet.lu and are only visible to individuals who have a private space on MyGuichet.lu that requires secure access.
Source: The Government of the Grand Duchy of Luxembourg (2022[39]; [40]), "MyGuichet.lu" and "Guichet.lu - Actualités - Consultez désormais encore plus de sources authentiques dans l'application mobile MyGuichet.lu !",

Since 2021, a pilot project is also being run via the GovTech Lab to develop a concept and implement technology that enable the creation of a verifiable digital residence certificate, using the structured data of a residence certificate from the national register of natural persons (RNPP). The digital certificate would also allow for selective disclosure of information on the attestation, for example for a person can prove that they have reached a certain age without having to show date of birth, which in turn supports data minimsation (govtechlab.public.lu, 2021[41]; Portail des marchés publics du Grand-Duché de Luxembourg, 2021[25]).

Box 4.9. Trust My Data – a call for solution for verifiable credentials

In 2021, the Govtech Lab launched a call for solution for the issuance of a **verifiable digital residence certificate** in a wallet.

Building on the increased interest and demand for making it easer for citizens to share official government-issued identity attributes and credentials through digital means – either fully or only certain attributes - the call asked for developing the general concept and technical building blocks needed for the Luxembourg government to create a verifiable digital residence certificate in a standard and interoperable format. The verifiable credential will use structured data of a residence certificate from the RNPP register.

The call for developing the solution was launched as an innovation partnership on the public procurement portal *portail des marchés public* and is currently under development.

Source: The Government of the Grand Duchy of Luxembourg (2021[42]), *Trust My Data*, https://govtechlab.public.lu/en/call-solution/2021/trust-my-data.html (accessed on 8 August 2022); The Government of the Grand Duchy of Luxembourg (2021[43]), *Trust my data: Issuance of a verifiable digital certificate in a wallet - Case of the Luxembourg residence certificate*, https://pmp.b2g.etat.lu/app.php/consultation/522602 (accessed on 8 August 2022)

Digital security

Luxembourg is an advanced country when it comes to digital security. As mentioned previously, Luxembourg is considered such a safe and stable environment for storing sensitive data that it hosts other countries' government data. According to the Global Cybersecurity Index 2022, Luxembourg ranks 13 in the world in cybersecurity measures. The relative strengths are its legal and technical measures, whereas the area for potential growth is organisational measures, meaning the "the existence of co-ordination institutions, policies, and strategies for cybersecurity development at the national level." (ITU, 2021[44]). The centralisation of IT infrastructure under CTIE has an important impact on security measures as most controls and security-related competencies can be managed by the CTIE. The CTIE has standardised methods for information security and puts it at the centre of all projects it carries out, whether for its own behalf or for ministries and administrations. Security measures are applied gradually according to the security needs identified and pay detailed attention to issues such as data minimisation, data retention, data dissemination, profiling and automated decisions, accuracy of decisions, data accuracy and quality, and guaranteeing the exercise of rights and respect of privacy. In the course of 2020, the CTIE has begun work to diversify the application security measures in order to adapt them to the needs of constantly evolving projects (Ministère de la Digitalisation, 2021[33]).

The regulatory framework for digital security in Luxembourg is based on the Law of 28 May 2019 of ensuring a high common level of security of network and information systems and the GDPR. The National Information Systems Security Agency (ANSSI) is the national authority responsible for the security of both classified and unclassified information systems installed and operated by the Luxembourg government. ANSSI is under the responsibility of the High Commission for National Protection (HCPN), which is also responsible for the protection of critical infrastructure, crisis prevention and management, and co-ordinating the fight against terrorism (The Government of the Grand Duchy of Luxembourg, 2021[45]). ANSSI has developed the "General policy for information security of the Luxembourg State", and a "Charter of good conduct for digital information security" that supports ministries and administrations in working securely with information and information systems (The Government of the Grand Duchy of Luxembourg, 2021[46]).In 2021, the National Cybersecurity IV was adopted, which include actions related to: reinforcing trust in the digital world and the protection of human rights online; the consolidation of the security and

resilience of the digital infrastructures of Luxembourg; and the development of a digital economy which is reliable, sustainable and secure (The Government of the Grand Duchy of Luxembourg, 2021[47]).

In addition to the work of ANSSI, Security Made in Lëtzebuerg (securitymadein.lu) is the national cyber security agency which provides support to companies in Luxembourg, but also to municipalities, to address cybersecurity challenges. The agency is an economic interest group founded by the State of Luxembourg, represented by the Ministry of the Economy, the Ministry of Education, Children and Youth; the Ministry of Family Affairs, Integration and the Greater Region; the Intercommunal Information Management Association (SIGI); and the Association of Luxembourg cities and municipalities (SYVICOL) (The Government of the Grand Duchy of Luxembourg, 2021[48]).

In 2022, the CEO of securitymadein.lu took over the chair of the newly installed EU Cyber Security Competence Centre, and securitymadein.lu was appointed Luxembourg's national co-ordination centre for the initiative (European Commisssion, 2022[49]).

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Notes

[1] 41.03% of surveyed ministries and administrations replied either “Agree” or “Strongly agree” to the statement “There is clear policy guidance on the governance and use of data.”

[2] To the question “Does your ministry/administration have a dedicated formal strategy or policy in place for the strategic management of data in your ministry/administration?” 46% of ministries and administrations responded “No”, whereas 26.64% responded “No, but we are working on it.”

[3] The study considered AI as “any software technology with at least one of the following capabilities: perception—including audio, visual, textual, and tactile (e.g. face recognition), decision-making (e.g. medical diagnosis systems), prediction (e.g. weather forecast), automatic knowledge extraction and pattern recognition from data (e.g. discovery of fake news circles in social media), interactive communication (e.g. social robots or chat bots), and logical reasoning (e.g. theory development from premises). This view encompasses a large variety of subfields, including machine learning.”

5 Building user-driven public service design and delivery in the digital age in Luxembourg

This chapter provides an analysis of how Luxembourg is digitally transforming public services based on the OECD Framework for Public Service Design and Delivery. The first section looks at the contextual factors that frame a service design and delivery agenda, including representative and organisational politics, the history of channels, technology and infrastructure, and societal and geographic factors. The second section reflects on the philosophical approximation to service design and delivery in the country, including the needed leadership, culture around users, co-ordination, collaboration and agility needed for a meaningful service transformation. Finally, the chapter analyses the current state of key enablers and tools to equip service teams to materialise the ambition for a user-driven service design and delivery agenda at scale while fostering trust and quality.

Introduction

Citizens and businesses are demanding public services that are responsive to understand and meet their needs, in a timely and effective fashion and regardless of their preferred channel. As observed across OECD member countries, adopting a service design and delivery approach is pivotal to provide services that contribute to strengthen the relationship between the State and the constituency. This became evident in the aftermath of the COVID-19 pandemic, when digital government maturity was instrumental for governments to continue operating under challenging and changing conditions, and to provide new or existing public services through digital channels timely. Improving the experience and convenience of citizens when accessing public services can help governments foster citizens' trust and the legitimacy of the public sector. This requires governments to adopt a user-driven culture across sectors to understand and meet these needs.

Digital government is instrumental to make public sectors work better for their citizens and businesses. The benefits that digital technologies and data can offer are multiple and far beyond simply translating analogue processes into digital means. Digital government can be a window opportunity to break down organisational siloes, rethink the interactions with the public sector, and to set the foundations for a longstanding and sustainable digital transformation that benefits all.

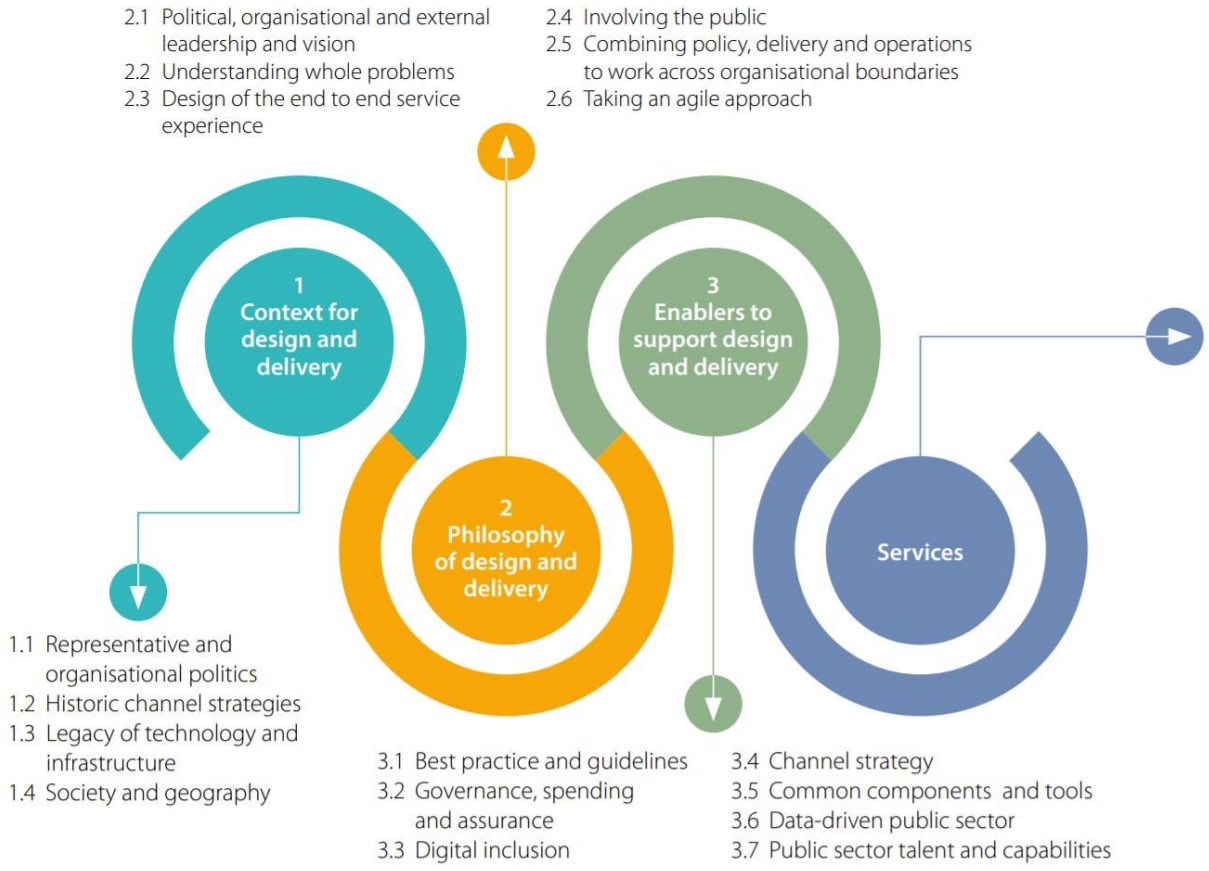
Adopting a digital-by-design culture and practice in the public sector can also foster a mindset shift to fully utilise digital tools and data to change the way public sector institutions understand and answer to the needs of citizens. A digital government redirects efforts from technology deployment to its use to be more responsive, trustworthy and protective with citizens and the community. As a result, digital transformation can drive a meaningful reorientation within the public sector towards understanding and meeting user needs from an end-to-end perspective, reorganising internally and establishing innovative channels to interact with citizens as well as to design and deliver the services they expect.

Unlocking the value of digital technologies and data to rethink service design and delivery in the public sector requires equipping service teams with the tools, culture and skills needed to transform services around user needs. It requires fostering a user research approach that foster agility and a better comprehension of users and their journeys when accessing public services and establishing meaningful feedback gathering and application mechanisms to reorient services in an agile and effective way.

The OECD has been supporting member and partner countries to advance towards a similar cultural and practice shift to transform service design and delivery in the digital age. In 2014, the OECD Council adopted the Recommendation on Digital Government Strategies, which early on identified the importance of digital government in order to understand, meet and anticipate the needs of users. Building on this work, the OECD Framework for Public Service Design and Delivery identifies three areas to help countries achieve their ambition to digitally transform services (see Figure 5.1):

- First, it sets the broader context in which public services are designed and delivered, including societal, technological, infrastructure and channel legacy factors
- Second, it reflects on the holistic organisational and cultural approach to transform services, including the leadership to advance this strategy as well as the rationale for understanding user needs, designing end-to-end service experience and promoting multi-level collaboration within the public sector for this purpose
- Finally, it looks at the enablers that equip teams to transform the service experience of citizens, including resources and common, interoperable technology that support a whole-of-government rather than silo-based transformation.

Figure 5.1. OECD Framework for Public Service Design and Delivery



Source: OECD (2020[1]), *Digital Government in Chile – Improving public service design and delivery*, OECD Digital Government Studies, OECD Publishing, Paris, https://doi.org/10.1787/b94582e8-en.

The Government of Luxembourg's ambitions are no different, with a determined agenda to foster an inclusive and effective public sector by enhancing the experience of citizens with the public sector through digitally transformed public services. Significant advances have been made in the past years with the consolidation of the informational service delivery portal GUICHET.LU and the development of its transactional version MYGUICHET.LU. Efforts are now devoted to increase coverage of and satisfaction with transactional services, as well as to continue equipping ministries and administrations with the building blocks needed for increased ownership to implement their digital transformation journeys.

This chapter presents the service design and delivery landscape in the Government of Luxembourg including the existing context, culture, philosophy and enablers that determine how ministries and administrations are addressing the digital transformation of public services in the country.

Context for public service design and delivery

Creating the conditions for a transformed approach for public service design and delivery is influenced by the national political and organisational context in which decisions and initiatives are framed (see Figure 5.2). Understanding the context for service design and delivery can help identify organisational and political levers needed to foster a culture around understanding users and their needs. Similarly, existing channel, technology and infrastructure legacy shape the ability of the public sector to streamline and

integrate processes and services around user needs to simplify their experience when interacting with the public sector. Finally, existing societal, cultural and geographical conditions can determine the way governments are able to deploy digital technologies as well as the extent to which citizens and businesses have the ability and resources to effectively experience a digital state.

