



GOVERNANCE



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**EQUITABLE GROWTH, FINANCE & INSTITUTIONS INSIGHT**

# Mobile Government How-to Note



WORLD BANK GROUP

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Republic of Austria  
Finance

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## List of Acronyms

2G	Second Generation of Broadband Cellular Network Technology
3G	Third Generation of Broadband Cellular Network Technology
4G	Fourth Generation of Broadband Cellular Network Technology
5G	Fifth Generation of Broadband Cellular Network Technology
ATMs	Automated Teller Machines
CDO	Chief Digital Officer
eIDAS	Electronic Identification, Authentication and Trust Services
EIF	European Interoperability Framework
EU	European Union
FIDO	Fast Identity Online
G2B	Government-to-Business
G2E	Government-to-Employees
G2G	Government-to-Government
G2P	Government-to-Person
GDPR	General Data Protection Regulation
GovTech	Government Technology
GPS	Global Positioning System, Global Positioning System
GSM	Global System for Mobile Communications
ICT	Information and Communications Technology
ID4D	Identification for Development
ITU	International Telecommunication Union
IVR	Interactive Voice Response,
LDCs	Least Developed Countries
LLDCs	Landlocked Developing Countries
NFC	Near Field Communication
OCR	Optical Character Recognition
OECD	Organization for Economic Co-operation and Development
OIDC	OpenID Connect

PC	Personal Computer
PKI	Public Key Infrastructure
QR	Quick Response, Quick Response Codes
SCOOP4c	Stakeholder Community Once-Only Principle for Citizens
SMS	Short Message Service
UMTS	Universal Mobile Telecommunications System
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
USSD	Unstructured Supplementary Service Data
UX	User Experience
WAP	Wireless Application Protocol
WCAG	Web Content Accessibility Guidelines





## Executive Summary

Mobile phones have become the main communication tool and helped countless people to improve their lives in many countries. The use of mobile phones has grown exponentially over the past 30 years from 11 million subscriptions in 1990 to 8.6 billion in 2021.<sup>1</sup> Ninety-five percent of the world's population now has access to a mobile network. Acknowledging the ubiquitous presence of mobile phones in our lives, European Union governments have embraced the paradigm shift from electronic government (eGov) to mobile phone-based access to government services (mGov) through the Berlin Declaration 2020. The rationale was simple: even if governments have implemented eGovernment portals and online solutions, not everyone has access to the internet via a laptop or personal computer. Mobile phones, on the other hand, are almost universal. Though 17 percent of people in Least Developed Countries still lack mobile access, active broadband subscriptions are increasing fast in all regions of the world, topped by Africa with 28 percent growth and Asia with 27 percent between 2018 and 2020.<sup>2</sup> Mobile phones are thus helping more and more people connect to the jobs, business opportunities, and services they need to escape poverty.<sup>3</sup>

## Opportunities and Challenges

Whether via simple low-tech feature phones or high-tech smartphones, through quick-win solutions or comprehensive approaches, mobile government offers enormous opportunities. mGov can essentially improve access to government, support in reaching more people, especially in remote areas, and improve social inclusion. Mobile devices and network subscriptions can be used to provide identification to citizens as well as information like health cards, birth certificates, driver's license or school admissions in mobile e-wallets. Mobile money can help to distribute cash among the poor, especially those who do not have a bank account. mGov can boost digital transformation, efficiency of government operations, and reduce costs by exploiting the mass usage of mobile devices and multiplying the return of investment for digital solutions. By reducing forms and travel to public agencies, mGov saves citizens money and

1. ITU (International Telecommunication Union). 2022. [World Telecommunication/ICT Indicators Database 2022 \(26th edition/July 2022\)](#). Geneva: ITU.
2. UNDESA. 2020. [E-Government Survey 2020: Digital Government in the Decade of Action for Sustainable Development](#). New York: United Nations.
3. Klapper, Leora. 2019. "[Mobile phones are key to economic development. Are women missing out?](#)" Future Development (blog). <https://www.brookings.edu/blog/future-development/2019/04/10/mobile-phones-are-key-to-economic-development-are-women-missing-out/>.

time; it also benefits the national economy, the environment, and the combat against climate change. By using rising mobile phone capabilities, governments can extend quality, usability, and the portfolio of their digital solutions. Mobile data and citizen engagement can improve the quality of public service delivery.

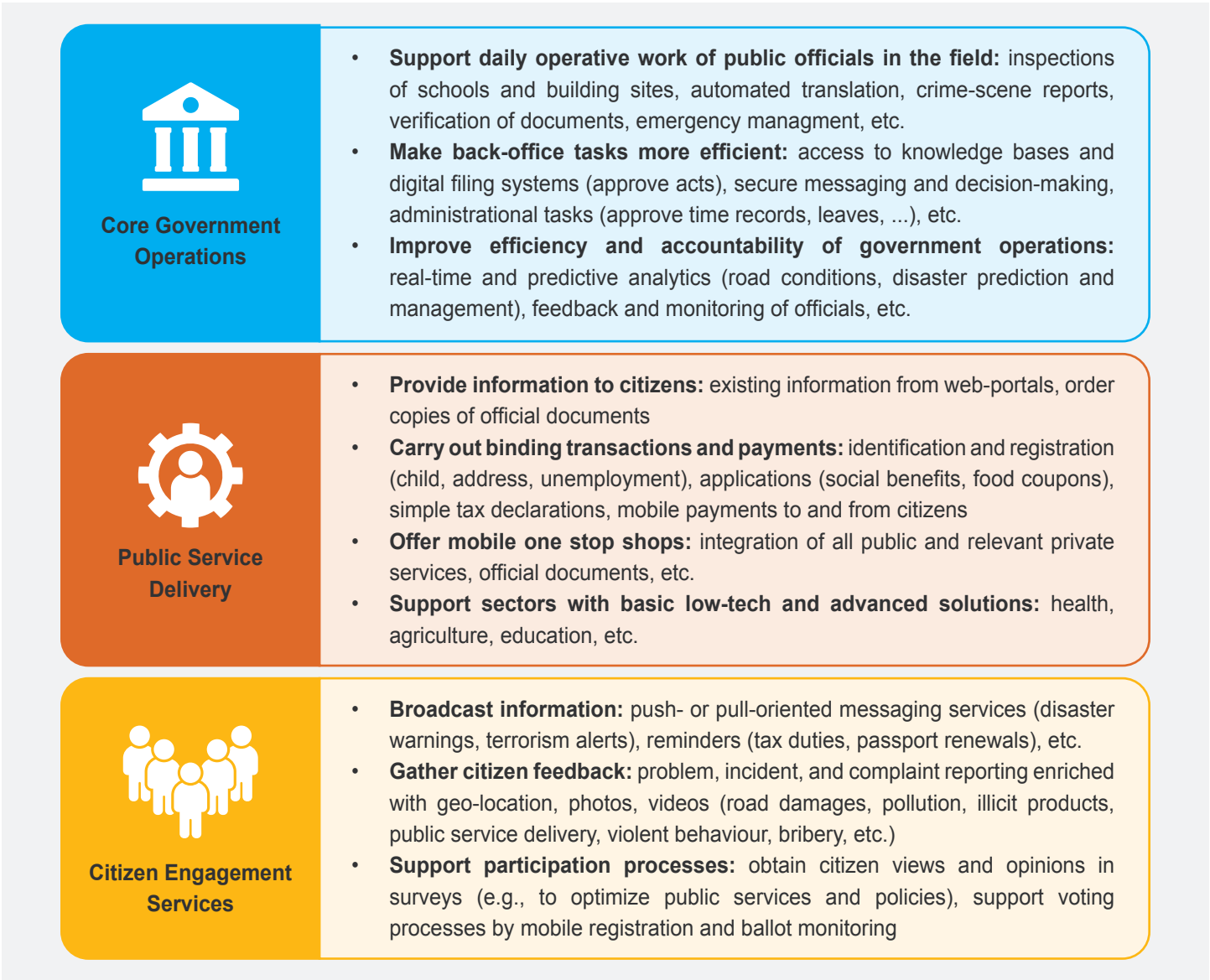
Despite the impressive range of opportunities for mGov, challenges to exploit the full potential remain, particularly in developing countries. Prices of network subscriptions and devices are often costly for the poor and the variety of user needs makes it difficult to find the right balance between a good level of trust and high usability. Governments also often lack central coordination, a whole-of-government strategy, a cohesive approach, an overarching legal framework,

and foundations like digital skills, high-quality network infrastructure, and shared digital services.

## Making the Case

Most successful mGov initiative are oriented on essential social, citizen-oriented or administrative challenges and the specific needs to be met. Possible areas typically include enhancing core government operations, improving public service delivery, and strengthening citizen engagement. Figure ES.1 presents potential use cases for these three areas. Many of the tasks can be implemented with little effort, others rely on prerequisites like identification or payment solutions.

> > >  
**FIGURE ES.1 - Potential Use Cases for Mobile Government**



Source: Authors.

# Holistic User-Centered Approach

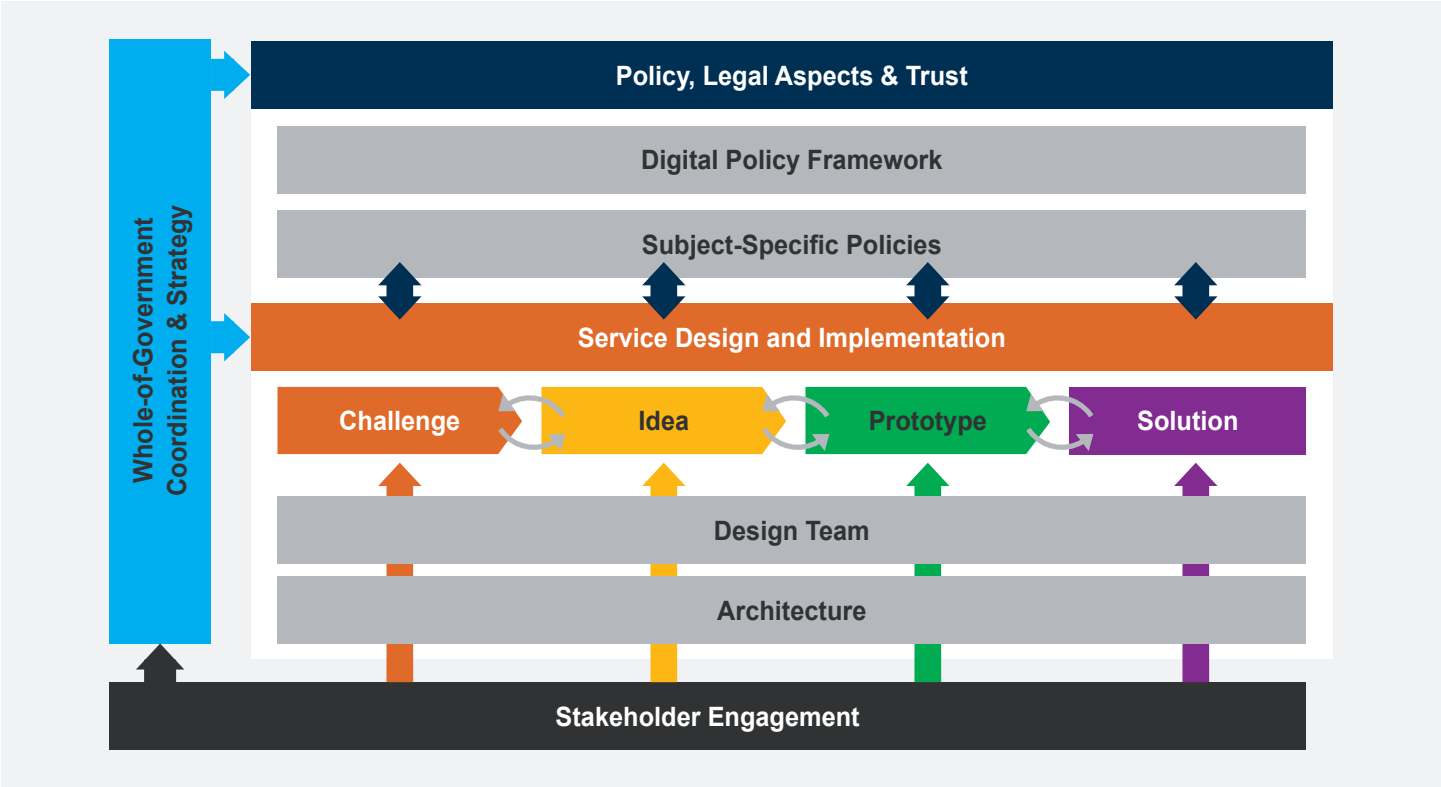
Beyond the opportunity to implement low-effort quick-wins with great impact, a systematic, user-oriented, holistic approach enables efficient and sustainable mGov. The foundation for this is a whole-of-government coordination and digital transformation strategy. With this mandate, a dedicated agency responsible for digital transformation can issue a digital policy framework with general requirements and standards. Subject-specific policies need to consider these and aim to facilitate user-centered end-to-end solutions.