Figure 5.2. The OECD Framework for Public Service Design and Delivery: Context

Source: OECD (2020[1]), *Digital Government in Chile – Improving Public Service Design and Delivery*, OECD Digital Government Studies, OECD Publishing, Paris, https://doi.org/10.1787/b94582e8-en.

Representative and organisational politics

As described in Chapter 2, contextual factors for digital government set an institutional path in which a country can advance and become digitally mature. In the context of designing and delivering services, political, socio-economic, and technological factors influence policy choices and actions that determine the capacity of the public sector to implement a service agenda that meet the diverse and context-dependent needs of citizens and businesses.

Luxembourg presents a stable political context, in which digital government has gained governmental relevance and visibility thanks to the strengthened governance for the digital transformation of the public sector. Created in 2018, the Ministry for Digitalisation (MDIGI) is the high-level and dedicated body to co-ordinate policy choices on digital government and translate them into concrete actions to be implemented either by the CTIE or ministries and administrations. Digital government policy in Luxembourg also benefits from the direct leadership of the Prime Minister as Minister for Digitalisation, and the Minister for the Civil Service as Deputy Minister for Digitalisation, enhancing co-ordination and alignment for a digital cultural shift within the domestic public workforce (The Government of the Grand Duchy of Luxembourg, 2018[2]).

The remit of the MDIGI includes the management of the CTIE as well as relevant agendas for the digital transformation of Luxembourg, such as digital inclusion, digital infrastructure, new technologies (including artificial intelligence and Blockchain)., and streamlining of administrative procedures. All together, they establish a strong ecosystem and empowered mandate for the Ministry. By contrast, it is less clear the extent of the mandate under which the Ministry (and by extent the CTIE) should lead the data-driven public sector policy in Luxembourg – for example data governance, sharing and reuse within the public sector. Currently, the mandate for the Ministry established in the Grand-Ducal Decree of 2018 only indicates that the Ministry should promote co-ordination and foster synergies for exchange of data and information (The Government of the Grand Duchy of Luxembourg, 2018[2]), while the CTIE is mandated to promote and

organise the secure sharing of data across the public sector. As discussed later in the section "Enablers to support service design and delivery", enhanced access to and sharing of data is pivotal for an integrated and transformative service delivery agenda, and the absence of such capability within Luxembourg's public sector may be hampering efforts to consolidate a common approach for service design and delivery in the country.

The strengthening of digital government in Luxembourg also includes the development of horizontal co-ordination mechanisms for policy coherence and alignment, which can also support realising the ambition of a transformed service design and delivery agenda. As explained in Chapter 2, the set-up of an inter-ministerial committee for digitalisation in public administration aims to co-ordinate ministries and administrations in the definition and implementation of the Electronic Governance 2021-2025 strategy. Chaired by the First Counsellor of the MDIGI and by the CTIE Director, it brings all high-level representatives across ministries and administrations to set a common approach for digital government in the country. Similarly, the High Committee for Digital Transformation, chaired by the Prime Minister and Minister for Digitalisation as well as the Minister Delegate for Digitalisation represent another essential instance for high-level co-ordination and alignment for digital transformation in the public sector. Luxembourg could consider leveraging this committee to establish a shared vision for service transformation in Luxembourg, and to use it as a policy lever for the Ministry for Digitalisation and the CTIE to create ownership across sectors regarding the philosophy, culture and enablers for service design and delivery in the public sector.

Legacy of channels, technology and infrastructure

The consolidation of the digital government ecosystem in Luxembourg builds on policies, initiatives and lessons across several decades. The recently created Ministry for Digitalisation works in tandem with the CTIE, main IT service provider for ministries and administrations in the country. Created in 1974, the CTIE's remit covers most of the whole-of-government IT functions and shared services in the public sector (see Box 5.1) (The Government of the Grand Duchy of Luxembourg, 2015[3]). For almost 50 years, one single entity has been responsible for provision of IT infrastructure and support to Luxembourg's government, and has set a path for wide adoption and use of digital technologies in ministries and administrations.

The CTIE enjoys high reputation and recognition among ministries and administrations. Its role is particularly valued in smaller public sector institutions with less capacity to deal in-house with the development of ICT/digital initiatives, often fully relying on the CTIE for digital technology aspects. By contrast, larger ministries and administrations have developed internal capacity to carry out projects while making use of shared IT infrastructure and standards provided by the CTIE. On top there are Ministries who have own IT centres such as the Ministry of Health (e-Health Agency); the Ministry of Education, Children and Youth (CGIE), Ministry of Social Security (CCSS).

The capacity of Luxembourg's government to adopt and use new digital technologies and the development of new digital solutions is thus highly correlated with the role and functioning of the CTIE. Its operating model has helped apply economies of scale and harmonise the adoption of common digital technologies in the public sector. In contrast, it was observed during the peer review mission that such approach led to a technical and administrative dependency from ministries and administrations with the CTIE that sometimes restricts their capacity and cultural change to lead their institutional digital transformation initiatives. Similarly, the high centralisation and overload of this entity can create delays to deliver as expected by the beneficiaries. Consequently, in cases when the CTIE is not capable of meeting specific requests and needs from ministries and administrations, they would develop or outsource their own solutions while observing CTIE's existing standards.

In this context, the Ministry for Digitalisation and the CTIE are responsible of leading the digital transformation of public services in the country. The CTIE is responsible for several technical functions related to service delivery in the country, including the set-up and operation of platforms for exchanges

between administrations with citizens and businesses; collection and publication of information about administrative procedures through different channels; running the helpdesks for citizens, companies and state public servants, and operation of the digital identity and postal service. Moreover CTIE is responsible for building, running and maintaining the IT infrastructure of Government (e.g. secured network, data centres, servers, mainframe, government cloud), for information security, development and deployment of platforms and back offices, project management and the acquisition of IT material.

Box 5.1. CTIE's mandate and main functions

The remit of the Government IT Centre (CTIE) is set out in the law of 24 November 2015 amending the amended law of 20 April 2009. Among several tasks, the CTIE's mission is to:

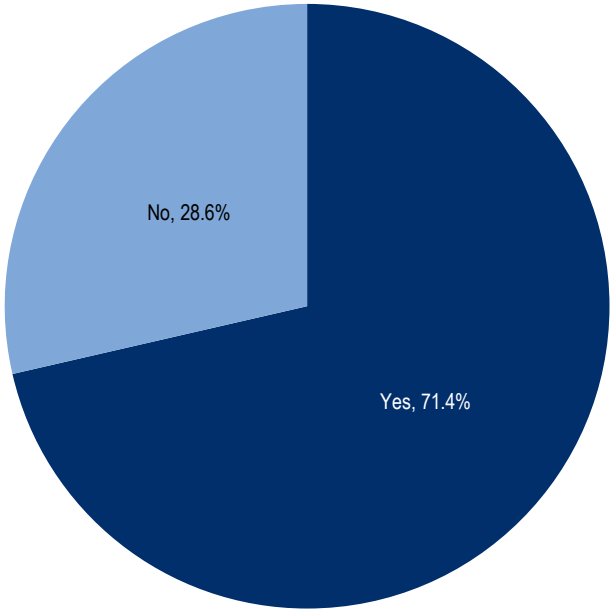
- promote and organise in a rational, co-ordinated way the automation of the State's administrations, particularly with regard to the collection, transmission and processing of data
- assist the various State administrations in carrying out ordinary IT work, and to manage fixed and mobile communication systems
- acquire and manage IT and office equipment for the State's administrations
- manage a support centre for the internal and external users of the information systems managed by the centre
- map the processes of the State's administrations and their interoperability, and keep the maps up to date
- seek synergies among the State's various administrations and optimise their exchanges of information
- co-ordinate the Internet presence of the State's administrations
- set up and operate platforms for exchanges with citizens and businesses
- set up and co-ordinate a network of regional physical front offices offering citizens a one-stop point of contact, whatever their administrative procedures;
- make available a knowledge base bringing together all the attributions of the State, accessible through the various public-service channels
- operate the Government's postal service.

Source: Adapted from The Government of the Grand Duchy of Luxembourg (2021[4]), *Remit*, https://ctie.gouvernement.lu/en/l-administration/Attributions.html (accessed on 15 June 2022).

Luxembourg's approach towards service delivery builds on the existing and well-established informational public sector portal GUICHET.LU (https://guichet.public.lu/) and its transactional version MYGUICHET.LU (https://www.myguichet.lu) available in web and mobile formats. To 2021, GUICHET.LU comprised approx. 1 600 informational services (procedure descriptions) while MYGUICHET.LU offers 440 online services. The CTIE operates both platforms and provides analytical and technical assistance to ministries and administrations when new services need to be included. To date, the vast majority of services available are informational rather than transactional, with GUICHET.LU being the prominent and single point of information for Luxembourgish citizens and businesses to access information related to services in the country. Currently, 71% of ministries and administrations in the country declared providing informational or transactional services through the national service delivery platform[1] while continue delivering services through their institutional platforms (see Figure 5.3 and Figure 5.4). Efforts towards continuing consolidating a service design and delivery agenda in Luxembourg, building upon the existing channels available in the country, may consider establishing a common experience for users when accessing a

service, independently from the institution that hosts its version considering that still a significant number of services are offered in-person.

Figure 5.3. Ministries and administrations providing information and/or transactional services to citizens/businesses



Source: OECD (2021[5]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

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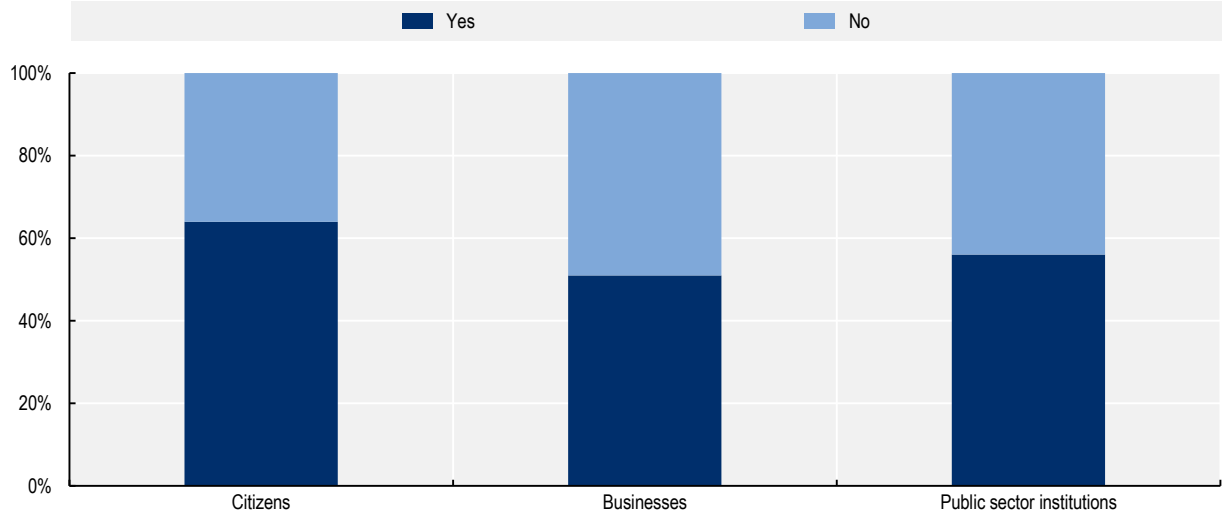
Figure 5.4. Ministries and administrations providing transactional services (digitally or not) by type of end-user



Source: OECD (2021[5]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

StatLink https://stat.link/5ib6f0

The Electronic Governance 2021-2025 Strategy (The Government of the Grand Duchy of Luxembourg, 2021[6]) sets the quality, inclusion and accessibility of digitally enabled services as keystones of the digital transformation agenda in Luxembourg's public sector. One of the ambitions of the Ministry for Digitalisation and the CTIE is to increase the coverage and availability of transactional services through MYGUICHET.LU to progress towards a paperless administration while still maintaining the possibility that a person can carry out their administrative procedure by physical means. However, this goal needs to permeate within a still a dominant paper-based mindset and culture driving government digitalisation efforts. Despite the acknowledgement of an inclusive and human-centric service delivery approach, the existing rationale for public services is perceived as inward looking and driven by the administrative complexity and dominant paper-based rationale. With the ambition set for a paperless administration by 2025 (The Luxembourg Government, 2021[7]; The Government of the Grand Duchy of Luxembourg, 2021[6]), further efforts are needed to take advantage of this strategy to rethink services from and end-to-end perspective and shaped by user needs rather than the existing legal and administrative approach.

Looking at strengthening an inclusive and user-driven approach for service design and delivery in the digital age, OECD member countries are promoting omni-channel service delivery as a coherent and integrated framework that standardise the user experience through different channels (either digital, mobile, or in-person) (OECD, 2020[1]). Currently, in Luxembourg the digital channel is the most relevant mean to deliver transactional services for 48% of ministries and administrations, while 24% of them uses paper-oriented means such as emails and/or traditional written communication.[2] Considering Luxembourg's emphasis on placing inclusiveness at the centre of its digital government strategy, respecting people's choice on their preferred service channel, further efforts are needed to align existing offline and online service delivery channels to provide a coherent and single experience to citizens and businesses when interacting with the public sector, as observed in the case of **Portugal** and **Chile** (see Box 5.2).

Box 5.2. An omni-channel service delivery approach in Portugal

Portugal's Agency for Administrative Modernisation (AMA, *Agência para a Modernização Administrativa*) is responsible for the service design and delivery policy in the country. AMA has advanced the development of an omni-channel service delivery approach through the alignment of online and offline channels to secure a coherent service experience to citizens and businesses regardless of their preferred way.

For online service delivery, Portugal's Citizen Shop is a central service delivery platform that comprises public and private services, and facilitates the interactions among citizens, businesses and the public sector. The platforms provide a coherent service experience to citizens and businesses while helping public sector organisations to share resources, infrastructures and platforms required for service delivery. Pursuing an omni-channel service delivery strategy, this service network is integrated with in-person offices that act as helpdesk for citizens and businesses to access public services – Citizen Spots' network.

Source: Author's elaboration based on (2022[8]), *ama.gov.pt,* https://www.ama.gov.pt/ (accessed on 15 June 2022).

Society and geography

Luxembourg benefits from several factors to advance and consolidate a service design and delivery agenda. This includes a mature digital ecosystem based on above-average performance in digital connectivity and infrastructure indicators compared to EU Member States and OECD member countries such as broadband coverage and speed – as presented in Chapter 2. Existing digital infrastructure serves also as the backbone of the Luxembourg's economy, largely shaped by financial and digital services. The digital maturity of the Luxembourg's economy has also fostered citizens' expectations to benefit from the accessibility of service delivery through digital channels (STATEC, 2019[9]).

The particular geographic and demographic context of Luxembourg calls also for leveraging the digital transformation agenda to promote an inclusive and accessible public sector. This is particularly relevant to meet the expectations of a large community of foreign residents (47.5% of citizens from 170+ nationalities) and workers that commute to the country regularly (197 000 workers from Germany, France and Belgium travelling on a frequent basis as employed or self-employed workers). The role played by foreigners in Luxembourg's society and economy has made the government to look at digital technologies and data to promote inclusiveness, cross-border inter-operability and convenience in service provision in order to attend the needs of a diverse and dynamic population, as well as to continue attracting EU workforce into the country (The Government of the Grand Duchy of Luxembourg, 2021[10]; The Government of the Grand Duchy of Luxembourg, 2021[6]). In this line, MDIGI has set digital inclusion as one of the pillars for the implementation of the Electronic Governance Strategy 2021-2025 (The Government of the Grand Duchy of Luxembourg, 2021[6]).

In this context, local governments are at the frontline of Luxembourg's service delivery agenda. For this, local governments have organised themselves to leverage capacities and work at scale in the introduction of digital technologies and data at municipal level through the Inter-Communal Informatics Management Association (SIGI). Currently, SIGI provides digital support to 101 local governments in Luxembourg, which includes the provision of shared digital tools and guidelines to standardise the digitalisation of public services and operations at the local level, e.g. shared systems to streamline interactions and mobility of citizens when they change their address and register into a different municipality (see Box 5.3).

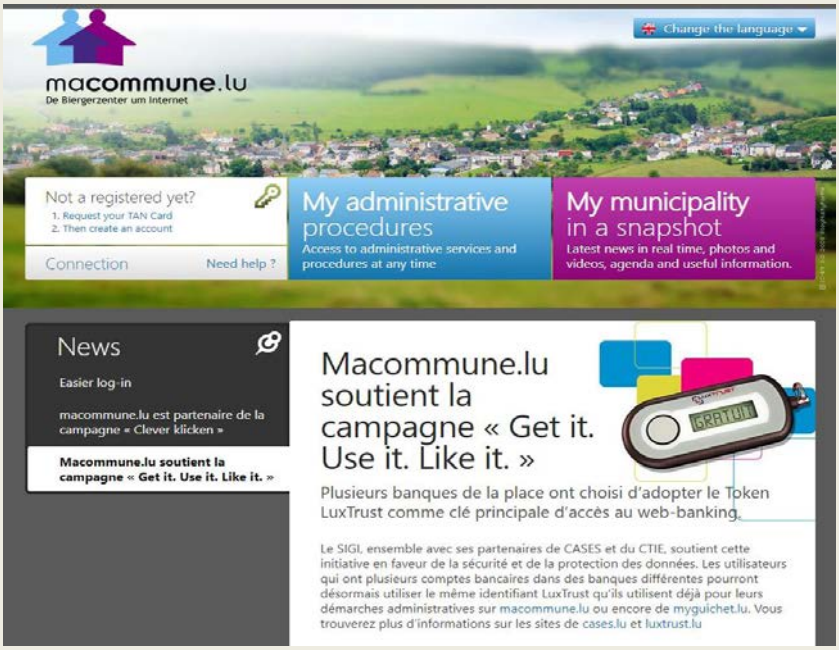
In this regard, further exchanges and collaboration between MDIGI and CTIE with SIGI would be beneficial to strengthen the adoption of agile approaches for service design and delivery at the central government level. It could be interesting to reinforce the integration of local government procedures into MyGuichet.lu. On top a better co-ordination would possible if there is an increased alignment about existing security and interoperability standards, as it is expected from the ongoing development of the National Interoperability Framework. Similarly, strengthened co-ordination between MDIGI and CTIE would contribute to align and streamline the service provision from ministries and administrations with local governments. Working towards a consolidated user experience for citizens and businesses when accessing central or local services would require strengthening the co-ordination and collaboration with entities supporting the digital transformation of local governments.

Box 5.3. Shared digitally-enabled administrative procedures in Luxembourg's municipalities

The platform MaCommune.lu, provides single access to basic informational and transactional local government services provided by 70 municipalities in Luxembourg. Currently, citizens can access services through the existing digital identity suite provided by LuxTrust in a similar way to services provided by the central government through MyGuichet.lu.

In order to enable shared administrative procedures, municipalities affiliated to MaCommune.lu can share data for example to allow citizens to switch their residence address to another local government. In terms of functionality, MaCommune.lu gives access to basic services such as:

- Submit a certificate request
- Submit a request for parental authorisation
- Order dustbins
- Request a "childcare-service voucher" card
- Consult municipal bills
- Download forms



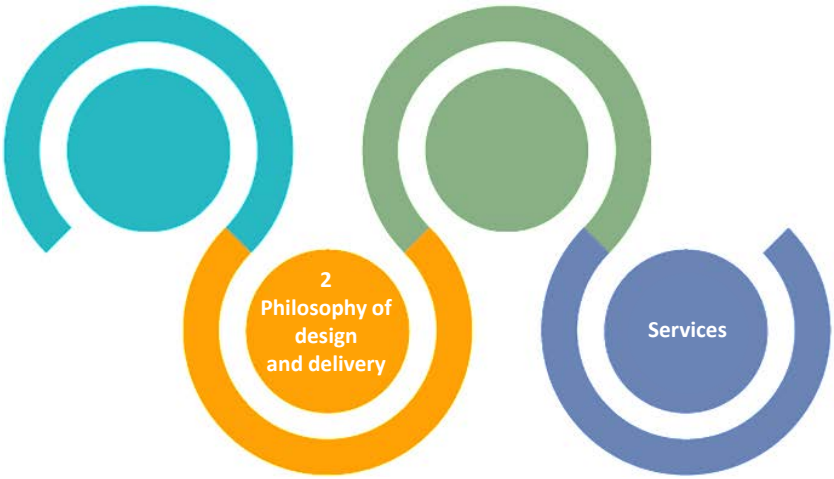
Source: Author's elaboration based on Syndicat Intercommunal de Gestion Informatique (2022[11]) *macommune.lu*, https://www.macommune.lu/ (accessed on 15 June 2022).

Philosophy for public service design and delivery

Advancing a whole-of-government approach for service design and delivery in the public sector builds upon organisational and cultural aspects to better understand and meet user needs. The second aspect to devise when looking at service design and delivery in Luxembourg relates to the philosophy that drives MDIGI, CTIE and ministries and administrations to offer services that reflect citizens and businesses' needs, as seen in Figure 5.5. The six elements identified below support an approach that helps better identify and address user needs on an ongoing basis and in a coherent way across the public sector. A

culture and philosophy around users contribute to deliver more timely, pertinent and effective services regardless of their preferred channel.

Figure 5.5. The OECD Framework for Public Service Design and Delivery: Philosophy



Source: OECD (2020[1]), *Digital Government in Chile – Improving public service design and delivery*, OECD Digital Government Studies, OECD Publishing, Paris, https://doi.org/10.1787/b94582e8-en.

Setting the leadership and vision to transform services

The digital transformation of public services calls for a shared vision, leadership and institutional culture to be proactive and provide user-driven services. This transformation process requires maximising the potential of digital tools and data from the outset to better understand and meet the needs of citizens and businesses in a way that streamlines their interaction with the public sector while fostering public trust.

The creation of the Ministry for Digitalisation and the development of the Electronic Governance Strategy 2021-2025 are seen as two cornerstones for an integrated and whole-of-government approach for service design and delivery in the country. During a dedicated workshop on service design and delivery conducted as part of this review, participants highlighted that service design and delivery agenda has gained political locus and significance across ministries and administrations with the leadership and mandate of the MDIGI. This has been translated into the primary goal of achieving a fully digitalised and proactive administration in order to meet the needs of a diverse, multicultural and dynamic population.

Despite not having a dedicated service design and delivery strategy,[3] the Electronic Governance Strategy 2021-2025 includes several provisions to advance towards a government that understands meets and anticipates people's needs. Within the six pillars for digital government in Luxembourg, the ambition is to achieve a *digital by default* and *digitally inclusive* administration (see Figure 5.6). The Electronic Governance Strategy 2021-2025 acknowledges the importance of inclusive and convenient access to public services. To do so, the Ministry for Digitalisation and the CTIE are prioritising the effective implementation of the One Only Principle and the data governance and sharing arrangements needed for this purpose (see previous section). Similarly, the Strategy invites ministries and administrations to take its implementation as an opportunity to streamline internal processes to offer a simplified experience to users.

It is important to note the difference between a government that takes advantage of digital tools and data to improve offline and online services (digital by design) from one that set digital services as the only alternative for citizens and businesses to interact with the public sector (digital by default). It is clear from this strategy that MDIGI and CTIE works towards a by design approach (e.g. the prominence given to digital inclusion) from a transactional perspective – offering end-to-end digital services while maintaining

offline channels available for citizens who prefer to access in-person services as set in the Coalition Agreement 2018-2023 that frames the programmatic priorities for the current government (Luxembourg Government Coalition, 2018[12]). However, further efforts are needed to clearly communicate this vision to the wider community, including ministries and administrations as they often do not have the same perspective about what this process entails – as observed during the peer mission and workshop.

Figure 5.6. Principles for digital government in Luxembourg

Source: The Government of the Grand Duchy of Luxembourg (2021[6]), "'Electronic Governance 2021-2025' strategy", https://gouvernement.lu/en/dossiers.gouv_ctie%2Ben%2Bdossiers%2Bstrategie_gouvernance_electronique_2021_2025%2Bstrategie_gouvernance_electronique_2021_2025.html (accessed on 15 June 2022).

In Luxembourg, service delivery is grounded on the well-established and adopted GUICHET.LU and MYGUICHET.LU platforms. The brand is widely recognised by ministries and administrations as the central focal point for digital services in the country and is referenced in all central government websites. For this, the Ministry and the CTIE have run promotional campaigns to increase the awareness and adoption of the platforms (The Government of the Grand Duchy of Luxembourg, 2021[13]). The CTIE, as IT service provider and responsible for the development of the GUICHET platforms, ensures that digital experience is coherent across the public sector regarding informational services and also for the increasing number of transactional services available through MYGUICHET.LU.

From an implementation perspective, MDIGI works closely with CTIE to materialise the goals and vision set in the Electronic Governance Strategy. However, evidence from the fact-finding mission and workshop illustrates the need for further alignment between MDIGI and CTIE regarding an inclusive digitalisation of public services as often this process is approached (and largely perceived) from a technical perspective. Participant ministries and administrations in this study highlighted the existing gap between the technical implementation role of the CTIE and the user-driven approach set by MDIGI in the strategy. Luxembourg

is working in this direction for example through the implementation of initiatives such as “Let’s simplify together” (see Box 5.4). This platform aims to create a space for ongoing dialogue between citizens with ministries and administrations regarding service pain points that can be streamlined (Ministère de la Digitalisation, 2022[14]). Similarly, the creation of an advisory service for digitalisation is being planned by the MDIGI to support public administrations and ministries in the implementation of the Electronic Governance Strategy. Closing the bridge between the vision and implementation is pivotal to secure that ministries and administrations can have the right enablers to translate high-level goals on services provision into digitally transformed services. In this line, countries such as **Norway** (Box 5.5) and the **United States** (Box 5.6) are advancing towards securing the right leadership, co-ordination and enablers to equip service teams to close the gap between service delivery vision and practice.

Box 5.4. The platform Let’s simplify together in Luxembourg

The online platform Let’s simplify together (*Zesumme Vereinfachen*) provides a space to citizens, public sector institutions and businesses to collaboratively help rethink public processes and services. It aims to give users a space to inform themselves about specific projects for administrative simplification and to actively contribute to service reengineering by commenting, making proposals or occasionally voting on a selected group of initiatives.

Currently, users have the possibility to contribute to rethinking administrative processes available on GUICHET.LU portal, or more broadly about websites and platforms made available by the CTIE as well as from ministries and administrations.

Source: The Government of the Grand Duchy of Luxembourg (2022[15]), *Let's simplify together! For digital public services that make your daily life easier,* https://www.zesumme-vereinfachen.lu/en-GB (accessed on 15 June 2022).

Box 5.5. Securing leadership for digitally enabled service design and delivery in Norway

The Agency for Public Management and e-Government (Difi), the Brønnøysund Register Centre and the Directorate for Financial Management (DFØ) issued in 2022 an updated version of the Norwegian Government’s Digitalisation Memorandum. This official document sets the political and organisational leadership for digital public service transformation in the country, comprising several orders and recommendations.