As shown below in Figure ES.2, based on common concepts of human-centered design, a design team can identify ideas

to solve specific challenges with relevant stakeholders, iteratively develop concepts, prototypes and pilots, test them with users, and finally roll out the solutions. Engaging policy and decision makers, a central coordination team, software developers, and citizens (the beneficiaries) ensures that solutions are developed, deployed, and function as required. Agile innovation labs that use design thinking methods and bring together interdisciplinary teams from multiple agencies with other key stakeholders like businesses and citizens can act as catalysts for innovative mobile solutions.

> > >

FIGURE ES.2 - Key Elements and Systematic Approach to Introduce Efficient and Sustainable mGov



Source: Authors.

Governments over the years often developed a variety of websites, platforms, and digital solutions. Instead of developing many apps for various purposes, an integrated approach, a modular system of building blocks or open interfaces can result in more user-friendly digital public services. While it might be difficult to consolidate all existing solutions, a single user-centered access point with digital identification or unified user

experience guidelines for the mobile channel can significantly improve user acceptance. A multichannel strategy that at least covers the channels currently most established in a target group can provide the most sustainable benefit for mGov. Smartphones provide the most extensive features, but dumb phones or smart feature phones also need to be considered, as well as specific screen size and input types.

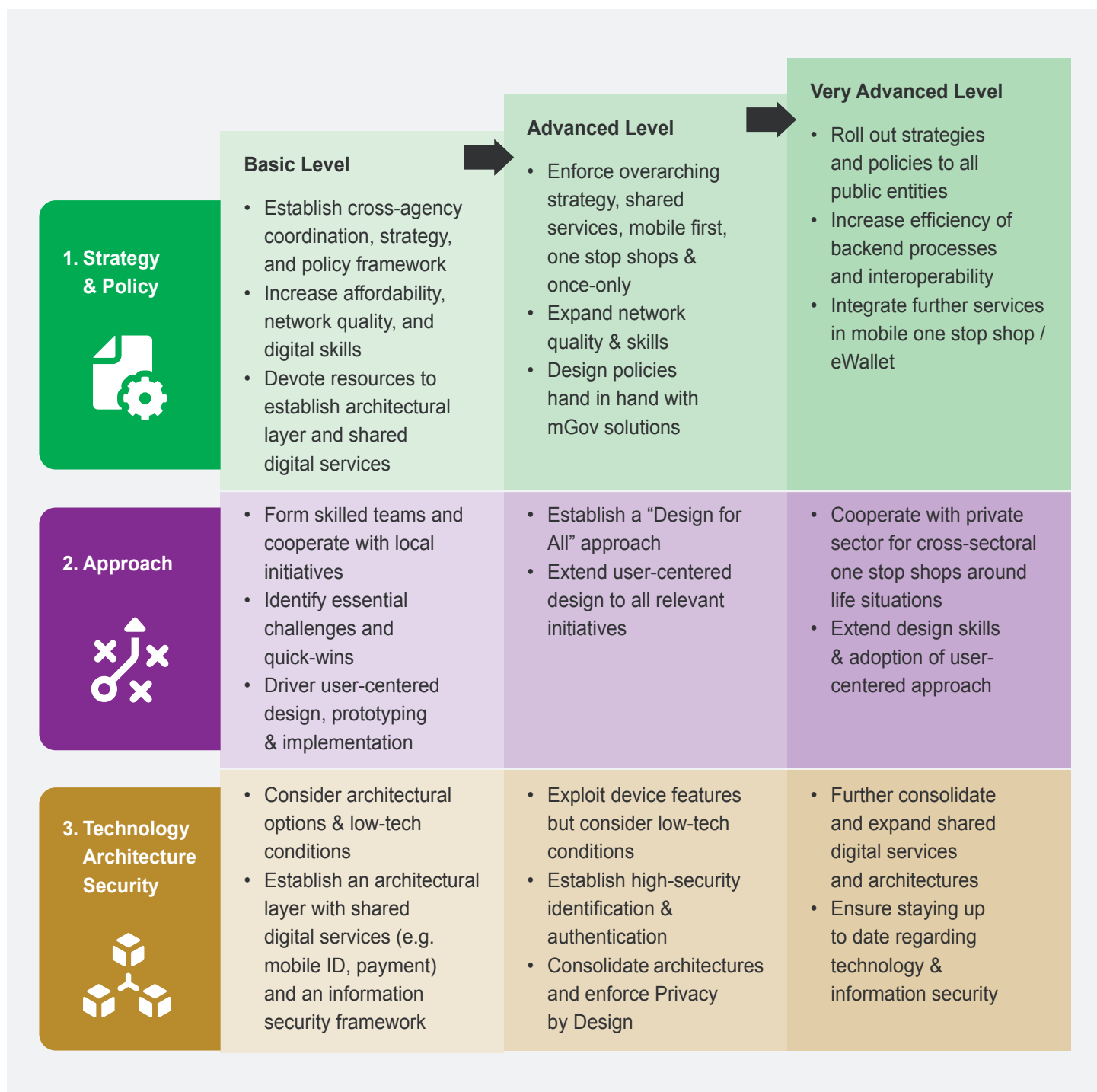
# Recommendations

Mobile Government is a multifaceted field and initiatives need to be designed specifically to fit each situation. Whether in a developing or a developed context, circumstances vary from country to country, region to region, or even from project to

project. The Note presents recommendations for countries with basic, advanced, and very advanced levels of digital development as shown in Figure ES.3.

> > >

**FIGURE ES.3 - Overview of Recommendations for Various Development Levels**



Source: Authors.

The following recommendations are relevant for all levels of development as they set the foundations for mGov:

1. **Set up cross-agency coordination and strategy.** Governance, institutional arrangements like a central board for coordination, and a cross-agency strategy will enable citizen centricity and cost efficiencies. A mobile first strategy prioritizing front-end mobile channels can increase penetration of digital solutions and reduce personal interaction with the bureaucracy. A once-only strategy can facilitate that data is fetched from existing systems and only interaction-specific additional information is needed to progressively build a citizen profile for future re-use.
2. **Establish a legal and policy framework.** Such a framework provides the authorizing environment for sustainable, efficient digital public service delivery and mobile Government that transcends political cycle and leadership tenures.
3. **Identify essential challenges and quick wins.** mGov initiatives are most successful if they address and solve key social and administrative challenges. Identifying potential quick-win solutions for services with high demand and hence high impact can show fast and impressive benefits without waiting for the full automation of backend systems, which typically take a long time to be implemented.
4. **Promote use cases for low-tech phones.** Particularly developing countries can with relatively little effort achieve a great impact with simple, low-tech mGov solutions, e.g. by providing information services (broadcast messages on nutrition, clean drinking water, drought, famine, pests, food shortages, pesticides, vaccines, voting); collecting information (geotagged pictures for monitoring services on mosquito sprays, school attendance, electoral rolls, child and maternity nutrition); engaging citizens (for getting feedback on infrastructure project completion and quality, gender violence, crime scene reports); and making digital payments (for sending social welfare payments, subsidies and other government-to-person payments).
5. **Form skilled teams.** Interdisciplinary teams of design thinking facilitators, process owners, user experience and cybersecurity experts, architects, and developers are best suited to design citizen-centric user journeys and develop mobile solutions with optimal user experience. Multiple teams working in agile sprints can deliver several services in parallel.

6. **Drive user-centric approach and co-creation.** Integrating users into design, development, prototyping and implementation will enable fast, cost-efficient mGov solutions that are designed to user needs. By cooperating with the private sector and social organizations, a real one-stop shop experience can be created that does not only cover governmental affairs, but all matters relevant to a person in a certain situation. This can lead to impactful win-win-situations for governments, citizens, and related organizations.
7. **Establish architectural layers with shared digital services.** Design the big picture of the whole-of-government technology architecture to avoid duplication of common building blocks. Initiatives may have a short-, medium-, or long-term focus and require minimum or large effort. They may include elements like identification and authentication, digital payment, push notification systems, central data management, enterprise buses, information security services and application development tools. A common interoperability platform can ensure integration of various elements and enable the adoption of a once-only strategy.
8. **Adopt inclusive and equitable approaches for accessibility** to ensure underserved communities, including people with disabilities, low digital skills, old age, eye sight issues, and slow connectivity are catered for. Involvement of a broad range of user profiles in the design and testing phase can make sure that mGov solutions reach as many people as possible.
9. **Increase affordability.** Unaffordable prices are among the highest barriers to adopt data services. Initiatives that make mobile subscriptions and devices affordable to the poor will promote mGov and digital transformation.
10. **Ensure trustful conditions and a high level of information security.** Since using information of mobile devices may be perceived as privacy invasive, security measures are of key importance. Weaknesses in the mobile network infrastructure tend to prevail and governments therefore need to take devices with low security into consideration. Principles like data minimization and Privacy by Design can help in establishing an appreciable level of security





## Conclusion

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Mobile government offers developing countries several benefits for their citizens including financial inclusion, wider access to government services, and citizen engagement. It would also establish effective channels for redress and feedback, providing key input to further enhance and better target public services. Countries with a basic level of digital development can take actions in all areas presented in the Note regarding cross-agency coordination and strategy,

policy, user-centered approach, technology, architecture, or information security. Initiatives can start by implementing simple solutions based on specific challenges to facilitate harvesting quick wins, or by planning and building holistic mGov systems covering a range of use cases. By moving to mGov, government service delivery can become more accessible, effective, and efficient.





## Introduction

**Mobile phones have become the main communication tool and helped countless people to improve their life in many countries.** The use of mobile phones has grown exponentially over the past 30 years from 11 million subscriptions in 1990 to 8.6 billion in 2021 (ITU 2022). Ninety-five percent of the world's population now has access to a mobile network. Though 17 percent of people in Least Developed Countries (LDCs) still lack such access, active mobile broadband subscriptions are increasing fast in all regions of the world, topped by Africa with 28 percent growth and Asia with 27 percent between 2018 and 2020 (UNDESA 2020). Mobile phones thus help more and more people connect to the jobs, business opportunities, and services they need to escape poverty (Klapper 2019).

**Mobile Government (mGov) offers enormous opportunities to connect citizens to the government and enhance their access.** Enhanced access reduces isolation, which has transformative potential for poverty alleviation. Broadband also provides access but is not as universally available or even used. Around 2 billion people currently access the internet via only their smartphone. Almost three quarters (72.6 percent) of internet users will access the web solely via their smartphones by 2025, equivalent to nearly 3.7 billion people (Handley 2019). Mobile phones can provide identification to a vast majority of citizens and give them access to government services like health, education, and welfare, thereby mitigating the digital divide and facilitating social and financial inclusion. Be it through simple button-based dumb phones or high-tech smartphones, mobile technologies offer a variety of opportunities in all GovTech focus areas: core government operations, digital public service delivery, and citizen engagement. A paradigm shift has taken place from e-government to mGov. European Union (EU) governments have embraced the paradigm shift through the Berlin Declaration on December 8, 2020, through which the EU governments committed to provide easy access to services for the mobile channel by enabling citizens to use their mobile devices to carry out digital public services (European Union 2020). The rationale was simple: even if governments have implemented e-government portals and online solutions, not everyone has access to the internet via a laptop or personal

computer. Also, mobile offers immense opportunities for citizen engagement through a range of opportunities such as citizen feedback, grievance redress mechanism, and inclusive policy formulation process.

**Maximizing these opportunities will enhance citizen trust and strengthen institutions necessary for economic growth.** This Note aims to highlight these opportunities, investigate challenges, present use cases

and recommendations for various levels of development, and provide policy makers as well as practitioners a holistic and practical framework to establish sustainable mGov. Maximizing these opportunities is especially pertinent when the world is facing a reversal of fortunes in its fight against reducing extreme poverty due to COVID on the one hand, and rising expectations of citizens who have ubiquitous access to mobiles and social media on the other hand.