The Digitalisation Memorandum specifies how the government should communicate with users through digital public services that are safe, comprehensive, user friendly, and universally designed such that the user experience with the public sector is coherent and efficient. These services are to be regularly analysed along with a regular review of the regulatory framework and legislation. Digitalisation should aim to increase value creation, innovation and productivity. The principles covered in the Memorandum include:

- Put the user at the centre of service development
- Facilitate the re-use and sharing of information
- Use national common components and common solutions
- Follow requirements on architecture and standards
- Ensure digital inclusion

- Create a sourcing strategy
- Co-ordinate with the municipal sector

Source: Government of Norway (2022[16]), *Digitaliseringsrundskrivet*, https://www.regjeringen.no/no/dokumenter/digitaliseringsrundskrivet/id2895185/ (accessed on 22 August 2022)

Box 5.6. Transforming the user experience with government services in the United States

Giving the raising expectations of users to interact with the US Government through digital channels and the importance of reorienting service delivery efforts towards addressing people needs, the US President Biden issued in December 2021 the *Executive Order on Transforming Federal Customer Experience and Service Delivery to Rebuild Trust in Government*.

In the executive order, the President designated 35 High-Impact Service Providers in Federal agencies given the volume and types of benefits, services, and programmes they deliver to the public. These service providers should co-ordinate the rationalisation and digitalisation of 11 services that have high impact on US citizens and businesses, including:

- Retiring
- Filing and managing your taxes
- Surviving a disaster
- Traveling
- Financing post-secondary education
- Managing health care and benefits
- Reducing barriers for those experiencing poverty
- Financing your business
- Supporting women, infants, and children
- Managing your health
- Updating your personal information once

In practice, the Executive Order requests these service providers to adopt a user-driven approach when designing and delivering services, including to reorganise internally to deliver services in an effective, efficient an timely fashion. This includes service rationalisation, digitalisation, and piloting of new tools and standards to provide simple, seamless and secure digitally-enabled services to citizens and businesses e.g. services should be available to users with only 1 to 3 clicks in their digital version.

The implementation of this Executive Order involves further co-ordination and collaboration across the US federal government, including the role of the Office of Management and Budget (OMB) as convenor the several ministries and agencies responsible for these selected high-impact services. Similarly, OMB is mandated to inform to the Office of the President regarding implementation progress.

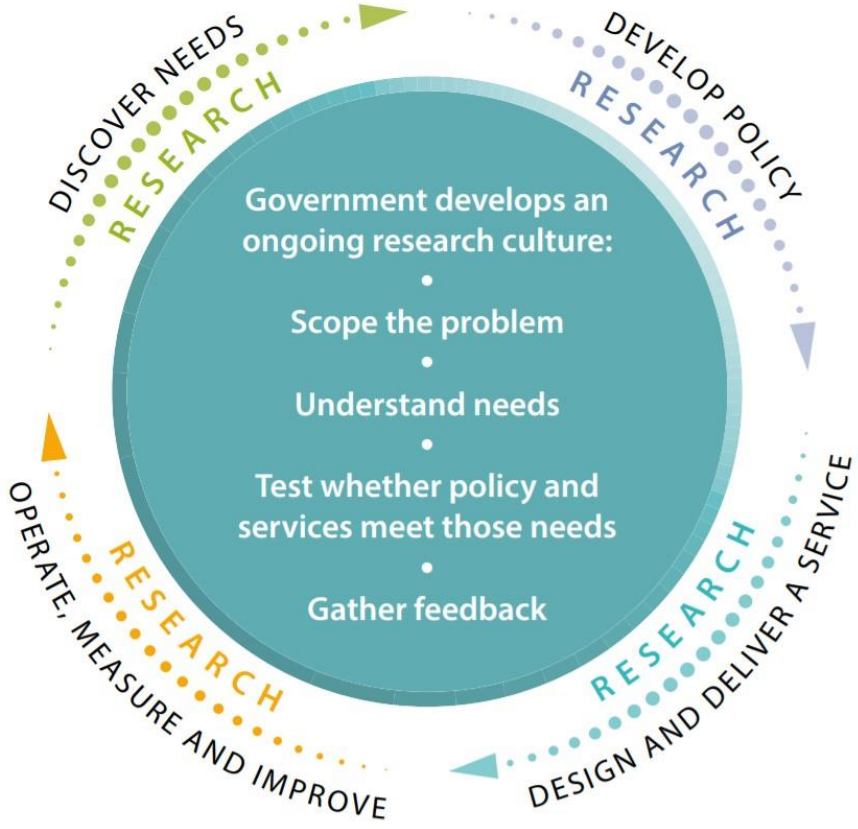
Source: The White House (2021[17]), *Executive Order on Transforming Federal Customer Experience and Service Delivery to Rebuild Trust in Government*, https://www.whitehouse.gov/briefing-room/presidential-actions/2021/12/13/executive-order-on-transforming-federal-customer-experience-and-service-delivery-to-rebuild-trust-in-government/ (accessed on 15 June 2022).

Embracing a comprehensive understanding of user problems and needs

The convenience of users accessing a certain service is given by the extent their needs are well understood and addressed. Rethinking services and processes around users requires an organisational culture and practice that favours an agile and collaborative approach to identify problems and understand needs, define and test a policy or service with users, and to collect feedback during and after the implementation for continuous improvement (see Figure 5.7). Such an approach embraces inherent uncertainty, systematic learning and feedback and improvement principles in order to engage users to maximise the likelihood of solving the final problem.

As opposed from a top-down approach where service providers assume user needs and expectations, a user-driven culture for service design and delivery follows a bottom-up approach. Engaging users from the outset fosters a continuous dialogue and interaction to better understand and define their needs to model services (OECD, 2020[18]; OECD, 2020[1]). As a result, service design is a process to work with those who are affected by a problem and find a suitable solution to address these needs in the most simple, effective and convenient way. Shifting towards a user-driven and agile culture within the public sector requires also working with all those involved in policy and service provision, bringing together diverse, multi-disciplinary teams to align and co-ordinate the development of services to ensure a whole-of-government and coherent approach to find and address user problems together.

Figure 5.7. An agile and user-driven culture for designing policies and services in the public sector



Source: OECD (2020[1]), *Digital Government in Chile – Improving public service design and delivery*, OECD Digital Government Studies, OECD Publishing, Paris, https://doi.org/10.1787/b94582e8-en.

Fostering the adoption and use of user research in the public sector can create a culture that leads to a meaningful service transformation. As opposed to a merely replication of existing procedures and formalities into digital means, a transformative digitalisation process involves rethinking services and simplifying the experience of users to resolve their final needs. Such an approach involves rationalising services i.e. merging, simplifying and/or interoperating services across boundaries in order to streamline the experience of citizens. Similarly, it also offers an opportunity to adopt whole-of-government principles and practices to secure that citizens trust in the public sector that the services they are accessing will lead to a satisfactory experience.

With MDIGI setting high-level goals to streamline service provision in Luxembourg, the review process unveiled a gap in terms of the culture, practice and capacities across ministries and administrations to effectively adopt a user research approach. The CTIE, as IT service provider and main partner to ministries and administrations in the country, has set a user experience (UX) and design team to support public sector institutions towards adopting a more user-centric approach when digitalising public services. In this regard, all transactional services offered through MYGUICHET.LU are by design developed observing the methodology Renow (The Government of the Grand Duchy of Luxembourg, 2022[19]). However, this on-demand service offered by the CTIE does not necessarily cover user research needs across the public sector as not all digital developments are delivered by the CTIE.

it would be important to continue progressing towards system-wide practices for an in-depth understanding of user behaviours, motivations and journeys in line with best practices observed across OECD member countries, for example in **Australia**, the **United Kingdom**, **Denmark** and **Colombia** (see Box 5.7). The initiative Let's simplify together and the work of the GovTech Lab to iteratively identify problems and develop solutions are positive steps to start creating a user-driven culture when addressing needs in Luxembourg public sector. Further efforts to create a system-wide mindset and practice for user research are needed so most types of users are incorporated into the design process.

Box 5.7. Applying user research to transform public services in Australia

The Digital Transformation Agency of Australia (DTA) promotes the adoption and use of user research across public sector institutions to improve the pertinence, quality and success of digitally-enabled services. The goal is to equip service teams with capacities to better understand users in order to increase the success rate of digitally transformed services.

User research is widely promoted by the Government of Australia in order to help minimise the risks of costly and late failures by making fewer assumptions about service users, as well as to decrease delivery time and uncertainly by delivering small increments that benefit from the understanding gained about users.

Following an agile development approach, the DTA encourages the use of user research techniques in order to capture relevant and timely information across different development iterations that can quickly provide insights about areas of improvement or changes needed to better meet user needs. This includes:

- Discovery stage: observe research sessions with users and help to analyse them. The user researcher plans and leads the sessions to help the team learn about the users and their needs.
- Alpha stage: help the team experiment with different content formats. Schedule research sessions to see if the prototypes help meet the user needs.
- Beta stage: work with the team to design content for the whole service. Observe people in usability sessions interact with the content that has been designed. After analysing the research as a team, improve the content.

- Live stage: spend time each sprint reviewing user feedback and analytics. If there are areas that need more exploration, the researcher plans targeted research.

Source: Australian Government (n.d.[20]), *User research*, https://www.dta.gov.au/help-and-advice/build-and-improve-services/user-research (accessed on 22 August 2022).

Design end-to-end solutions

The transition towards a fully user-driven government involves rethinking the way public services are provided. The digital government imperative calls for a transformative approach that uses digital technologies and data to support the redesign of processes and services to increase the convenience of users when interacting with the public sector. From an e-government perspective, governments advanced in digitisation journeys, putting analogue processes into digital means but often working on a silo-based approach. Therefore, legacy issues to work across organisational boundaries end up providing a fragmented experience to users.

In this context, a transformative approach towards service delivery should provide users the means to solve their needs from the first attempt through its resolution (end-to-end), in an integrated way from user experience to back-office arrangements (external to internal) and across all available channels regardless of the user's preference (omnichannel) (OECD, 2020[1]; Welby and Tan, 2022[21]). For users, the way public sector institutions organise internally to solve a need should be transparent. For the public sector, end-to-end services should encourage integration and rationalisation of multiple intermediate steps needed to meet a final need, streamlining such interactions as needed in order to offer an effective service.

Luxembourg has advanced in the adoption of an end-to-end approach for service delivery but still faces challenges for a system-wide implementation across the public sector. The development of MYGUICHET.LU represents a step forward in terms of transactional service provision and an end-to-end experience for citizens in Luxembourg. However, evidence from the peer review and dedicated workshop underlined the still dominant paper-based rationale that has driven the digitalisation of services in the country. This is reflected in the way MYGUICHET.LU is organised and the extent to which services are broken down into specific formalities - intermediate steps provided by other ministries and administrations that breaks the experience for the user – who then cannot complete it straight away. Interviewees underlined the absence of a comprehensive data-driven public sector approach (in particular data governance and sharing across relevant ministries and administrations) as one of the fundamental challenges to tackle to provide an end-to-end experience to users (further analysis on public sector data is discussed in Chapter 4). Ongoing efforts with the National Interoperability Framework will help address these challenges in the future and offer a seamless experience for users when trying to solve specific needs.

Similarly, organisational and cultural constraints to work collaboratively and across organisational boundaries restricts an end-to-end approach for service delivery. In this sense, Luxembourg would benefit from establishing system-wide initiatives to break down service siloes and create a culture of collaboration, integration and co-ordination across relevant ministries and administration. Transformative actions in this direction are taken with the implementation of the National Interoperability Framework (NIF). Similarly, initiatives such as the GovTech Lab are creating spaces for experimentation and collaboration within and outside the public sector and can serve as reference for future spaces for horizontal collaboration such as communities of practice. Other OECD countries have embraced an end-to-end culture and practice to better meet user needs. From a process reengineering perspective, **Colombia** has been working for several years in addressing the procedural barriers to streamline service delivery and to bring together institutions that could better resolve people needs through increased co-ordination and alignment (see Box 5.8). Similarly, **Australia**, the **United Kingdom** and **Estonia** have been working in embracing a life event approach to address specific and complex needs from and end-to-end perspective (see Box 5.9).

Box 5.8. Service rationalisation in Colombia

As part of a broader effort for the transformation of service delivery in Colombia, the government has embarked in an ambitious agenda to rationalise public services along with their digitalisation process. Service streamlining efforts date from 2012 under the leadership of the Administrative Department of Civil Service (*Departamento Administrativo de Función Pública*, DAFP) in co-ordination with the Ministry for Information and Communication Technologies (MINTIC).

The Colombian government has established a service rationalisation policy in which public sector institutions are mandated to streamline public services around three areas, including services in which digital technologies and data can lead to more efficient and effective provision:

- *Normative rationalisation:* modify or eliminate normative instruments that frame public services, administrative procedures and formalities, extending their temporal validity, reducing administrative processing times, costs or requirements;
- *Administrative rationalisation:* streamline internal processes, opening hours, service delivery spots, internal and external costs, requirements, forms, formats and payment methods;
- *Digital rationalisation:* tap on existing data sharing frameworks, proactive service delivery, and online support to minimise requirements, costs and time for users to access a certain service.

This plan currently feeds the National Service Registry that is co-ordinated by the DAFP. Similarly, service rationalisation has been institutionalised in Colombia thanks to the Law 2052 for horizontal administrative co-ordination for service rationalisation (Congreso de Colombia, 2020[22]). This legal framework mandates public sector organisations to establish an institutional plan for service rationalisation that needs to be revisited every six months. Additionally, the Law mandates that all new services created in the country have to be digital by design and offered in digital means according to the requests and provisions established by the MINTIC.

Source: Author's elaboration based on Congreso de Colombia (2020[22]), *Ley que establece disposiciones transversales a la rama ejecutiva del nivel nacional y territorial en relación a la racionalización de trámites*.