## DEFINITION

**mGov, mGovernment, or mobile Government is most commonly understood as any mobile phone-based access to government systems, services, and communication with citizens.** The major goal is to connect citizens with the government through mobile devices and to promote simple, accessible, and efficient public services for anyone, anywhere, anytime.

**Mobile Government has been a growing trend for many years.** Important primers on mGov were published by the OECD and the UN more than 10 years ago, predicting a shift from eGovernment to mGov with an abundance of potential. Ever since, many solutions have been implemented, resulting in impressive impact. Several publications (Ogunleye and Van Belle 2014; Bhatti, Zall Kusek, and Verheijen 2015; Isagah and Wimmer 2017, 2019; Dutra and Soares 2019) have illustrated promising initiatives and benefits, as well as challenges of sustainably introducing mGov in developing countries. Recently, the World Bank has addressed the potential of mGov for sustainable digital government transformation following the example of Austria's engagement in mGov (Farooq and Kustor 2021), and established a working group with representatives from 16 countries worldwide to leverage activities.

**Governments over the past two decades have successfully launched mGov initiatives. However, holistic approaches for sustainable mGov remain few, especially in developing countries.** Successful initiatives such as providing identity and welfare to the poor in Myanmar and Bangladesh, addressing gender-related violence in Argentina,

reporting bribery in Pakistan, and reporting defective public infrastructure by submitting mobile phone images in many countries around the world show the potential of mGov. The sustainability of many initiatives, however, suffers from the absence of a comprehensive strategy and a structured approach. As a result, many solutions that are implemented have suboptimal impact, or are abandoned after a short time. This paper strives to deliver a holistic strategic approach, a systematic framework, and hands-on guidance towards successful and lasting mobile government.

**This Note prepared under the GovTech initiative of the World Bank is in response to growing demand from World Bank client countries for support in leveraging these technologies to ensure that the countries are not left behind.** GovTech is a whole-of-government approach to public sector modernization that promotes simple, accessible, and efficient government. It aims to promote the use of technology to transform the public sector, improve service delivery to citizens and businesses, and increase efficiency, transparency, and accountability.

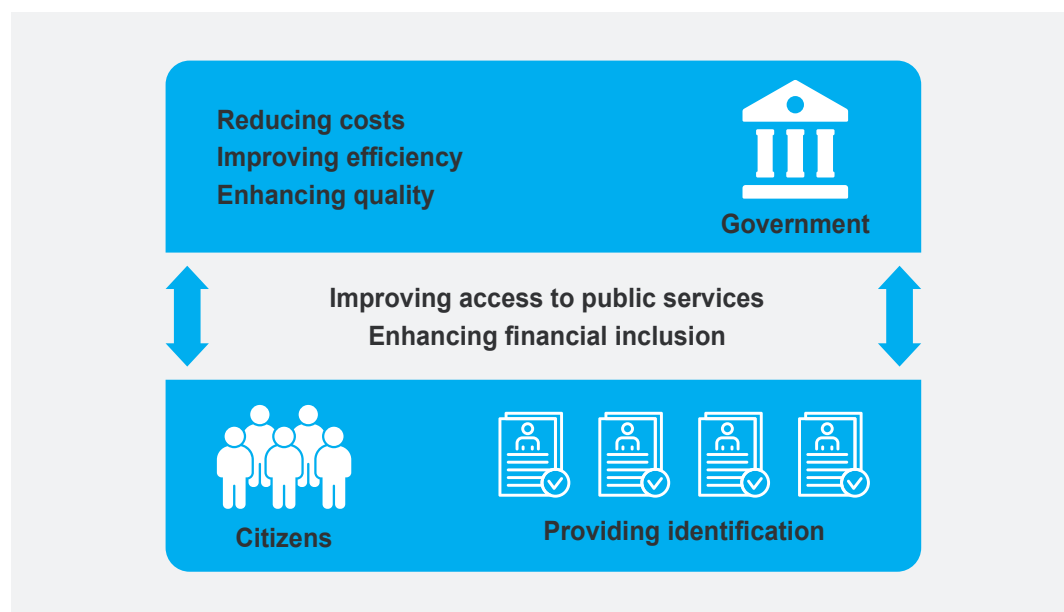


## Opportunities and Challenges

**Mobile Government offers enormous opportunities to reach virtually all citizens and to enforce public sector modernization.** Good practice GovTech solutions are known to consider device- and internet-access limitations, digital literacy, cultural norms, and other factors that might inhibit access (World Bank 2021). This chapter unveils how mGov can contribute to overcome such access limitations. It also discusses challenges that frustrate reaping the benefits of mobile governments and often persist in developing countries.

> > >

**FIGURE 2.1 - Overview on Opportunities of mGov**



Source: Authors.

## 2.1 Opportunities

Providing multiple channels for service delivery, particularly for those who do not have adequate connectivity, devices, or literacy, is one of the main challenges in delivering public online services (World Bank 2021). mGov can extend existing channels, be it via simple low-tech feature phones or high-tech smartphones, and increase social and financial inclusion, improve quality and efficiency of public services, and raise satisfaction of citizens.

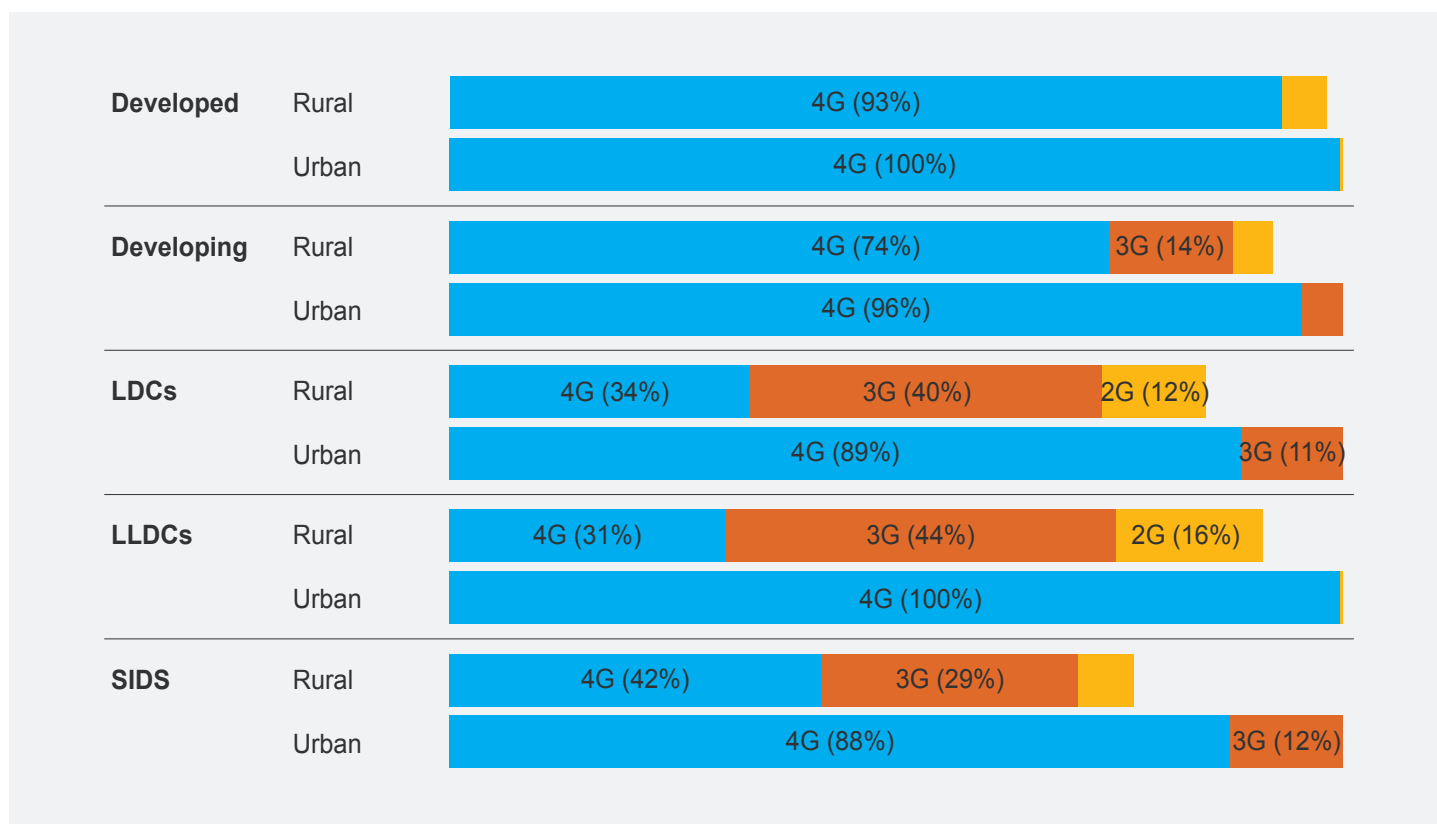
### 2.1.1 Improving Access to Government and Providing Digital Identity

Public service delivery can significantly expand through mGov solutions by reaching more people, especially

in remote areas. While only eleven percent of the world's population have fixed broadband internet access, even in rural areas of developing countries 88 percent of the population are covered by mobile broadband network (ITU 2022) – see Figure 2.2. Even those who do not own a mobile phone can often access mobile phones through facilitators like friends, families, social workers, or local officials. Mobile solutions can thus be the trigger to leapfrog the digital divide in terms of fixed line infrastructure limitations. They can give the poorest access to government, health, education, and other public services.

> > >

FIGURE 2.2 - Population Coverage by Type of Mobile Network and Area



Source: ITU.

Note: The values for 2G and 3G networks show the incremental percentage of population that is not covered by a more advanced technology network (e.g. 95% population is covered by a 3G network, that is 7% + 88%).

**Mobile government can help to reach people with disabilities as well as population with limited literacy, thereby improving social inclusion.** About one billion people or 15 percent of the world’s population lives with some form of disability (World Health Organization 2011). Despite drawbacks like small screens, mobile applications now help people with physical disabilities in many areas—for example, by speech-to-text-communication for deaf, text-to-speech for blind, or voice controls for people with limited mobility. Citizens of all educational and social backgrounds now use mobile applications. Even people who cannot read and write can use mobiles via voice services, and people who have never used a personal computer (PC) can deal with intuitive mobile phone apps.

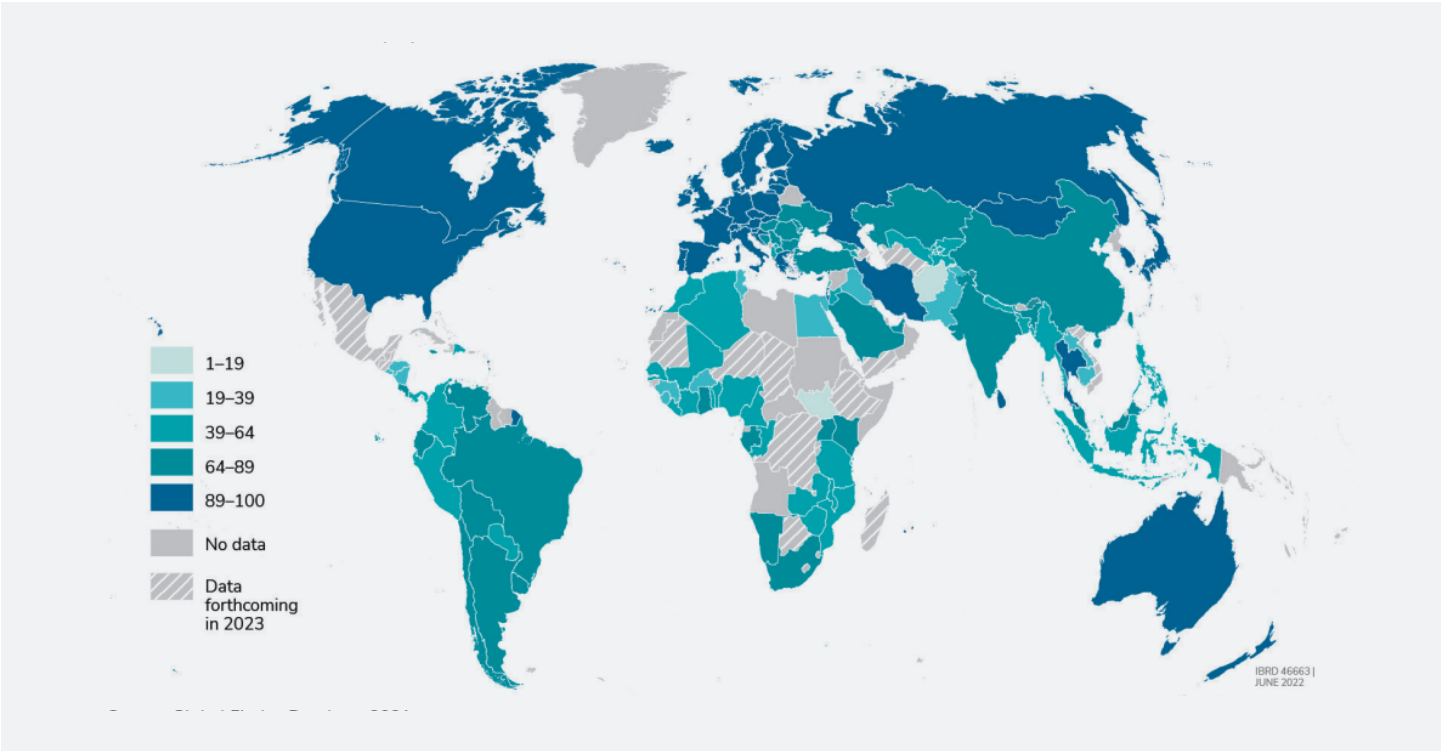
**Mobile devices and network subscriptions can be used to provide identification to citizens as well as documents in mobile e-wallets.** More than one billion people in the world do not have basic identity documents (World Bank 2019). Many jurisdictions now construct a proxy for ID from mobile data. Mobile phones can thus empower citizens to bring their existence to the government by registering themselves and their children, fulfilling a crucial basis for a variety of purposes such as delivering food stamps and welfare payments. For example, Pakistan has enabled digital birth registration for some 700,000 children by using franchised network points

as registrars (see also Chapter 4.3.2). Similar programs have been launched in Tanzania, taking advantage of the mobile agent network (Gelb 2020). Digital identities facilitated by mobile devices can thus support reaching the Sustainable Development Goals, which include providing legal identity for all, including birth registration, by 2030. More sophisticated implementations can extend identification with secure authentication (see Chapter 5.2.1), a core requirement to carry out secure and binding transactions. Beyond that, many countries like Argentina, Australia, Brazil, Iceland, India, and Ukraine today already provide identification documents like identity cards (IDs) or driver’s license directly on mobile phones, replacing physical (paper) versions.

### 2.1.2 Enhancing Financial Inclusion

**Mobile money can help to distribute cash among the poor, especially those who do not have a bank account.** About 1.9 billion of the world’s adult population remain unbanked – see Figure 2.3. But two-thirds of them do have a mobile phone and in developing economies, the share of adults making or receiving digital payments is now 57 percent (World Bank 2021). Having an ID and a mobile phone boosts the chances of financial inclusion by nearly five times over the baseline case (Gelb 2020).

> > >  
**FIGURE 2.3 - Overview on Quota of Adults with a Bank Account**



Source: World Bank, 2021.

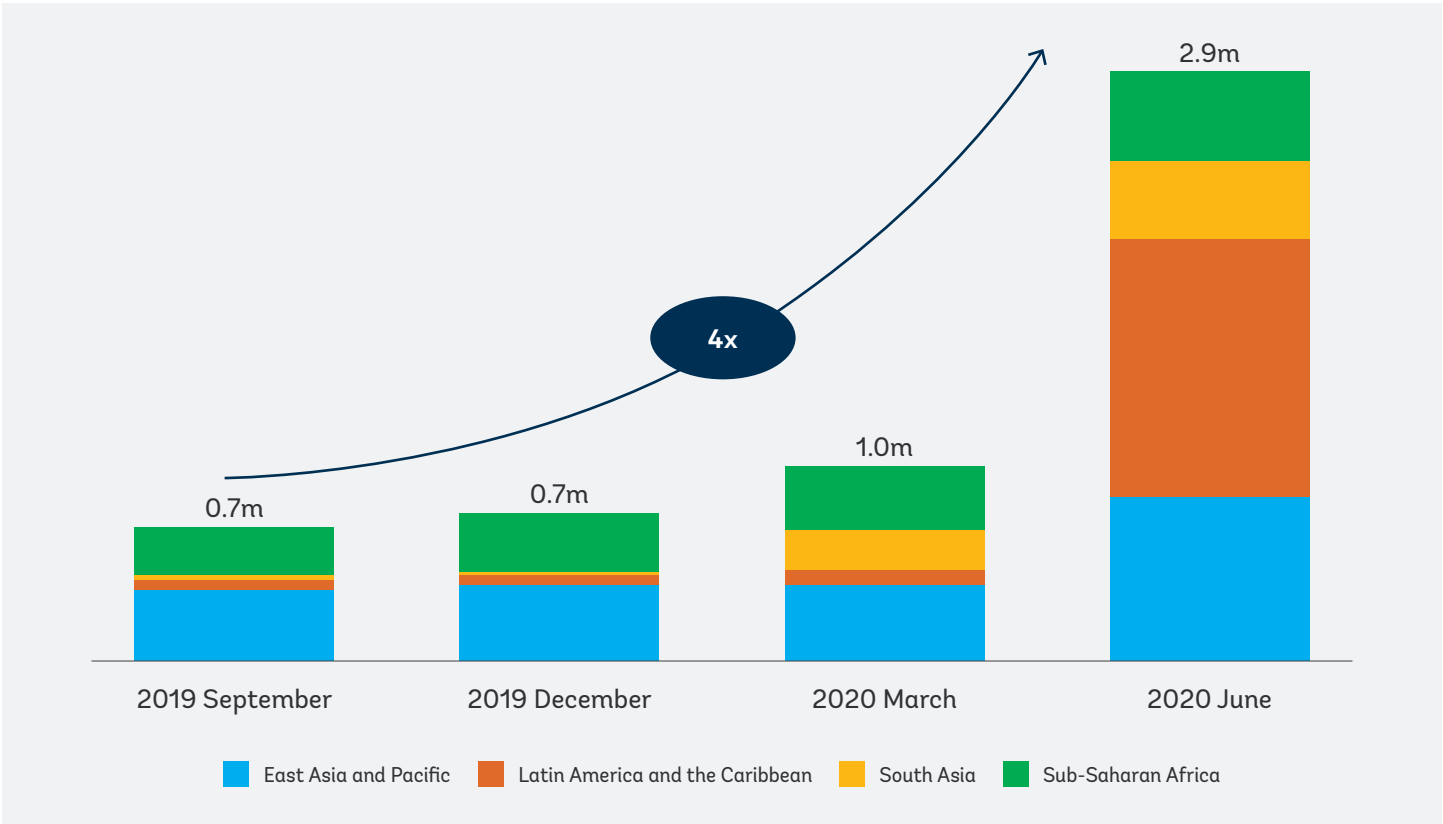
**To protect the poor from the inflation caused by fuel and food prices, governments can use mobile phones to pay subsidies to targeted poor populations.** Governments have increased the prices of fuel and food to reduce their overall subsidies on these items in order to meet their fiscal deficit targets for macro fiscal sustainability. However, higher costs of these items are immensely unpopular, with potential unrest and political instability, as seen in Sri Lanka in 2022. Mobile money or voucher transfers can be an effective and efficient option to pay subsidies to the poorest people and quickly bring help to citizens in desperate need. For the 648 million people worldwide living in extreme poverty, immediate cash support can be lifesaving. Mobile money agents that register new users and teach them how to initiate transactions on their phones are estimated to have seven times more outreach than automated teller machines (ATMs) and twenty times more than bank branches (Econofact 2020). In Kenya, the largest mobile phone network has established more than

11,000 agents across the country to send and receive money transfers. Since its launch one in four Kenyan adults has signed up.

**Mobile money infrastructure is now being used by dozens of countries for social welfare transfers through government-to-person (G2P) programs.** Ethiopia, for example, uses mobile money as one mechanism to disburse payments. The two leading mobile money providers partner with a range of humanitarian organizations and government agencies to facilitate cash payments across the country (GSMA 2021). Many countries including Bangladesh, Cambodia, Colombia, India, Paraguay, and Togo have set up mobile money payments for COVID-19 response measures, thus enabling G2P payments to quadruple at the beginning of 2020 (Figure 2.4). Not only payments by the government can be made through mobile, but also payments to the government, for example, income tax.

> > >

**FIGURE 2.4 - Number of Unique Customer Accounts Receiving G2P Payments by Region**



Source: World Bank, 2021.



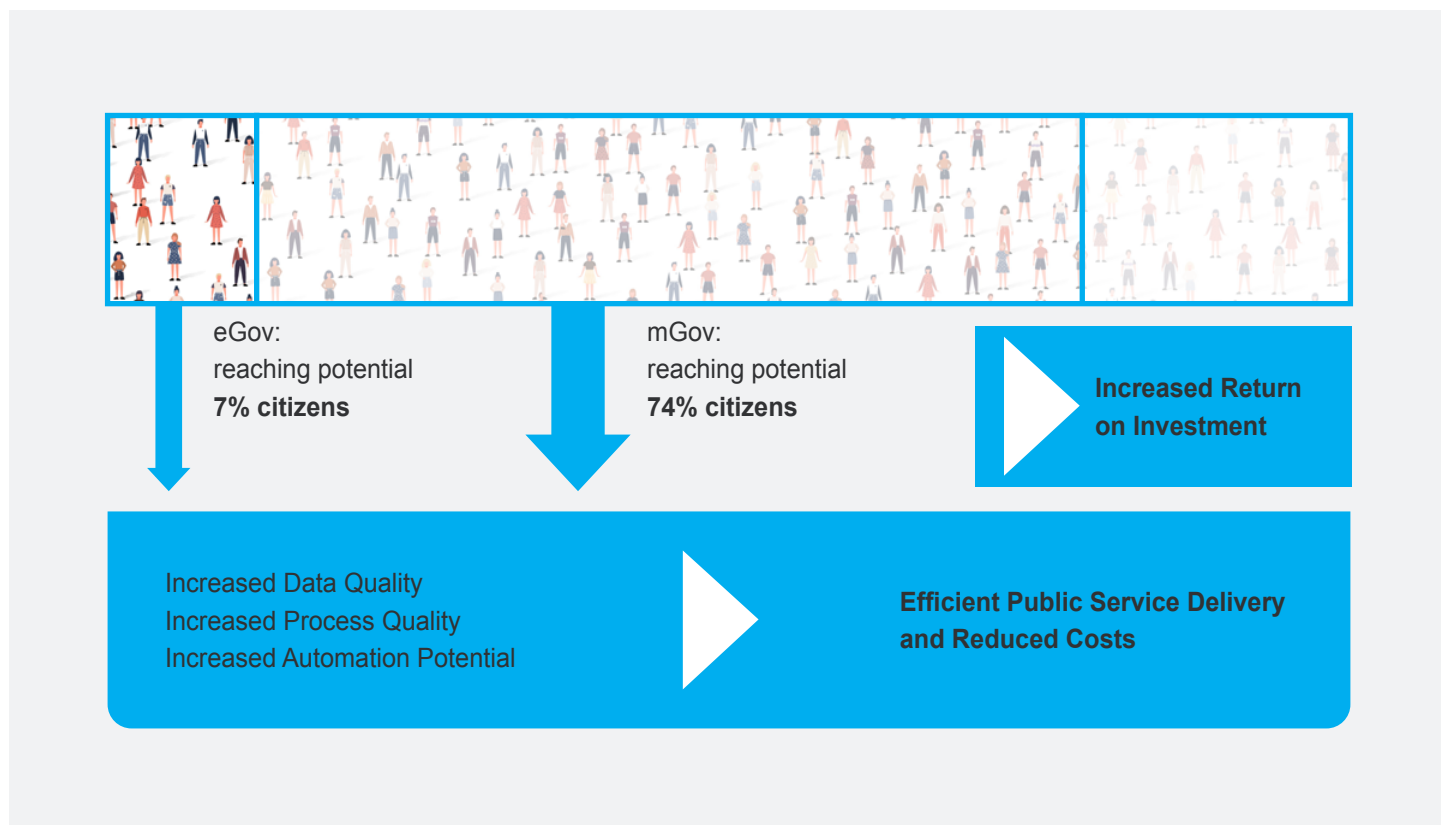
### 2.1.3 Reducing Costs and Improving Government Efficiency

**Exploiting the mass usage of mobile devices can multiply the return of investment for digital solutions.** Digital transformation is reducing the operational costs of businesses and governments around the world. Increasing user penetration

directly increases the return of investment. For example, with a budget of one million dollars for a developing country of fifty million inhabitants, a digital solution would cost 29 cents per potential user for the average seven percent fixed line users as opposed to 2,7 cents per user for the 74 percent potential mobile broadband users (Figure 2.5).