Box 5.9. Life events in Australia

With the goal of improve the experience of citizens with digitally enabled public services, Australia's Digital Transformation Agency (DTA) has established a life events programme to address user needs from an end-to-end perspective. DTA's life event approach is based on the importance of addressing user needs beyond the boundaries of a single service, institution or jurisdiction and organise internally within the public sector to resolve a particular need. It underlines the relevance of understanding user journeys for a very specific need in order to offer transactional rather than informational services solely.

The DTA is promoting life events as a way to rationalise public services based and around user needs. By understanding user needs from a holistic perspective, service teams can work across organisational siloes and levels of governments to identify common or systemic problems, including understanding the relationship between services, potential gaps or duplications, and pain points due to attempts to resolve a need through different and unco-ordinated services.

Fostering an end-to-end culture within the Australian public sector is fundamental to break down organisational boundaries and bring together different institutions to address a certain need from a

holistic perspective. For this, the DTA established the GovX Life Event Communities, an instance to connect service teams from different public sector institutions in order to address and solve complex needs that require a cross-agency and multijurisdictional approach.

Source: Australian Government (n.d.[23]) *Life events*, https://www.dta.gov.au/our-projects/govx/life-events (accessed on 22 August 2022); Australian Government (n.d.[24]), *Life event communities*, https://www.dta.gov.au/our-projects/govx/life-event-communities (accessed on 22 August 2022).

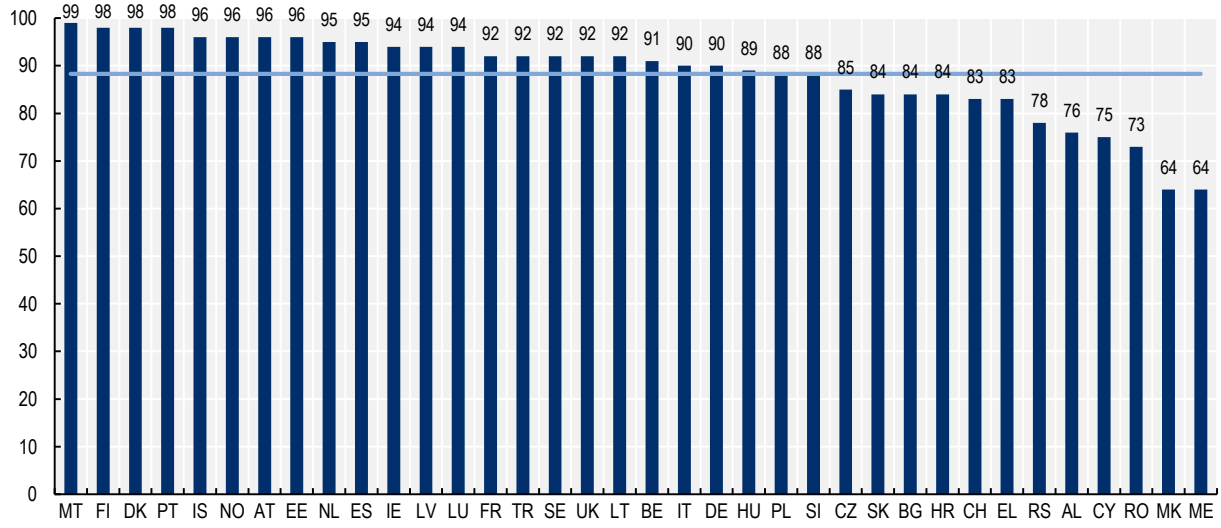
Involving users

The *OECD Recommendation of the Council on Digital Government Strategies* identifies the meaningful involvement and participation of different stakeholders within and outside the public sector as a foundational element in the development of digital government strategies (OECD, 2014[25]). Building on the Recommendation, the OECD Digital Government Policy Framework stipulates the adoption and promotion of a user-driven culture and practice as a cornerstone in the efforts to digitally transform the public sector (OECD, 2020[18]).

From a conceptual perspective, a government that is *user-driven* and *proactive* establishes concrete mechanisms for users to *shape* the services they access, establishing development principles and dialogue platforms to capture user needs and reflect them in how services are designed and delivered. In turn, a government is *user centric* when establishes mechanisms that strengthen accessibility and usability of digital services (OECD, 2020[18]). In this line, Luxembourg's results in the first and pilot edition of the OECD Digital Government Index presented mixed results regarding the role of users in informing and *shaping* the design and delivery of digitally enabled service (OECD, n.d.[26]). In this benchmark, Luxembourg performed well across the six dimensions under study but below the OECD average in the areas related to understanding and meeting user needs through digitally enabled services (*user-driven*) and anticipating their needs through seamless and proactive service provision (*proactiveness*).

When looking at user centricity, Luxembourg has a longstanding tradition and excellent performance in providing digital services that are findable, accessible, and available through different platforms. In the EU eGovernment Benchmark 2022, the country obtained a score of 94 out of 100 points in the indicator *User Centricity* (which measures "the extent to which a service is provided online, its mobile friendliness, and usability in terms of available online support and feedback mechanisms") (European Commission, 2022[27]). The performance of Luxembourg in this indicator goes in line with most countries in the region as seen in Figure 5.8.

Figure 5.8. EU eGovernment Benchmark 2022 - results for indicator User Centricity



Source: European Commission (2021[28]), eGovernment Benchmark 2021 Background Report, https://digital-strategy.ec.europa.eu/en/library/egovernment-benchmark-2021.

These results are supported by the work of the Information and Press Service (SIP) who defines the national digital accessibility platform and initiative (https://accessibilite.public.lu/) and informed by the experience of France's DINUM (Service Information et Presse, 2021[29]). Within this initiative, the Service Information and Press (SIP) leads the General Framework for Improving Accessibility (RGAA), an operational framework for the monitoring of websites based on the European norm EN 301 549. RGAA serves as reference for public sector institutions to adopt a common approach to web accessibility. Given its overseeing role, SIP conducts regular monitoring exercises to assess the adherence to these principles across the public sector (SIP, 2021[30]). Similarly, SIP has implemented since 2021 a similar monitoring framework for mobile applications called RAAM (Since 2021, SIP has also used a similar approach to define an accessibility framework for the monitoring of mobile applications, RAAM (https://accessibilite.public.lu/fr/raam1). At the same time, the CTIE manages the methodology Renow (https://renow.public.lu/fr.html) which also promotes web accessibility and UX techniques when designing and delivering services. It comprises a set of good practices and suggested methods for user research (see Box 5.10), as well as a check-list for ministries and administrations to comply during the design and delivery of a service. At large, the work of SIP and CTIE focuses on improving services' *accessibility* rather than *user-driveness.* Despite clear outlined responsibilities and legal frameworks, rrom the perspective of ministries and administrations they are observed as duplicated efforts to address similar issues, for which Luxembourg may consider promoting policy and actions coherence to clearly communicate the roles and competencies of each actor.

Box 5.10. Renow: Quality standards for Luxembourg's public websites

Created in 2008 as a continuation to previous efforts started in 2003, the initiative Renow (*Référentiel de Normalisation des sites Web)* aims to standardise the accessibility and experience of users when interacting with websites from Luxembourg's government. It provides a number of good practices and standards to make sure that websites are accessible, findable and meet the expectations of users according to common principles of quality and usability.

Renow provides several standards and guidelines, including:

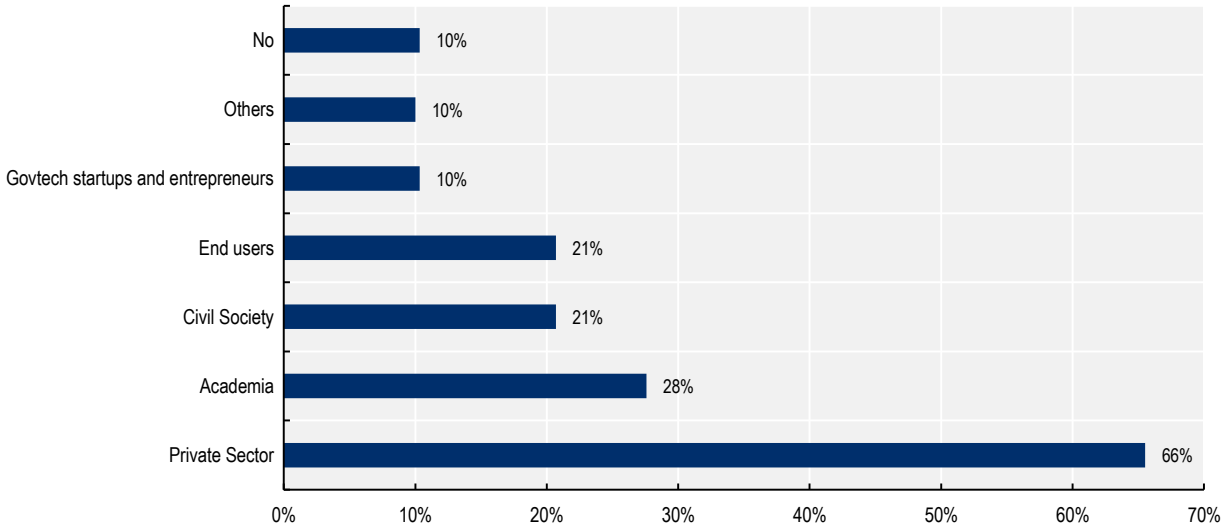
- quality of all State websites
- web accessibility
- project management
- user experience
- assessment tools

Source: The Government of the Grand Duchy of Luxembourg (2022[19]), *Renow*, https://renow.public.lu/fr.html (accessed on 15 June 2022).

The digital government imperative calls for radical cultural and practice shift for users to drive and shape how the public sector designs and delivers public services in the digital age. This implies engaging with end-users throughout the digitalisation process to identify and understand needs, collaborating horizontally with all ministries and administrations with a role in solving a certain problem. At the moment of this study, only a 15% of participant ministries and administrations indicated that users are actively and comprehensively involved throughout the design and delivery process (see Figure 5.9), nor their experience is comprehensively assessed in terms of service performance and satisfaction beyond the availability of feedback forms. Similarly, all ministries and administrations that indicated observation to national guidelines and standards to involve users in service design and delivery made reference to existing Renow.[4]

Despite a limited involvement of users when designing and delivering services, Luxembourg is taking concrete actions to foster a user-driven culture. This includes setting a dedicated UX and design unit within the CTIE, as well as the development of the platform "Let's simplify together" in order to promote further participation of users to streamline public services (Zesumme Vereinfachen (zesumme-vereinfachen.lu)) or *Meng Iddi zielt!* Which has been launched as a pilot project to several civil servants at the ministries and administrations in Luxembourg. The idea is to share spontaneous ideas or to participate in call for challenges. Both intend to accelerate and the digitalisation of public services in a co-creative way.

Figure 5.9. Actors involved by ministries and administrations in service design and delivery



Source: OECD (2021[5]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

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In this line, the central role played by the CTIE as IT-service provider and manager of all GUICHET platforms should be an opportunity to embrace a cultural change from the outset. For example, by creating momentum for a shared vision on service transformation and equipping service teams with the tools and resources to achieve this ambition. Further efforts are needed to embed an agile and user-driven culture within Luxembourg's public sector, strengthening user research and service design capacities within the CTIE as well as in ministries and administrations. The experience from SIGI in fostering user research and a bottom-up approach for service design and delivery can be considered given the large number of services provided by local governments in the country.

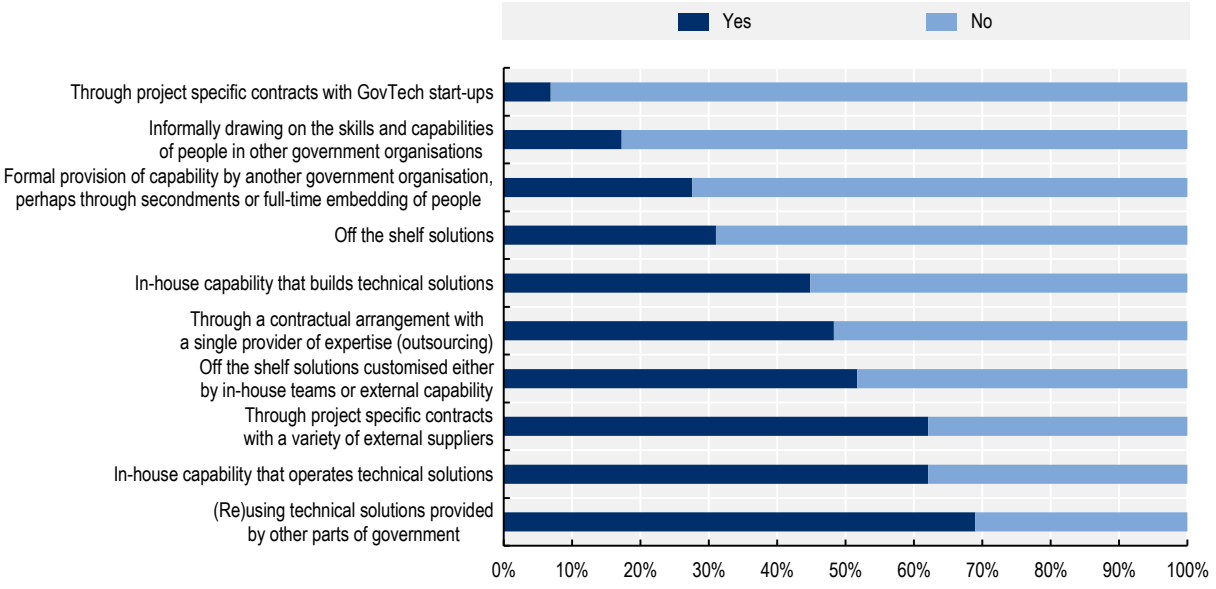
The country could benefit from CTIE's leading role in managing and rationalising resources for digital transformation in Luxembourg's public sector to prioritise this cultural shift and support especially small ministries and administrations that do not have resources nor capacities to adopt this approach. In the same way, the CTIE could bring together all the existing expertise and interest in user research observed across the public sector through multi-disciplinary communities of practice to foster peer learning and horizontal collaboration. Fostering peer learning among service champions within the public sector e.g. by establishing communities of practice can promote horizontal dialogue and collaboration among ministries and administrations to share lessons and good practices on best ways to jointly solve user needs. During the peer review mission, it was observed an interest for promoting community experiences on service design and delivery, with several ministries and administrations acknowledging their importance given existing limited internal culture and expertise in this matter.