> > >

**FIGURE 2.5 - Potential for Digital Spending and Government Operations**



Source: Authors.

**Savings also directly apply to citizens and include benefits to the national economy.** Travel to public agencies can be costly especially for the poorest people in rural areas, which often leads to people not registering their children and not applying for welfare. Moreover, instead of travelling to and waiting in queues in public agency offices, citizens can be going about their daily work. Saving just one hour of absence from work per person for eight million people equates to a gain of one million working days, raising the country's gross domestic product (GDP).

**Mobile government can boost digital transformation and efficiency of government operations.** Through economies of scale, digital government transformation can come to full effectiveness. Redundant data gathering at each citizen

contact – for example, birth, education, marriage, parenthood, employment, death – creates inefficiencies and reduces data quality. Enabling citizens to provide digital information, combined with efficient data management, can expand the potential of a once-only-principle and help governments gain efficiencies. Citizens only need to provide their data once in the system to access different services across government. Most of the data can be fetched from existing sources connected to a digital identification; only minimum additional data is required to be used to progressively build a citizen profile for future reuse. Using data that has once been collected following interactions is a prerequisite for process optimization and automation, ideally resulting in no-stop shops, where no in-person interaction is needed.

### 2.1.4 Realizing Climate Co-Benefits

**Avoiding unnecessary transport of people reduces carbon dioxide (CO<sub>2</sub>) emissions and contributes to combat climate change.** Getting rid of the necessity of long journeys from rural areas to visit central agencies reduces pressure on the environment and is climate-friendly. Preventing 100,000 people from taking a 10 km car trip to a public office saves about 300 tons of CO<sub>2</sub>.

**Reducing the production and distribution of paper leads to great environmental benefits.** Distributing forms for registration or census requires paper and logistics. Eliminating the use of one million pages of paper reduces waste and saves more than 100 trees, 10 million liters of water, and 4.5 tons of CO<sub>2</sub>. Operating information and communications technology (ICT) systems includes negative environmental impact itself, but by reaching more people with mGov solutions, the environmental effects can be leveraged more efficiently resulting in a positive net effect.

### 2.1.5 Enhancing Quality, User Experience and Digital Portfolio

**Exploiting rising mobile phone capabilities can extend quality, usability, and the portfolio of digital solutions.** The functionality of digital government solutions can be enhanced through using information on the location, cameras, and sensors of mobile devices (see also Chapters 3 and 5.1). Modern phones can support secure authentication of a person's identity as a basis to personalize and contextualize services. Also, in contrast to physical visits to agency offices, mGov solutions can easily scale potentially to a higher number of use cases – for example, in exceptional circumstances such

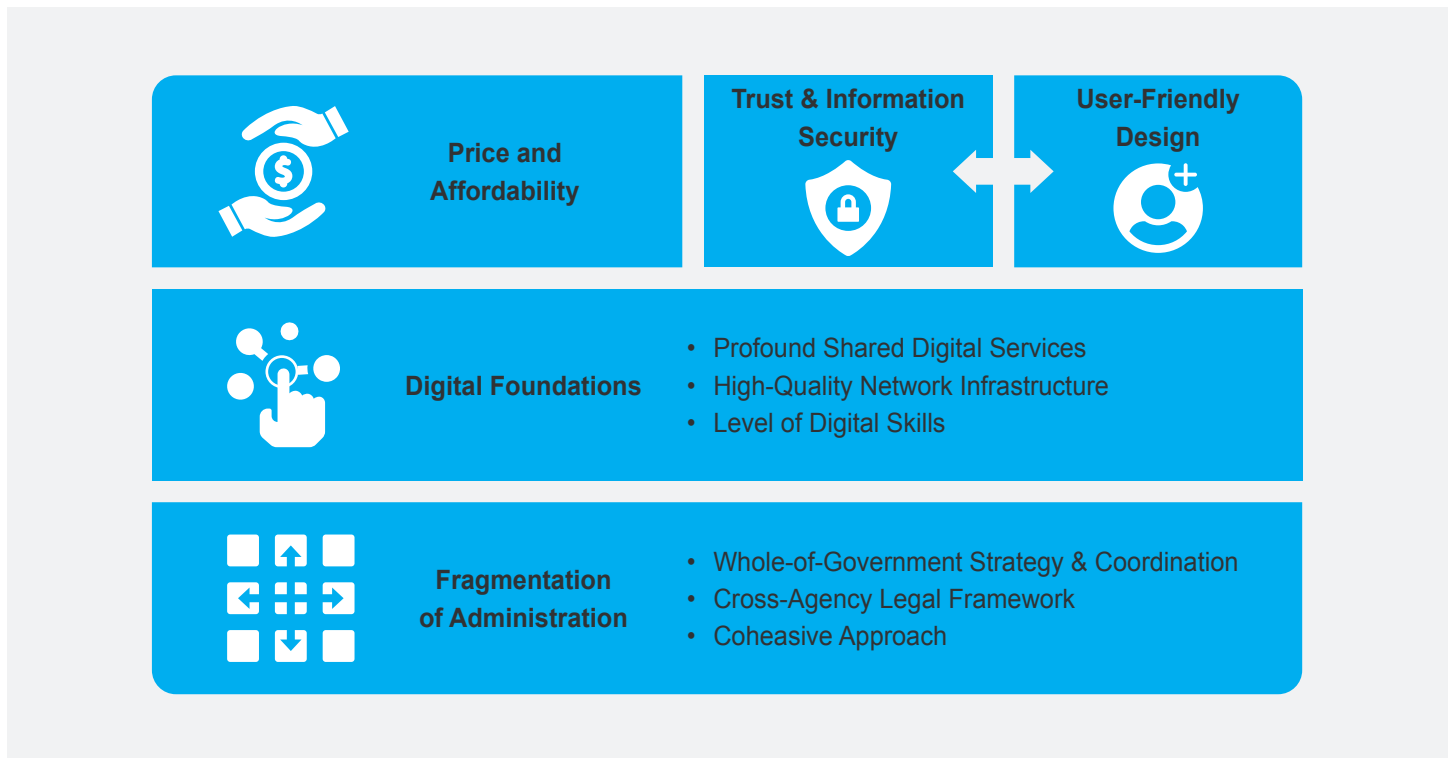
as natural or manmade disasters. Through mGov solutions, governments can provide intuitive, convenient, flexible, and integrated services in the way that citizens and government employees are used to in their daily lives.

**Mobile data and citizen engagement can also improve the quality of public service delivery.** Mobile data can be used to improve public services and processes to fit the citizen's needs. Citizen participation and feedback can also improve public service delivery and policy making by identifying problems and collecting proposals for solutions. Only 28 of the 75 existing national citizen engagement government portals are universally accessible or provide support for users with disabilities (World Bank 2021). Mobile can, with little effort, provide participation options reaching virtually all citizens. Modern and high-quality public service delivery will significantly increase citizen satisfaction and the image of governments.

## 2.2 Challenges

**While facing an impressive range of opportunities, the main challenge for developing countries to establish mobile government lies in digital foundations.** In many developing countries, promising singular mobile solutions have been developed, but whole-of-government approaches, coordination, and legal frameworks to exploit the full potential are mostly still missing. Figure 2.6 captures challenges often faced in establishing mGov.



**FIGURE 2.6 - Challenges in Establishing Sustainable mGov**

Source: Authors.

### 2.2.1 Fragmentation of Administration

**Governments often lack a whole-of-government strategy and cohesive approach for all agencies.** Different variations of fragmentation are noted, horizontal as well as vertical. Agencies within the same national level or at subnational levels often implement mGov through isolated initiatives using separate technologies, frameworks, and approaches. While singular initiatives can have a great subject-specific impact and show the potential of mobile solutions, an overarching vision and cross-agency strategy can lead to efficient and sustainable mGov. Lacking such a strategy and leadership, mGov solutions will mostly reach a small set of people or have only local impact.

**An overarching legal basis is needed for efficient core government systems and digital interaction between the state and the citizen.** To implement a whole-of-government strategy and effective digital government transformation, a general digital policy and a legal framework for all public organizations is essential. Conflictive interests, be they horizontally between ministries or vertically between federal

and local governments, can frustrate overarching initiatives. Without subordinate regulation on digital ID, digital payments, digital signature, digital documents, cybersecurity, and privacy, among others, mGov cannot be established in an efficient and sustainable manner.

**Central coordination, resources, and a digital agency that has strong official authority are necessary to enforce the rollout of overarching principles.** Dedicated central government GovTech units have been established in 80 countries, but limited government financial and human resources remain a main challenge (World Bank 2021). To establish consensus on digital matters and a strategy, coordination mechanisms for cross-ministerial consultations such as a digital board or council with representatives of all major federal organizations are necessary. A central agency responsible for digital affairs is needed to effectively coordinate the implementation of a strategy and roadmap to issue policies, standards, and guidelines; to support agencies in the consistent implementation of policies and digital services; and to monitor compliance to the policy framework.

## 2.2.2 Lack of Digital Foundations

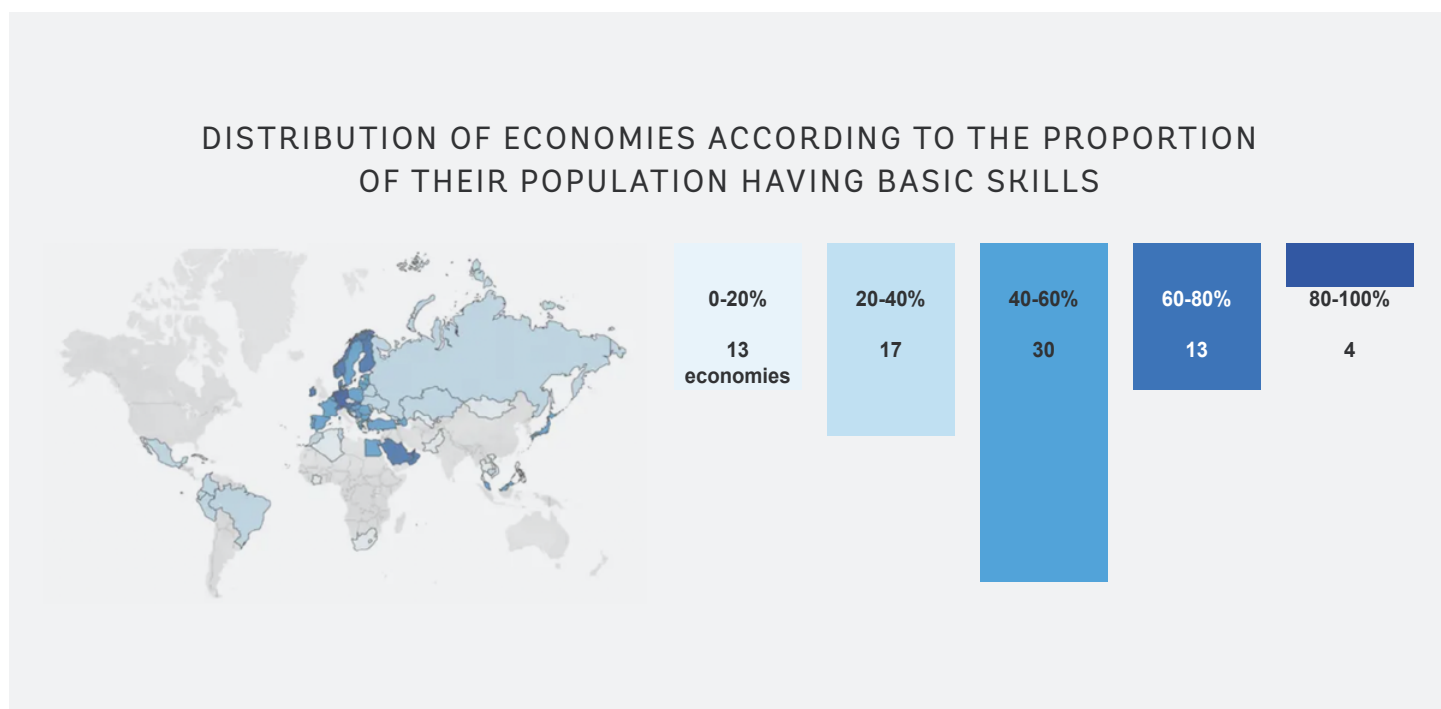
**The level of digital literacy and capabilities among citizens as well as government employees is highly diverse.** Many people now use mobile phones in various situations of their daily lives, but not all have the same physical, intellectual, or digital skills. Penetration of mGov solutions can only reach its full potential if they are designed in a way that users are familiar with, be it via web, app, text, or voice.