Adopting a multi-dimensional approach to work across organisational boundaries

A user-driven approach for service design and delivery shifts service teams efforts towards ensuring that users do not perceive and experience the complexity of the public sector to organise, collaborate and deliver end-to-end services. In line with the OECD *Recommendation of the Council on Digital Government Strategies* (OECD, 2014[25]), the public sector is called to establish capacities and mechanisms to collaborate and co-ordinate within and outside the public sector for service teams to streamline the experience of citizens when accessing a service.

In Luxembourg, the approach towards cross-organisational co-ordination and support for the development of digitally-enabled services underlines the central role of the CTIE given the limited capacities at institutional level to implement and operate digitally-enabled services. Most ministries and administrations do not have sufficient in-house capacities to develop services and largely rely on the CTIE or in external providers to outsource their developments. With the exception of a few ministries and administrations, including the Ministry of Health and the Ministry of Social Security and Ministry of Education, Children and Youth, a significant number of central public sector bodies do not have dedicated teams to build and operate digitally-enabled services and tools as shown in Figure 5.10.

Figure 5.10. Institutional approaches to designing, building and maintaining digitally-enabled public services in Luxembourg



Source: OECD (2021[5]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

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Most of the existing digital needs are provided by the CTIE, which oversees and approves the development of ICT/digital projects according to the Electronic Governance Strategy 2021-2025' priorities and existing workload (for more details see Chapter 2). Projects and initiatives that are not absorbed by the CTIE are thus largely outsourced through the procurement of digital/ICT initiatives (46% of surveyed ministries and administrations[5] as shown in Figure 5.10), with open tender procedures representing the largest share of public procurement processes in the country (European Commission, n.d.[31]). In the context of projects developed with the support of the CTIE, public procurement processes are managed by internal dedicated teams that cover the entire procurement cycle. However, evidence from the peer mission revealed that open tender procedures require significant efforts during the pre-tendering stage to establish certainty around business and technical requirements. Such an approach makes procurement exercises lengthy, delaying contract award stages and risking procuring outdated technology. As a consequence, service teams focus largely on the specificities of the procurement process rather than understanding users and their needs. In line with the experience of member countries (OECD, forthcoming[32]), Luxembourg faces challenges to embrace system-wide agility and a user-driven culture when procuring digital solutions for the public sector.

In order to accelerate digital innovation in the public sector in Luxembourg, the MDIGI and CTIE have launched the initiative GovTech Lab (see Box 5.11) (The Government of the Grand Duchy of Luxembourg, 2022[33]). The Lab offers a space to bring together ministries and administrations with local entrepreneurs that can contribute to the digital transition of Luxembourg's public sector. Despite its novel role within the digital government agenda at national and regional international level, the GovTech Lab represents a step ahead in understanding the needs of public sector institutions and finding innovative digital solutions (Kuziemski, 2022[34]) that blend the use of EU public procurement frameworks (such as innovation partnerships and competitive dialogues) with a demand-driven approach based on the challenges that ministries and administrations face in their digitalisation journeys. Luxembourg may consider accelerating the role of the GovTech Lab, expanding the coverage and frequency of innovation exercises across ministries and administrations, for example establishing regular sectoral exercises to intensify the cultural shift towards more agile and iterative developments. Similarly, giving its leading role in advancing GovTech at European level, Luxembourg could look at the lessons emerging from the GovTech Lab to reform public sector capacities to plan, fund and procure agile-based ICT/digital projects.

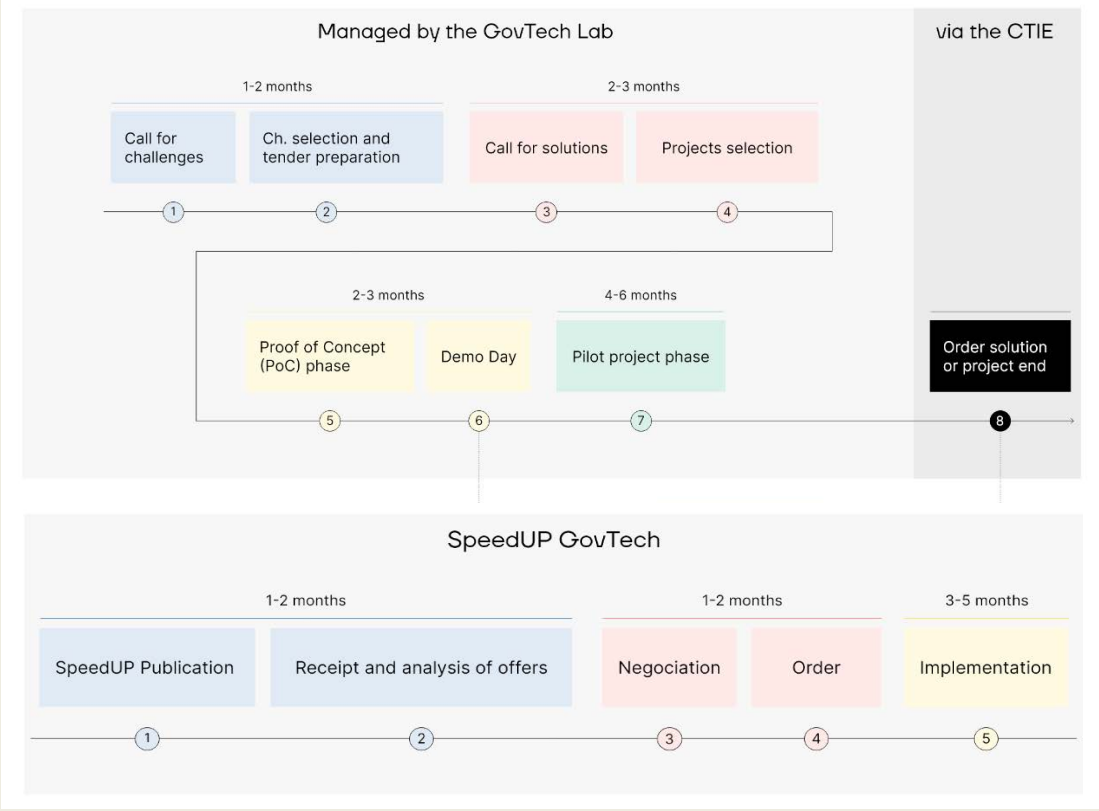
Box 5.11. Luxembourg's GovTech Lab initiative

In line with the global trend to foster an ecosystem of entrepreneurs, innovators and start-ups to support the digital needs of public sector institutions (GovTech), Luxembourg created the GovTech Lab in 2021 with the purpose of accelerating the development and improvement of digital public services.

Managed by the MDIGI and CTIE, the GovTech Lab helps foster an agile culture within countries' ministries and administrations to develop innovative digital solutions in public service delivery. It builds upon an open innovation approach, bringing together ministries and administrations with external actors through calls for challenges selected by the Lab's team upon the demand of public sector institutions.

The Lab is currently implementing innovation partnerships that provides start-ups and entrepreneurs an opportunity to present solutions that can be scaled up from a proof of concept (PoC) to a final solution purchased and deployed by the CTIE. The process may take 8 to 14 months from the call for solutions until the CTIE purchase the selected project. For faster exercises, the Lab has created SpeedUp, reducing the operation time to a maximum of 8 months.

Beyond regular call for innovations, the GovTech Lab also organises activities to foster an innovative culture within Luxembourg's public sector. This includes thematic hackathons, seminars and show&tell activities.



Source: Author's elaboration; The Government of the Grand Duchy of Luxembourg (2022[33]), *GovTech Lab,* https://govtechlab.public.lu/en.html (accessed on 15 June 2022).

Embracing agility in the design and delivery of services

Assuring that services respond to a culture of continuous testing, learning and improving is reflected in the extent to which agile methodologies are adopted and guide service design and delivery. Traditional waterfall projects entail having certainty about requirements and needs upfront, with limited involvement of users throughout the development process (OECD, 2020[18]). In contrast, agile methodologies contribute to avoid having fixed requirements early on and embrace a culture of continuous improvement that contributes to more suitable and trusted solutions. Agility in the public sector can be pivotal to develop services that better meet user needs and consequently more reliable and effective (OECD, 2020[1]).

As been noted in the survey and during the peer review mission, there is a limited culture and practice to embrace agility in digital transformation projects in Luxembourg's ministries and administrations. As indicated previously, participant institutions widely noted the role of the CTIE in supporting project implementation and the provision of infrastructure and resources for most of their digital needs. However, it was also observed that the approach followed by the CTIE largely responds to a waterfall rationale that makes difficult to incorporate user needs and feedback throughout the development process beyond traditional user-centricity efforts (e.g. accessibility and user friendliness). The CTIE has implemented an IT project management methodology named Quapital IT (see Box 5.12) which is a variant of the QUAPITAL methodology based on international co-operation within the European spectrum (Ministère de la Fonction Publique, 2021[35]). However, no participant ministry or administration identified agile management as one of the key enablers in place for service design and delivery in the country during the research process. Currently, the CTIE is reviewing Quapital IT methodology in order to make it available widely across ministries and administrations that want to carry out digital transformation projects as well as to enforce its adoption as a requirement to have access to government budget for ICT/digital projects.

Additionally, there is a long tail of projects that are not supported/implemented by the CTIE and thus need to be outsourced by ministries and administrations. In the absence of centralised principles and guidance for agility, and the aforementioned lack of capacities in ministries and administrations to carry out digital transformation projects, there is a need observed regarding further support to equip service teams to lead and implement ICT/digital projects observing agile principles. In this sense, several OECD countries are advancing towards empowering service teams with methodological support to decentralise the implementation of digital transformation projects in a coherent yet simple way. For example, the **United States** (see Box 5.13), **Australia** and the **United Kingdom** have developed agile management principles and guidelines for this purpose.

Box 5.12. QUAPITAL IT – project management methodology in Luxembourg

The CTIE manages QUAPITAL IT (*Qualité des projets d'implémentation des TIC dans l'administration luxembourgeoise*), a management standard for ICT/digital projects. It was developed based on the methodology HERMES 5 from the Swiss E-Government Switzerland Programme Office. It aims to equip development teams with guidance for the implementation of a project and a portfolio management framework.

The model has been undertaken by Luxembourg's Ministry of Public Administration (*Ministère de la Fonction Publique*) to be further developed. The Ministry has been working in a new version of QUAPITAL which adds agility concepts and principles to support the implementation of iterative and complex projects – including within the digital transformation domain. However, currently its structure and guidance material are mostly focused on supporting waterfall-oriented projects, hence the need to materialise this ambition to further equip teams to develop agile-oriented initiatives.

Source: The Government of the Grand Duchy of Luxembourg (2021[36]), *Le référentiel de gestion de projects Quapital - Axe 2 – Quapital – Une initiative FP2025*.

Box 5.13. Agile principles in the United States

As part of the mandate of the Technology Transformation Services (TTS) at the General Services Administration (GSA), the initiative 18F was developed to support US federal agencies in improving the user experience of government services by helping them build and buy technology.

To help federal agencies becoming more agile as they buy and develop technology and digital services, the 18F developed the *18F Agile Principles*. Among other resources the principles include "agile fundamentals" and an "agile lexicon".

Source: Federal Government of the United States (n.d.[37]), *18F Agile Principles*, https://agile.18f.gov/ (accessed on 22 August 2022).

Key enablers to support public service design and delivery

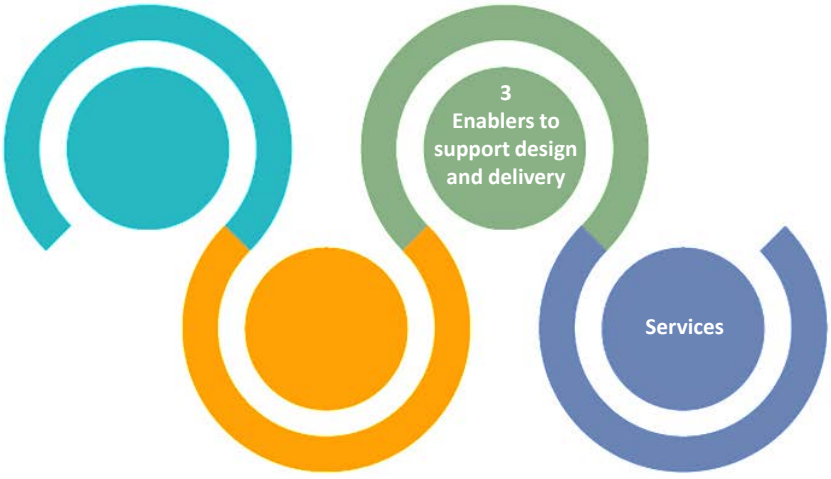
Bringing a philosophy for service design and delivery into reality cannot be achieved without the tools and guidance needed for a digital transformation at scale. Single public sector institutions can work towards materialising this vision but the digital government imperative calls for a service transformation that is coherent, integrated and equally embraced across the public sector. The result is the need for common and scalable tools to support a whole-of-government service transformation that benefits all and leave no one behind.

The third pillar of the OECD Framework for Public Service Design and Delivery reflects the importance of enablers to operationalise this service transformation (OECD, 2020[1]). It builds upon the relevance of transiting towards governments that act as a platform in order to realise a digital transformation at scale and coherent within and across sectors (OECD, 2020[18]). In this regard, this pillar depicts key enablers and common approaches for service design and delivery to materialise in the public sector. Similarly, the relevance of a Government as a Platform approach is that service teams can focus on better understanding and meeting user needs rather than in the tools required to meet these needs in practice. It nurtures an ecosystem of actors, tools, guidelines and good practices that unlock the digital transformation to all those who want to contribute in a coherent and sustainable way e.g. service teams, private sector and entrepreneurs and innovators (Govtech).

The pillar focused on enablers can be depicted into seven components to turn a service design and delivery philosophy into reality (see Figure 5.11). Several of these elements have been previously addressed in different chapters of this report e.g. governance, spending and assurance as well as digital talent and skills in Chapter 3; and data in Chapter 4. Hence, this chapter will give larger attention to the elements that have not been addressed yet and will make reference to those covered previously in the context of service design and delivery.

The context for service design and delivery in Luxembourg helps explain the ongoing role of the CTIE as a cornerstone for a Government as a Platform approach in the country. By centralising most of the IT functions, services and infrastructure, the Government of Luxembourg transits a path of providing common components to ministries and administrations. The demographic context and capacity conditions of ministries and administrations makes the centralised approach taken by Luxembourg as a reasonable path for adoption and use of digital technologies in the public sector. However, further efforts are needed to strengthen this ecosystem in order to foster more coherence in projects that are not centralised through the CTIE and which requires third parties to use guidelines, standards and common components.

Figure 5.11. The OECD Framework for Public Service Design and Delivery: Enablers



Source: OECD (2020[1]), *Digital Government in Chile – Improving public service design and delivery*, OECD Digital Government Studies, OECD Publishing, Paris, https://doi.org/10.1787/b94582e8-en.

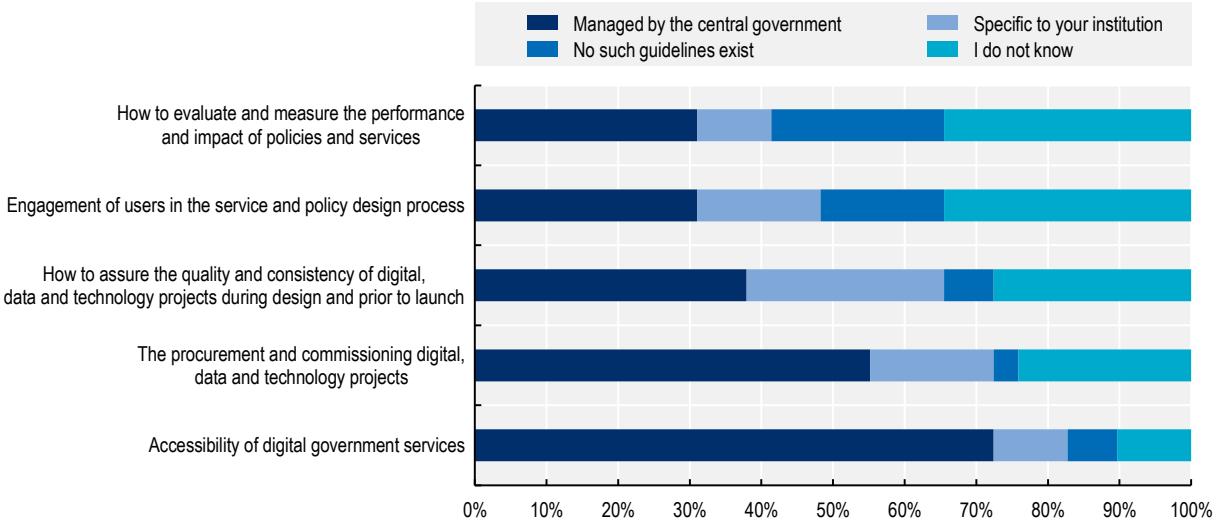
Guidelines and standards for coherent transformation

Securing a coherent service transformation across the public sector demands common tools and supporting guidance to equip service teams with the mechanisms that lead to a coherent transformation. This includes standards and guidelines that show how things can be done well and a path for public sector institutions to carry out their digital transformation processes aligned with principles and standards set for the entire public sector (OECD, 2020[1]). The availability of a centralised source of tools and guidelines within and outside the public sector supports public sector institutions (and those from the private sector that provides digital goods and services to them) to be more independent and responsible for their digital transformation processes (OECD, 2020[18]).

In the case of Luxembourg, the centralised approach through the CTIE as IT service provider has eventually made guidelines and standards not as relevant as in other latitudes. However, it is important to note that the CTIE does not absorb and implement *all* digital transformation projects in Luxembourg's public sector. As ministries and administrations prioritise digitalising their processes and services, it is reasonable to suggest that projects outside the scope of the CTIE should achieve the same level of quality and coherence than the initiatives under its remit. In this context, MDIGI and CTIE have the challenge of fostering ministries and administrations' capacities, for example through a set of guidelines and standards for service design and delivery. Not following this or a similar path risks fostering misalignment and a lack of internal coherence, shadow IT costs, as well as a fragmented and confusing experience to users when accessing a service.

Evidence from this study highlights the importance of advancing in common shared guidelines and standards in Luxembourg. Along with the aforementioned Renow (standard for web accessibility and user centricity) (The Government of the Grand Duchy of Luxembourg, 2022[19]) and Quapital IT (guideline for project management) (Ministère de la Fonction Publique, 2021[35]), other relevant areas such as engagement of users in service design and delivery, performance and impact measurement could be further developed.[6] This contrasts with the perception of ministries and administration of the existence of some of these documents, as seen in Figure 5.12. In this line, and regarding the existing available guidelines and standards, 42% of ministries and administrations that deliver transactional services were not aware of did not follow the standards and guidelines for service transformation issued from the CTIE.[7]

Figure 5.12. Guidelines recognised by ministries and administrations in Luxembourg



Source: OECD (2021[5]), *Digital Government Survey of Luxembourg: Ministries and administrations* (unpublished).

StatLink https://stat.link/vp1qay

There is a strategic opportunity for the MDIGI and CTIE to better communicate the availability of existing tools and strengthen the standards ecosystem if expectations are for ministries and administrations to become more active and independent in carrying out their digital transformation initiatives. MDIGI and CTIE can see this as a process of adherence and awareness about their role as well as to secure that projects outside the scope of the CTIE comply with the same level of quality. In this sense, the advisory service on digitalisation planned by MDIGI and CTIE can be an opportunity to further communicate existing standards across ministries and administrations. Similarly, the availability of such common tools can help ministries and administrations to be empowered either to have a more active role in their interactions with the CTIE as well as to secure that their developments will comply with central norms. Several OECD countries are advancing in the development of common and widely available guidelines and standards repositories, and most notably in the **United Kingdom** (Box 5.14), the **United States** Box 5.15, **France**, **Australia** and **Colombia**.

Box 5.14. Service Toolkit and Service Standard in the United Kingdom

Service Toolkit

The United Kingdom Government Digital Services (GDS) curates the service toolkit, a repository of good practices, standards and guidelines to support coherent service transformation across the UK government. The Toolkit comprises supporting material covering several key dimensions for digital transformation projects from an end-to-end perspective, including:

- *Technology and digital standards* for public sector institutions to create and run digitally enabled government services that are coherence and aligned across the public sector. This includes the service standards, service manual, guidance for API and data consumption, technology code of practice and open standards.
- *Guidance on specific technology and digital topics* to provide give clarity and references to public sector institutions to address common challenges in areas such as accessibility and assisted digital services, adoption of agile methodologies, dealing with digital procurement and complex IT contracts, and digital and technology spend controls.
- *Design and style guidance* to create an inclusive and clear experience for users when accessing digital services, including design principles, prototype kit, style guide and design systems.
- *Guidance on use of common components* upon which public sector organisations can build and run government services, such as notification, payment, identity and cloud systems.

Service Standard

As part of the Service Toolkit, GDS maintains the Service Standard, a methodological guidance to equip service teams to design and deliver user-driven services that meet the needs of users. The Service Standard provides detailed support from the moment of understanding needs to the operation of services. It builds on 14 principles that include:

1. Understand users and their needs
2. Solve a whole problem for users
3. Provide a joined up experience across all channels
4. Make the service simple to use
5. Make sure everyone can use the service
6. Have a multidisciplinary team
7. Use agile ways of working
8. Iterate and improve frequently
9. Create a secure service which protects users' privacy
10. Define what success looks like and publish performance data
11. Choose the right tools and technology
12. Make new source code open
13. Use and contribute to open standards, common components and patterns
14. Operate a reliable service

Source: Government of the United Kingdom (n.d.[38]), *Design and build government services*, https://www.gov.uk/service-toolkit (accessed on 22 August 2022); Government of the United Kingdom (n.d.[39]), *Service Standard*, https://www.gov.uk/service-manual/service-standard (accessed on 22 August 2022).

Box 5.15. The Digital Service Playbook in the United States

The Chief Information Officers (CIO) Council of the Federal Government of the United States has issued a Digital Service Playbook with 13 key "plays" to help government build effective digital services. These are:

1. Understand what people need
2. Address the whole experience, from start to finish
3. Make it simple and intuitive
4. Build the service using agile and iterative practices
5. Structure budgets and contracts to support delivery
6. Assign one leader and hold that person accountable
7. Bring in experienced teams
8. Choose a modern technology stack
9. Deploy in a flexible hosting environment
10. Automate testing and deployments
11. Manage security and privacy through reusable processes
12. Use data to drive decisions
13. Default to open

Source: Federal Government of the United States (n.d.[40]), *Digital Services Playbook*, https://playbook.cio.gov/ (accessed on 22 August 2022).

Common components and tools

Enabling service design and delivery in the digital age requires building solid digital foundations to sustain service transformation processes. This becomes especially relevant amid large digital transformation processes involving hundreds of individual services as well as when public sector organisations do not have sufficient capacities or resources to operationalise such reforms. Similarly, there is also a need to foster coherence and inter-operability across the public sector, ensuring that all institutions can leverage digital tools and data in a consistent and sustainable way.

OECD member countries are advancing in this direction by developing a Government as a Platform ecosystem of shared digital tools, infrastructure, standards and guidelines to equip ministries and administrations with the resources to drive change. Similarly, a Government as a Platform approach can help public servants and service transformation teams to focus on user needs rather than cumbersome technological developments as well as to enable the involvement of the private sector and Govtech actors to contribute to digital transformation efforts. This becomes particularly important in countries such as Luxembourg, where most ministries and administrations have limited staff and face challenges to attract digital talent to the public sector, thus being largely supported by the CTIE and the Ministry for Digitalisation.

The CTIE, as national IT service provider, plays a pivotal role in creating the conditions for ministries and administrations to realise their digital transformation ambitions. This includes the management of digital identity, shared data centres, common data infrastructure, interoperability, base registries and digital notification systems (The Government of the Grand Duchy of Luxembourg, 2021[6]; 2021[41]). The approach

undertaken in Luxembourg is plausible and certainly positive given the limited capacities at institutional level to maintain similar digital and data infrastructure, but also poses challenges in terms of the capacity of CTIE to timely address the needs of ministries and administrations *vis a vis* the significant efforts and resources devoted to maintain shared infrastructure.

An effective service design and delivery approach requires availability and uptake of common platforms and infrastructure to unlock a whole-of-government transformation. This is fundamental for example for ministries and administrations to use strategically data to better understand and anticipate user needs, delivering services in a timely and proactive way. In line with the analysis presented in Chapter 4, further efforts are needed to secure the uptake and awareness of ministries and administrations to adhere to existing digital frameworks and infrastructure, including the NIF. This is particularly clear for some of the key enablers led by the CTIE: only 35.9% of ministries and administrations uses the common data infrastructure,[8] 25.64% declares using the interoperability framework,[9] and 28.81% use the existing national digital notification system.[10] The limited uptake of common tools may be hindering a whole-of-government and coherent digital transformation while creating shadow IT infrastructure and costs which may also lead to future legacy issues.

Digital Identity

In Luxembourg, available digital identity solutions for accessing public services include Luxembourg national identity card (eID card) provided by CTIE in collaboration with the Ministry of Home Affairs (The Government of the Grand Duchy of Luxembourg, 2021[42]), which is also notified under the eIDAS notification scheme, and LuxTrust which is a private trust service provider listed under the eIDAS list of qualified national trust services (LuxTrust, 2021[43]). In 2019, the company BE INVEST International SA also become registered as a qualified trust service provider for electronic signatures and electronic seals (The Government of the Grand Duchy of Luxembourg, 2019[44]). Both the eID card and LuxTrust are currently used to provide secure access to services on MYGUICHET.LU. The adherence of these two digital identity solutions at the ministry and administration level is high, with 93% of ministries and administrations using them to enable users with access to their services.[11] However, Luxtrust solution is significantly more used than the eID card in the country.

At the same time, concerns were raised by some ministries and administrations during the peer review mission about the relatively “electronic” (ID card) rather than “digital” (multi-device solution) approach to identification and authentication in relation to public services in Luxembourg, which is also seen in other EU member states that have invested in the provision of physical-token-based digital identity (i.e. electronic ID card). The wide adoption of the Luxtrust solution, including its mobile version, offers a more convenient and user-oriented digital identity mechanism as it does not require carrying physical devices.

MDIGI and CTIE are working towards increasing the inclusiveness and impact of digital identity in the country. CTIE has made available the dedicated mobile authentication app GOUV.ID (The Government of the Grand Duchy of Luxembourg, 2022[45]). This app provides citizens access to transactional services provided on MYGUICHET.LU using their Luxembourg’s national ID card to identify themselves using different devices. The app provides an interface between existing ID cards and online services, eliminating the need for a card reader and giving broader accessibility to digital services hosted in the national transactional platform. Additionally, users can access services provided by the Centre for Financial Data (*Collecte des Données Financières*, eCDF) and different applications of the Luxembourg Business Registers. In line with findings of OECD/G20 work and the revised eIDAS regulation, further efforts could therefore be channelled towards improving the user experience of digital identity in Luxembourg, both within and outside the public sector, and ensuring further usability of available digital identity solutions in terms of mobile, cross-sector, and cross-border use.