**Governments struggle to engage skilled experts for coordination, design, and implementation of digital**

**solutions.** To design and implement mGov solutions in a way that they are taken up by as many users of all relevant target groups as possible, a skilled team is needed in all phases. It is not only in developing countries that these skills are often missing and have to be established with professional guidance. Facing a high demand for skilled personnel in digital matters, many governments find it hard to establish a pool of experts – at market-based salaries – who have the capabilities to design and implement an efficient digital environment. Figure 2.7 above illustrates the issue.

> > >

**FIGURE 2.7 - Percentage of People with Basic ICT Skills**



Source: ITU 2018.

Note: For each economy, the value for basic skills is the average value of the available recent data for following four computer-based activities: copying or moving a file or folder, using copy and paste tools to duplicate or move information within a document, sending e-mails with attached files, and transferring files between a computer and other devices.

**Consistent and integrated backend applications, platforms, and digital infrastructure building blocks are prerequisites for sustainable mGov that are often lacking.**

Singular mGov solutions can usually be successfully developed without relying on sophisticated backend systems. But to operate a greater set of efficient and effective mGov solutions, a cross-agency digital architecture, shared platforms, and a set of shared digital services are necessary. Developing countries particularly are often short of manpower and budget to establish such basic functional layers as a government

service bus, high-quality central data management, or identification.

**Secure identification as an essential foundation to provide binding public services is complex to implement.**

That and authentication solutions are costly and need high-end mobile devices as a prerequisite. Only few countries like Austria, Belgium, Estonia, and recently Moldova have established such solutions. Simple means of identification based on network subscriptions can also be of high benefit but remain widely uncommon.

**Mobile financial services are not yet comprehensively established.** Despite its potential, mobile money adoption is still low in certain regions and countries. While there are over 1 billion registered mobile money users worldwide, there is significant variation in adoption within and across countries. In Sub-Saharan Africa, for example, adoption in East Africa is high, whereas the number of active users in West Africa ranges from 1 percent in Niger to 20 percent in Ivory Coast (Econofact 2020).

**Keeping pace with technological dynamics and dealing with dependencies is challenging.** The mobile phone and app market is developing fast and opportunities as well as requirements are constantly changing. Therefore, mGov solutions must be kept up to date regarding security measures and functionality, and often need to support a broad range of operating system versions. The current market dominance of two mobile phone platforms includes advantages but also creates a high dependency on the providers. Dependencies from platforms also include time plans. When defining a rollout-plan, the timeframe for publication of native apps in app stores needs to be considered.

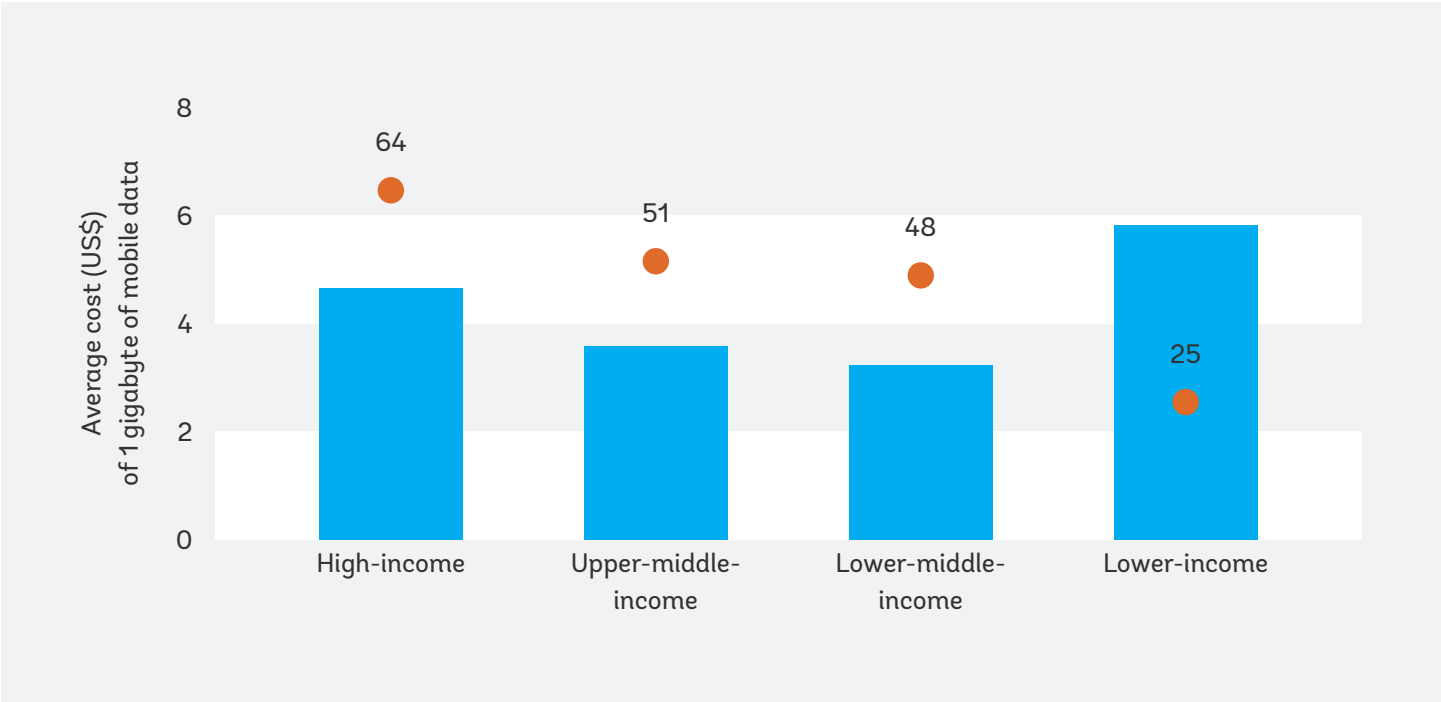
**High-quality infrastructure and access to mobile networks and devices are still not established in many rural areas.** The best mGov solutions are of no use if people do not have

appropriate devices or are unable to connect to a network. In Africa, 18 percent of the rural population has no mobile network coverage at all, and another 11 percent has only 2G coverage, unable to access the internet. In the Americas, 22 percent of the rural population is not covered (ITU 2022). Many poor communities living in rural areas have substandard equipment and minor network quality or even a lack of electricity supply. Often these people would benefit most from mGov solutions and, at least, the possibility to connect with the government. Only by reaching them can the full potential of mGov be exploited to good effect.

### 2.2.3 Price and Affordability

**It is still costly for the poor to connect to a broadband network.** The cost of active mobile broadband subscription varies drastically depending on the specific region. While expenses for European citizens are less than one percent, African citizens face costs of almost 12 percent of their gross national income (Figure 2.8). A mobile data and voice low-consumption package costs more than 30 percent of an average income in African countries like Niger and Central African Republic (ITU 2022). Mobile broadband subscriptions can therefore not be assumed as standard when implementing mGov solutions in developing countries.

> > >  
**FIGURE 2.8 - Average Costs of Data Services**



Source: World Bank 2021.



**Affordable devices with extended features are rare.** For those living below \$2 per day, a \$100 handset accounts for 14 percent or more of annual income. More affordable phones would be more suitable. While in high-income-countries 73 percent of devices are 4G or 5G smartphones, in Sub-Saharan Africa these make up only 12 percent as shown in Figure 2.9

(GSMA 2021). High-end smartphones can thus not be taken for granted even in technologically advanced countries. In developing countries, dedicated device ownership cannot be assumed at all, since only community phones might be available. Furthermore, only simple channels like voice and text messages might be available.

> > >

**FIGURE 2.9 - Mobile Connections by Device Type for High-Income Countries and LMICs (by Region), 2020**



Source: GSMA 2021.

### 2.2.4 Trust and Information Security

**The variety of user needs makes it difficult to find the right balance between a good level of trust and high usability.** Often, people do not trust digital solutions and prefer to physically visit office buildings. Moreover, mobile devices are very personal items and many people do not want to provide their data through mobile phones due to the fear

that the government will use it for unintended purposes (Eibl, Lampoltshammer and Temple 2022). Others are willing to share data if they get high quality, easy-to-use public services in return, and would be irritated by heavy security features. However, since security incidents regarding personal data can seriously harm trust in digital public services and the government, information security is of key importance.





**A robust level of information security is complex to establish and maintain.** Weaknesses in the cybersecurity of digital government systems can lead to data breaches or abusive use. Shared information security services like certificates or encryption are often missing. Also, older mobile network infrastructures and mobile devices often carry security weaknesses and can severely harm trust in mGov services. A lack of understanding of secure technologies and skills to solve challenges in architecture and implementation can harm trust in digital services.

### 2.2.5 User-Friendly Design

**A holistic service design approach is necessary to provide user-centered mGov applications with a high usability and accessibility.** Traditional digital design and implementation frameworks are still widely used in developed as well as developing countries but do not fulfill the needs of modern digital service delivery. Highly accepted mobile solutions can hardly be achieved without the capabilities to follow a human-centered service design approach, end-to-end process view, and up-to-date user experience principles.

**To reach as many people as possible, mobile solutions need to consider small and simple screens and cover**

**the user needs in any aspect, including language requirements.** While traditional eGovernment websites are usually text-intensive, information and forms might not be suitable for the limited size of mobile phones, especially button-based phones. Form factor aspects thus need to be considered (see Chapter 5.1.3). While local dialects of citizens in various regions of a country may be highly diverse, apps often cover one official language only. Implementing apps that contain two or more languages can be both a technical and a resource challenge (see Chapter 5.1.4).

**Efficiency of backend processes in core government operations is often not sufficient to provide responsive solutions.** The best mobile government apps and interfaces are of no use, if transactions are not carried out in a timely and high-quality manner. The number of requests may multiply as a result of reaching a higher number of people with mGov services. If the backend processes of governments are not streamlined, simplified, and digitized, governments may not be able to cope with the number of inquiries and the potential of mobile service delivery would remain suboptimal.

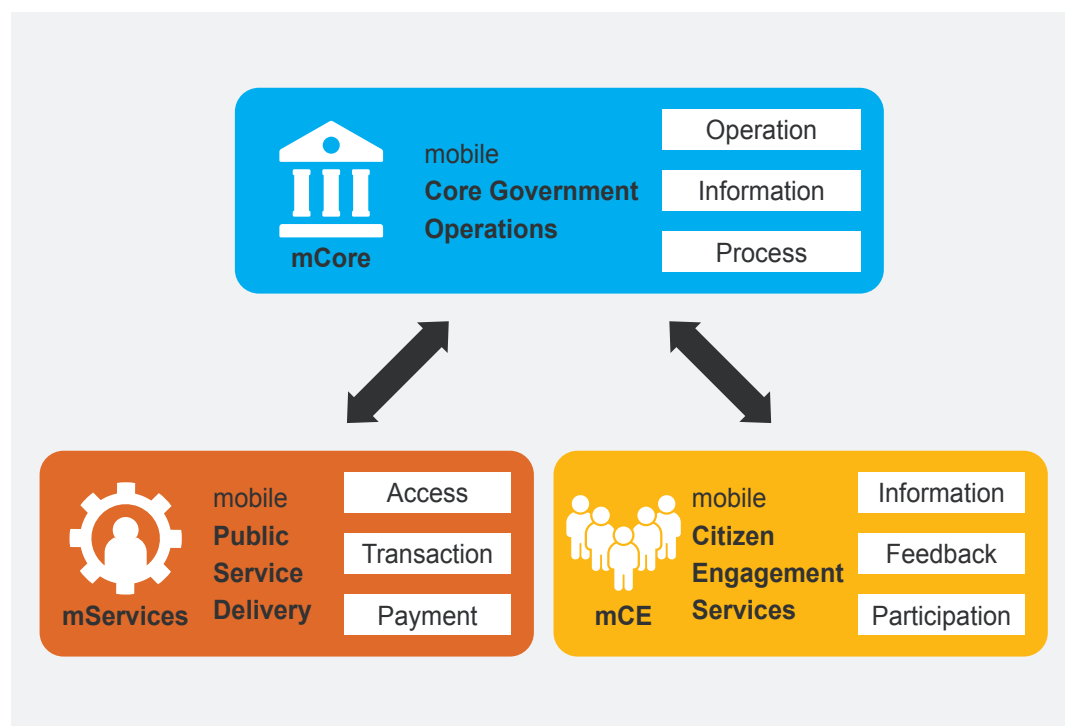


## Potential Use Cases

The opportunities outlined in the last chapter can be realized in a vast variety of use cases. This chapter presents potential use cases and examples in three focus areas of GovTech: core government operations, public service delivery, and citizen engagement, as shown in Figure 3.1.