MDIGI and CTIE have also invested issuing first credentials into a digital wallet both in the EBSILUX project for digital diplomas and the Trust My Data innovation partnership of the GovTech Lab for a digital residence

certificate. In the context of the eIDAS revision that is in progress, efforts are undertaken to participate in large scaling piloting of a digital wallet that can be used both cross border and across different use cases helping to make converge the different projects towards a wallet providing the foundation for a digital identity.

Hosting services and digital solutions

As discussed in Chapter 4, Luxembourg benefits from the centralised role of the CTIE as IT service provider. It relies on a long-standing tradition of proving secure and reliable data infrastructure to ministries and administrations, including Infrastructure as a Service (IaaS), PIatforms as a Service (PaaS) and generic and customised software solutions - Software as a Service (SaaS). The overall reduced costs and easiness to access these common resources helps ministries and administrations overtake the technical and economic complexity of individual efforts. As a result, ministries and administrations can access a number of common platforms and solutions for storing, processing and analysing data, reducing overall costs and allowing organisations to direct their resources to primary tasks such as defining technical and business specifications.

Taking payments

Given the centralisation of online transactional service delivery through the CTIE and MYGUICHET.LU platform, Luxembourg has not prioritised the availability of a common and single payment tool. Users regularly use credit cards, digital payment with QR codes or interoperable payment platforms such as Payconiq.

Sending notifications

The development of MYGUICHET.LU includes the possibility for ministries and administrations to send messages and information to citizens, acting as a central notification system for the government for official mail and notifications through users' personal space. In this regard, MYGUICHET.LU acts as a user digital mailbox for government notifications. The platform also provides users the possibility to book appointments with service desks from ministries and administrations.

Submitting information to government

The possibility to submit information to the government differs depending on the type of user. For citizens, users that require access to transactional services through MYGUICHET.LU, forms are available to capture this information. Conversely, the informational platform GUICHET.LU offers forms available to be printed out and handed in when requesting an in-person service. This certainly poses a challenge in terms of the opportunity and speed of delivery as well as the quality and timeliness of data dealt by ministries and administrations.

MDIGI and CTIE are working towards dematerialising PDF forms in order to process their data in an effective and efficient way. This includes the ongoing development of a low-code framework that will enable data processing in a more effective way (Ministère de la Digitalisation, 2021[46]). This framework will be complemented by the possibility to submit PDF forms through MYGUICHET.LU in a more secured way than regular email considering that a large fraction of citizens prefers to communicate with ministries and administrations via their personal email addresses.

This is certainly a step forward in the digitisation of services but it may present also challenges to overcome the strong paper-based rationale observed in ministries and administrations, so its use should be considered as a transition while most services are fully offered in digital and transactional ways.

For private sector entities, similar means are available. These are complemented by the availability of application programming interfaces (APIs), in particular regarding the registers under the remit of the Luxembourg Business Register (LBR). Available since 2021, the CTIE as IT service provider of LBR made available a series of APIs to exchange data, for which an agreement is needed between the business and the LBR and for which the institution charges a fee (Ministère de la Digitalisation, 2021[46]).

Digital inclusion

One of the pillars of the Electronic Governance Strategy 2021-2025 is to make the public sector more inclusive and diverse. The geographic and demographic conditions in which Luxembourg is placed made digital inclusion one of the pillars of the strategy and drives efforts towards securing that digital solutions and services are accessible to all.

MDIGI and CTIE are addressing digital inclusion from different angles. Notably, most of the efforts in this area are comprised in the *Zesummen Digital* project, the national action plan for digital inclusion developed by the MDIGI (Ministère de la Digitalisation, 2022[47]). This initiative aims to advance the capacity of the public sector to design and deliver services that work for all, as well as to prepare citizens and businesses to fully benefit from the digitalisation of the Luxembourg's economy, society and government. The initiative outstands within the regional and international landscape given its comprehensive and multi-stakeholder approach (involving actors from the civil society, private sector and government) and action plan that covers digital skills, public communication about digital services, easy-readable and multi-language websites, increased internet coverage and multi-channel delivery, among others (see Box 5.16).

One remaining challenge is further communicating functions and mandate for accessibility. As highlighted previously in this chapter, efforts are scattered between CTIE and SIP. While the CTIE is responsible for the provision of accessible online services, SIP is the auditing institution that monitors compliance. Despite plausible reasons to have these functions under separate institutions (i.e. implementation and overseeing), most ministries and administrations find this approach confusing.

Box 5.16. Actions comprised in Luxembourg's Digital Inclusion Initiative

Luxembourg's *Zesummen Digital* comprises three pillars to organise the actions conducted by the MDIGI, CTIE and relevant ministries and administrations to advance digital inclusion during the period 2021-2024.

- ***Facilitating digital access:*** securing access to ICT tools and the Internet as well as ensuring that the content provided by the public sector is accessible to a diverse audience. Within this pillar, the following actions are undertaken:
  - Promoting of easy read language on Guichet.lu
  - Development of MyGuichet.lu app
  - Educational support to access digital government services
  - Efficient connectivity for all
  - Digital accessibility awareness
- ***Developing digital skills:*** enabling citizens to navigate the digital world in a more autonomous and safer way, regardless of their age, level of education or gender. Actions within this pillar include:
  - Digital skills training in different languages
  - Training on digital inclusion for public sector institutions
  - Training in the safe use of the Internet

- Training for young job seekers
- Development of a digital academy

- ***Increasing digital motivation and building digital confidence***: fostering awareness about the advantages and possibilities offered by digital technologies as well as protective measures to secure a trusted digital experience. Actions within this pillar comprise:
  - Educational videos on new technologies
  - Outreach activities across public sector institutions
  - Awareness campaigns on responsible use of digital tools
  - Cybersecurity information campaigns

The initiative includes activities to monitor and assess its implementation with the support of an inter-ministerial working group for digital inclusion.

Source: The Government of the Grand Duchy of Luxembourg (2022[48]), *Levers and initiatives,* https://zesummendigital.public.lu/en/plan-national/leviers-et-initiatives/levier-acces.html (accessed on 22 August 2022).

Channels

Luxembourg's public service delivery policies relies on a set of online and offline channels managed by the CTIE. The main delivery channels is GUICHET.LU, the central informational delivery platform for the national government. It comprises relevant information and steps for citizens and businesses to understand how to conduct formalities and administrative procedures, including beneficiaries, conditions, involved costs, step-by-step guidance and main points of contact (The Government of the Grand Duchy of Luxembourg, 2022[49]). When relevant, informational services also include downloadable forms for procedures to be conducted offline. However, such an approach still creates a fragmented approach for users when accessing certain services. The CTIE and MDIGI are currently working towards addressing these services and underlying user needs from an end-to-end perspective. Similarly, the work towards dematerialise PDF forms and process underlying data can contribute to a reliable, timely and effective management of data but they could consider intensifying efforts to rationalise and reengineering these procedures so they can be offered in a fully transactional way and streamlined driven by the needs of final beneficiaries in line with the need to adopt an agile, user-oriented and data-driven culture for service design and delivery in the country.

Complementing informational services, the CTIE manages MYGUICHET.LU, a sister platform that provides access to a set of fully transactional services (The Government of the Grand Duchy of Luxembourg, 2022[50]). Intended to both citizen and business users, MYGUICHET.LU also gives the possibility to users to manage some of their personal/corporate data held by ministries and administrations, including personal data held by the National Register of Natural Persons, certificates and attestations, and data related to driving licenses, land registries and illness and maternity, among others (The Government of the Grand Duchy of Luxembourg, 2022[50]). In order to ease access to users, the CTIE has developed in 2022 a mobile version of the platform that offers similar functionalities (The Government of the Grand Duchy of Luxembourg, 2022[51]). Efforts towards advancing a fully transactional experience for user when accessing digital services in Luxembourg is further framed by ongoing efforts at European level to provide trusted cross-border services (see Box 5.17).

The efforts done in advancing the digital experience of citizens and businesses with the public sector has not been fully reflected in an omni-channel approach for service delivery. GUICHET.LU has one in-person office in the City of Luxembourg that offer transactional services (and currently analysing its expansion to northern and southern regions), while most ministries and administrations continue offering their in-person services through via institutional offices. The consolidation of a unique digital experience with the public

sector through both GUICHET.LU and MYGUICHET.LU represents a step forward in terms of quality and accessibility of services but further efforts are needed to secure a coherent experience through in-person offices in order to materialise an inclusive service delivery approach in the country. Similarly, other complementary actions are being taken by MDIGI and CTIE in the context of the GovTech Lab work. This includes the development of a digital proxy to explore under which criteria a third person can carry out services on behalf of an individual who has not have access and/or skills to interact digitally with the public sector (GovTech Lab, 2022[52]). Another good practice is the ongoing experimentation to develop a videoconferencing solution for citizens to access services remotely (GovTech Lab, 2022[53]). It is expected that these ongoing efforts as well as the initiative carried out through *Zesummen Digital* can contribute to develop this omni-channel approach.

Similarly, further efforts are needed to expand the coverage of transactional services available through MYGUICHET.LU. Luxembourg may consider adopting a decentralised approach for the management and operation of transactional services, in line with efforts to empower ministries and administrations with capacities to become more independent in their digital transformation processes, including the digitalisation and streamlining of services. This goes in line with the need to consolidating enablers for service design and delivery, such as service standards, continued development of micro-services (APIs), discrete and reusable digital public goods (notifications and payment), among others. Ministries and administrations expressed their interest in having such tools available in order to adhere to cross-governmental principles that secure a coherent experience of users with the public sector, streamline costs and generate horizontal sharing of practices among public sector institutions.

Box 5.17. European Union priorities to provide access to cross-border services

Single Digital Gateway

The Single Digital Gateway aims to provide a single point of access to information, procedures and assistance services online that citizens and businesses need to live and work in another EU country. Citizens and companies moving across EU borders will easily be able to find out what rules and assistance services apply in their new residency. By the end of 2023 at the latest, they will be able to perform a number of procedures, like registering a car or claiming pension benefits, in all EU member states without any physical paperwork.

Digital identity

In order to enable cross-border living as envisaged by the Single Digital Gateway it is necessary to establish trust services and digital identity. Within the EU, the Regulation on electronic identification and trust services for electronic transactions in the internal market (eIDAS Regulation) attempts two things. Firstly, it is designed so that people and businesses can use their own national digital identity solutions to access public services available online in other EU countries. Secondly, it creates an internal market for trust services within Europe by ensuring that they will work across borders and have the same legal status as their traditional paper-based equivalents.

Source: EUR-Lex (2018[54]), *Regulation (EU) 2018/1724 of the European Parliament and of the Council of 2 October 2018 establishing a single digital gateway to provide access to information, to procedures and to assistance and problem-solving services*; European Commission (2022[55]), *eIDAS Regulation*, https://digital-strategy.ec.europa.eu/en/policies/eidas-regulation (accessed on 22 August 2022).

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Notes

[1] 71.4% of surveyed ministries and administrations that declared providing services answered “Yes” to the question “Are the digital services provided by your ministry/administration showcased and/or available in the main national citizens and/or business website for government service delivery?” (OECD, 2021[5]).

[2] 47.8% of surveyed ministries and administrations that declared providing services answered “National website for government services” as the most relevant channel when delivering transactional services (OECD, 2021[5]).

[3] MDIGI answered “No” to the question “Does the central government have a formal strategy relating to the design, delivery and evaluation of government services?” (OECD, 2021[5]).

[4] Ministries and administrations that answered “Yes” to the question “Does your ministry/administration have guidelines/standards relating to the design, delivery and evaluation of government services?” (OECD, 2021[5]).

[5] 46% of surveyed ministries and administrations answered “”Yes” to the alternative “Through project specific contracts with a variety of external suppliers” when asked “How does your institution design, build and maintain online services?” (OECD, 2021[5]).

[6] CTIE replied “Specific to your institutions” to the question “Do you have written guidelines regarding accessibility of digital government services”; “No such guidelines exist” to the question “Do you have written guidelines regarding engagement of users in the service and policy design process”; “Specific to your institutions” to the question “Do you have written guidelines regarding the procurement and commissioning digital, data and technology projects”; “Specific to your institutions” to the question “Do you have written guidelines regarding how to assure the quality and consistency of digital, data and technology projects during design and prior to launch”; “No such guidelines exist” to the question “Do you have written guidelines regarding how to evaluate and measure the performance and impact of policies and services” (OECD, 2021[5]).

[7] 42% of surveyed ministries and administrations that declared providing services answered “Yes, we have individual institutional guidelines/standards” or “No, neither” to the question “Does your ministry/administration have guidelines/standards regarding the design, delivery and evaluation of government services?”. In contrast, 58% of surveyed institutions answered “Yes, we follow central/national guidelines/standards” (OECD, 2021[5]).

[8] 48.72% of surveyed ministries/administrations answered “Yes” to the question on the availability of common data infrastructure in the country, and 35.9% of them answered “Yes” when asked about its use at institutional level (OECD, 2021[5]).

[9] 41.03% of surveyed ministries administrations answered “Yes” to the question on the availability of a common interoperability framework in the country, and 25.64% answered “Yes” when asked about its use at institutional level (OECD, 2021[5]).

[10] 51.3% of surveyed ministries/administrations answered “Yes” to the question on the availability of a common electronic notification system in the country and 28.81% answered “Yes” when asked about its use at institutional level (OECD, 2021[5]).

[11] 93% of surveyed institutions that declared providing services answered “Yes” to the question “Does your ministry/administration use this digital identity solution?” (OECD, 2021[5]).

OECD Digital Government Studies

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PRINT ISBN 978-92-64-55650-8
PDF ISBN 978-92-64-98542-1