> > >

FIGURE 3.1 - Overview and Categories of Potential mGov Solutions




Source: Authors.

## 3.1 Core Government Operations

Mobile government solutions can provide support in many areas of government operations, be it between entities (G2G), their employees (G2E), or by providing the foundation like digital identity for efficient public service delivery to people (G2P). The solutions can assist public officials in their daily operations and also improve

organizational efficiency and accountability, maximize limited resources, and enhance the quality of service to citizens with special benefits for field staff (OECD & ITU 2011). In addition, digital mobile identity can be a key element of efficient core government systems as described in chapters 2.1.1 and 5.2.1 as well as Use Case Briefs 1, 2, and 6.

Use Case Brief	1. Mobile identity using hybrid keys in Moldova
Strategic Context and Challenge	Moldova has recently had advancements in digital identity and digital signature uptake, but it is still low. Current issues include costs that need to be paid by citizens, not being adequate for occasional use, and the need to carry a specialized physical device or replace the mobile SIM, which in some cases requires two office visits to obtain the qualified signature.
Solution	<p>The mobile app, MobiSign, implemented by the E-Governance Agency of Moldova provides citizens with an easy and secure means to identify, authenticate, and sign documents in any system in public or private institutions. It is leveraging common advanced security features of modern mobile phones and operating systems, such as built-in application isolation, a strong random number generation, and biometry features (face or fingerprint identification) to implement a hybrid secure scheme for authentication and signature. The solution requires the use of two private keys for each transaction, one being generated and partially stored on user's mobile phone and another managed in a Hardware Secure Module (HSM) operated by the service provider. By keeping a part of the private key encrypted and under exclusive control of the user, the service provider is not able to impersonate the user while there is no way to clone the key or to guess the user's PIN offline.</p> 
Results and Benefits	Offering users a qualified mobile identity without requiring a special device on their side simplifies logistics and reduces the registration process to one agency visit. The efficiency of the implemented solution enables the government to offer it for free. QR code usage during a transaction replaces user inputs during authentication and simplified signature by entering a PIN code only.
Learnings	Digital identity solutions that are easy and free to use for citizens can act as enablers for mGov. Experiencing such a solution and its usefulness increases user acceptance and provides inspiration for further advancement.
Relevance	Most relevant for countries with an advanced or very advanced digital development.

**Mobile solutions can support the daily operative work of public officials in the field.** Mobile devices can be used while on inspection of schools, building sites, or businesses to prevent redundant information collection, minimizing bureaucratic effort. Officials can use automated translation apps to communicate with people that speak a local dialect. Police officers can generate crime scene reports on-site and enrich textual documentation with image and video. They can also scan and process vehicle and driver's licenses in traffic checks. A case study in the United Kingdom showed that roadside checks were carried out 66 percent quicker with

mobile support, saving 14,000 hours for the police officers involved (UK Driver and Vehicle Licensing Agency 2021). Official as well as private entities can verify the legality of official digital documents as in Switzerland's JuraVerifier (Figure 3.2), which checks documents tamper-proof via a trusted app and a QR code. Mobile data can also be used to better coordinate police forces, rescue workers, or firefighting units in emergency management. Finally, as implemented in Austria, augmented reality apps can support field operations like customs control by showing potential hiding places in cars or lorries.

> > >

**FIGURE 3.2 - Mobile Document Verification in Switzerland**



### > Vérification de l'authenticité des documents émis par la République et Canton du Jura

Cette application permet de vérifier l'authenticité d'un document (numérique ou papier) contenant un QR-Code sécurisé émis par la République et Canton du Jura.



**Vérification universelle et indépendante**


**Quick intuitive interactions via mobile can make back-office tasks more efficient.** By providing mobile channels, public officials can quickly access knowledge bases anywhere, anytime in any operational area, be it in public financial management, human resource management, tax administration, public procurement, or public investment management. Mobile apps can also provide access to digital filing systems to quickly execute tasks or approve acts. Secure messaging systems between public officials can provide an easy way to interact and provide a means for asynchronous decision making, for example, for urgent decisions of the council of ministers. Simplifying government internal support processes can increase efficiency as well as employee satisfaction. Mobile phones can be used to quickly register and approve time records or to request and confirm business trips or leaves in human resource processes. Asset management can be supported by using mobile devices for the registration of furniture, hardware, or utilities.

**Mobile data can support well-informed decisions to facilitate efficient and accountable government operations.** Data from mobile devices can also be harvested, anonymized, and used for historic, real-time, and predictive analytics. Examples include managing traffic flow, tracking

and informing on road conditions, or predicting potential and manage present disasters such as panic in mass gatherings. Beside feedback by citizens (see Chapter 3.3), mobile-based feedback by officials in the field can be collected and considered, for example, about road damages, construction work deficits or about public services in schools or hospitals. Information can be used for dashboards and included in decision making processes. Analyzing context-specific information on mobile phones like location, date and time of pictures can improve the presence and spatial coverage of health inspectors, agriculture extension workers or vaccinators (Z. Bhatti 2020).

### 3.2 Public Service Delivery

**By bringing public service directly to every person’s hands, governments can provide easy access for citizens (G2P) or businesses (G2B).** Mobile can provide information, transactions and simple payment solutions in comprehensive one-stop shops or e-wallets for all digital public services as seen in Use Case Brief 2 or in simpler apps for dedicated topics.

Use Case Brief	2. Providing personalized government one-stop services anywhere, anytime, in Austria	
Strategic Context and Challenge	Austria has for decades been a leader in digital government. To establish the next generation of digital services, a mobile app to access all services was developed. The project aimed to close the digital divide, improve participation opportunities for people in more remote areas of Austria and reduce traffic.	
Solution	<p>With its "Digitales Amt" (Digital Office) mobile app, the Austrian Federal Government promotes user-oriented access to public services and decision-making processes. The platform offers a range of features, including a time-saving residence registration process, a secure application process for voting cards and a digital 'Baby Point' to receive birth certificates via mobile, postal vote applications, a reminder service for passport renewal, pdf signature, theft reports, and many more. It includes secure identification via ID Austria according to up-to-date EU frameworks and delivers integration, with all digital public services, be it for justice, taxes, social insurance, or businesses. The associated eAusweise (electronic ID) app acts as a quick and easy way to show a driver's license using a smartphone. Citizens can use it if they are stopped by the police, or in any other situation where they might need it. The system allows them to share your driving license data at the touch of a button using contactless technology. In the future, they will be able to use the same app to present other types of paperwork electronically.</p> 	
Results and Benefits	The 3.4 million active mobile eIDs in Austria act as a large user base for digital government. The app was downloaded 1.1 million times. The project ensures non-discriminatory access to public services and is in line with the underlying concept of "leaving no one behind."	

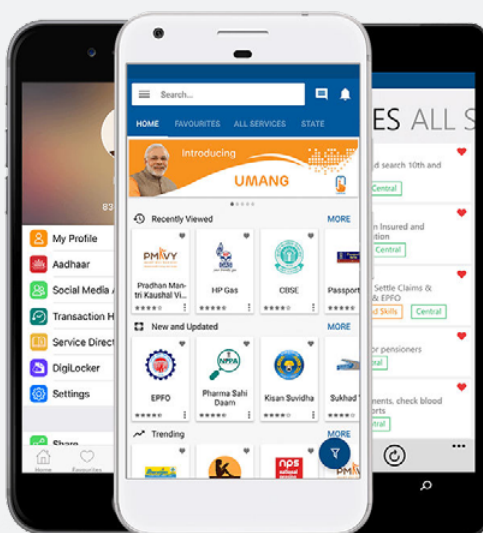
Use Case Brief	2. Providing personalized government one-stop services anywhere, anytime, in Austria
Learnings	The best way to reach citizens is to offer personalized, pro-active, multiagency digital and mobile services, in which users can handle their administrative businesses in an intuitive and formless way and with little interaction (one-stop and no-stop shop).
Relevance	Most relevant for countries with advanced or very advanced digital development.

**Quick wins can be achieved through providing information and answering simple requests on mobile phones, often by using existing elements of digital government.** Most governments today operate web-based portals that at least contain basic information on public services. By providing this information in a way that is easily readable on mobile devices, citizens can, for example, organize an efficient physical visit to an agency, being informed of opening hours or documents and forms to bring. More advanced systems can allow the user to order copies of official documents like birth certificates, residence registration or a certificate of citizenship, or to track the status of certain applications or legal matters. The Dubai government's DubaiNow App offers more than 55 smart services. India's Unified Mobile Application for New-

Age Governance (UMANG), Figure 3.3, is an example of an all-in-one secure multichannel, multiplatform, multilingual, multiservice, freeware mobile app for accessing more than 2,000 central and state government services (World Bank 2021). Taking a mobile-first approach, Bangladesh has developed a mobile app version of its national e-Government portal called MyGov. In addition, to address the feature phone segment – citizens with low literacy and familiarity with technology – an Interactive Voice Response (IVR) based voice platform '333' for service delivery is present where citizens can call for instant assistance. To date, 230 million calls have been served with information service and grievances – see also Use Case Brief 3.

> > >

**FIGURE 3.3 - India's Unified Mobile Application for New-Age Governance**




Source: <https://www.fonearena.com/blog/235796/pm-modi-launches-umang-one-app-to-avail-all-government-services.html>



Use Case Brief	3. Accessing the land records and carrying out mobile payments in Bangladesh
Strategic Context and Challenge	<p>Land Records, “Porcha” or Record of Right (RoR) is a legal document for identifying land relating to land tenure and ownership that is determined by the possession survey and land development tax assessment. Landowners regularly faced hassle and bureaucratic complexities to find physical papers of Porcha that often exacerbated disputes in landownership and required several visits to the local land offices.</p>
Solution	<p>As part of the Digital Bangladesh and SMART Bangladesh initiatives, the government of the People’s Republic of Bangladesh simplified, digitized, and thus transformed a number of services. The most notable is “e-Porcha” - an online land record service where Bangladeshi citizens can conveniently find land ownership records and collect any land-related information anytime from anywhere in the world. e-Porcha also provides certified copies of documents via postal and courier services for a nominal fee. Not only does this expedite the process and enhance transparency, but it also reduces the time, cost, and number of visits required of citizens to travel to offices to follow-up, complete, and collect paperwork. Now it is all electronic and hassle-free.</p>  <p>The Bangladesh mobile network has an impressive 98 percent geo-coverage of which 48 percent mobile phone users are using smartphones. Smartphone users can avail e-Porcha service through the website (eporcha.gov.bd), the mobile app (MyGov) and through third party applications such as the apps of all national mobile network operators (MNOs). Notably, the remaining 52 percent of the mobile phone users using feature phones are not left behind. They too can access the service by dialing a special short code number, or with the assistance of 9,000 Digital Centers – one-stop shops located at the village level within walking distance and run by youth entrepreneurs – across Bangladesh.</p> <p>In order to register with e-Porcha services, an applicant only needs to have a mobile phone number and national identification number. Users can complete payments through digital banking systems or even mobile money. More recently, the government added mobile direct/carrier billing to this service to increase accessibility so that marginal populations can also pay for the services using a mobile airtime wallet.</p>
Results and Benefits	<p>To date, over 3.5 million users have visited the portal, of whom 69 percent availed land-related services from e-Porcha. It is visited daily by nearly 26,000 users.</p>
Learnings	<p>Multimodal and assisted approach makes e-services more inclusive. A flexible payment system along with a flexible authentication process in the mGov core engine are the critical success factors.</p>
Relevance	<p>Most relevant for countries with a basic or advanced digital development</p>

**Mobile government holds immense potential for financial inclusion for poor populations without a bank account.** The phenomenal success of M-PESA in Kenya offers an example

of how the government could orchestrate a partnership among Central Bank, Telecom providers, and other stakeholders to deliver remarkable results as illustrated in Use Case Brief 4.

Use Case Brief	4. M-PESA: Convenient and easy digital payments through the mobile phones in Africa
Strategic Context and Challenge	<p>Fifty-seven percent of the population in Africa, around 95 million people, do not have a traditional bank account (Harrison 2021). However, 83 percent people in Sub-Saharan Africa (excluding high income earners) have mobile cellular subscriptions (data.worldbank.org). Poor populations without a bank account but a mobile payment account can enhance financial inclusion and facilitate social welfare payments to improve their opportunities in life.</p>
Solution	<p>M-PESA is an SMS-based system that enables users to deposit, send and withdraw funds using their mobile phone. Customers do not need to have a bank account, and can transact at any of the country's 40,000 agent outlets. Customers register for the service at authorised agents – often small mobile phone stores or other retailers such as barbers, butchers, bakers– and then deposit cash in exchange for electronic money. Customers can then send money to their family or friends throughout the country.</p>  <p>Once they have registered, all transactions are completed securely by entering a PIN number and both parties receive an SMS confirming the amount that has been transferred. The recipient receives the electronic money in real-time and then redeems it for cash by visiting another agent. Alternatively, they can spend it at an M-PESA merchant. Registration and deposits are free and pricing for most other transactions is based on a tiered structure to allow even the lowest-income users to use the system. Transaction values are typically small, ranging from US\$5 to US\$30. M-PESA grew at a blistering pace following its inception in 2007. In less than two years from its launch, M-PESA had become the leading money transfer method in the country.</p> <p>M-PESA is a mobile money service that was officially launched in March 2007 by Safaricom, the leading mobile phone operator in Kenya. Safaricom formed strategic partnerships with organisations such as the Central Bank of Kenya, the Commercial Bank of Africa – for local banking services – and the ATM provider, Pesapoint, to establish ATMs throughout Kenya. The local microfinance company, Faulu, helped the company to launch the pilot. Additionally, Safaricom received funds from DFID in the UK through its Financial Deepening Challenge Fund, which was established to finance PPP projects that would improve access to financial services.</p> <p>The Kenyan government owns 35 percent of Safaricom and assisted Safaricom and Vodafone in establishing a strong relationship with the Central Bank, which was integral in getting the M-PESA deposits insured, as well as the regulatory approval. The Central Bank insures M-PESA deposits in the banking system under its Deposit Protection Fund. The government was actively committed to M-PESA and the Central Bank's post-audit endorsement of M-PESA was also a measure of political support.</p> <p>Sources: (Vodafone 2022); (Center for Public Impact 2016).</p>
Results and Benefits	<p>51 million Africans are making over \$314 billion in transactions per year through M-PESA, using more than 604,000 active agents operating across the Democratic Republic of Congo, Egypt, Ghana, Kenya, Lesotho, Mozambique, and Tanzania.</p>



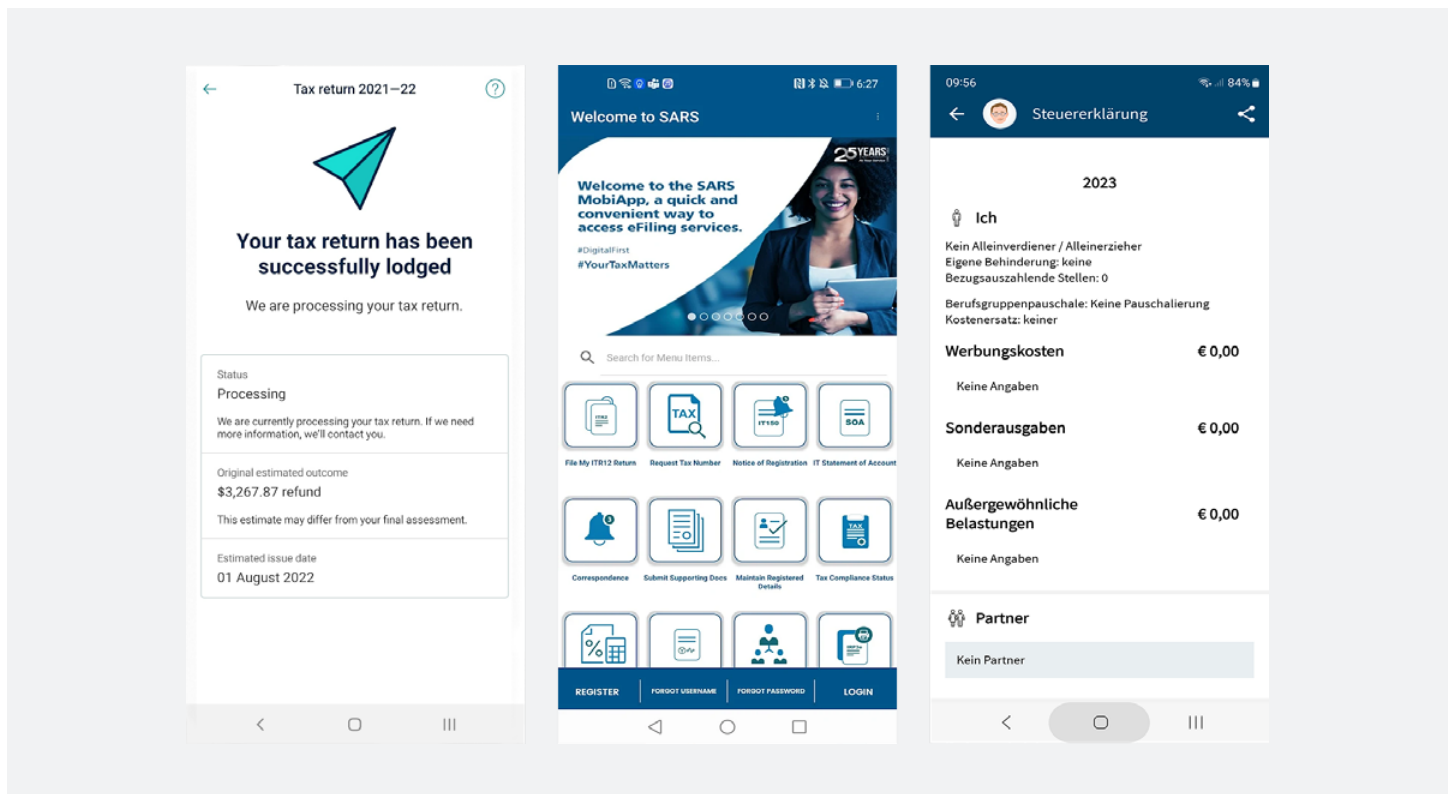
Use Case Brief	4. M-PESA: Convenient and easy digital payments through the mobile phones in Africa
Learnings	Government political commitment is key to success. Public-private partnership holds the potential to substantially impact the digital and financial inclusion agenda. The role of the telecom providers and the Central Bank, orchestrated by the Government, could make a big difference on mGov.
Relevance	Most relevant for countries with a basic or advanced digital development.

**Beyond simple requests, binding transactions can eliminate the necessity for citizens to physically visit agency offices and be the basis for payments.** Citizens can carry out two-way-interactions like registering a newborn child, changing their address, or registering unemployment with their mobile phones. They can apply for social benefits like basic income grants or food coupons and carry out simple tax declarations or confirmations. For example, in South Africa, citizens can use the “SARS MobiApp” to review their automated tax assessment and carry out payments.


Australia’s “ATO App” and the Austrian “FinanzOnline [+]” provide a similar approach. An area especially relevant for developing countries is to provide welfare payments through mobile accounts – see Chapter 2.1.2 and Use Case Brief 5. Even if transactions are not carried out directly on mobile phones, they can be used to confirm receipt of payments and prevent corruption. A pilot among 1.3 million farmers in India showed 7.8 percent reduction in the number of beneficiaries who did not receive their benefits and an increase of 1 million USD delivered to farmers (Muralidharan, et al. 2021).

> > >

**FIGURE 3.4 - Examples for Tax Filing Apps in Australia, South Africa, and Austria**



Source: Google Play, Authors.

Use Case Brief	5. Providing maternal and child cash transfers via mobile phones in Myanmar
Strategic Context and Challenge	People throughout Myanmar suffer from difficulties in accessing basic services and infrastructure. The objective of the project is to improve nutritional outcomes for mothers and children during the first critical 1,000 days of life.
Solution	<p>The solution was implemented on open-source basis, minimizing costs. An agile approach and iterative process was used to continuously incorporate feedback directly from the users. The digital tools provided an end-to-end solution for mother and child nutrition field data collection, analysis, and registration for the program. The use of smartphones has improved efficiency and introduced the prospect of collecting new forms of data that would not be possible through the traditional paper-based collection or use of digital spreadsheets. This includes the ability to collect geo-referenced inputs and photos at virtually no extra cost. For example, monitoring of payment conditions (like hospital visits) and key project-related outcomes (like children's weight) can now be directly monitored, confirmed, and linked to the beneficiary's profile supported by the new digital workflow.</p> 
Results and Benefits	Each of the over 250,000 beneficiaries were eligible to receive 15,000 Kyat per month (around \$10 at the time of the intervention). The proportion of children receiving a minimum acceptable diet increased by over 30 percentage points when the combined package of cash and intensive Social Behavioral Change Communication was provided, increasing from 9.9 percent of children to 41.7 percent.
Learnings	A combination of low-tech smartphones, open source tools like ODK, and web dashboards can jumpstart digital workflows and create value for government processes. Including stakeholders was essential for user-centric design (Bhatti et al. 2021).
Relevance	Most relevant for countries with a basic or advanced digital development.

**Integrating related services of the public or private sector can provide synergy and mutually push penetration.**


Cooperation with local businesses or social organizations can enrich public services and provide holistic solutions around life events. Italy's "IO App" described in Use Case Brief 6 combines public services with payment, discounts, refunds, and the promotion of certain activities like sports and cultural events. The Republic of Korea increased access to public services through diversifying service delivery channels

using a private-public-partnership model (World Bank 2022). All-inclusive life event solutions can bring a multiple value proposition to citizens and significantly increase the individual benefit and general penetration. For example, when registering a new resident, nearby institutions or related services like car registration or insurance could be offered. Citizens could also use their official information to interact with private entities, for example, by sharing documents or specific relevant data to verify the minimum age.

Use Case Brief	6. Digitizing the Italian public sector through a unique, citizen-centered mobile application
Strategic Context and Challenge	In the highly fragmented scenario of 23,000+ entities in the Italian administration, and diverse communication channels, procedures, and touchpoints for citizen services, the main goal was to develop a centralized ecosystem of interoperating, user-centered digital platforms aimed at simplifying the relationship between the State, citizens, and businesses.
Solution	<p>PagoPA, a state-owned enterprise founded in 2019 with the mission to spread a new generation of digital public services with payments and a mobile first strategy as cornerstones of the digital turnaround in the public sector, launched “IO,” the app for Italian public services (io.italia.it) in April 2020. This serves as a single channel through which all local and national authorities (municipalities, regions, central agencies) can offer their services to citizens in a simple and personalized way, based on the user’s needs and preferences, directly on their smartphones or tablets. The IO app is designed to interoperate with all the digital infrastructures realized by PagoPA. It integrates the enabling platforms for the PA’s digital transition – the national digital identity system, the central platform for electronic payments pagoPA, the single national registry – and therefore represents the official mobile access point to all digital public services. For example, public bodies can send reminders to taxpayers about due amounts related to a specific service and citizens can directly pay the amount via the app.</p> 
Results and Benefits	IO has been downloaded over 30 million times, with 6 million active users each month. Over 7,100 public entities like schools, transport institutions, and registry offices are offering 88,000 services and receive 10,000 payments for public administrations daily. It allows administrations to redesign their processes to digitally cover every moment of the “public service lifecycle” and eliminate duplication and complexity according to the once-only principle.
Learnings	In the public sector, initiatives that work are those that manage to involve everyone. A mobile-first, user-centered approach is helping to spread new digital habits, including payments, among citizens, regardless to their age, skills, or social status, thanks mainly to a simple user experience (UX) and interface.
Relevance	Most relevant for countries with an advanced or very advanced digital development.

**Solutions that were implemented to support the management of the COVID pandemic could be extended to other health-related fields.** During the COVID pandemic, many countries implemented apps to verify tests and vaccination status, or to track if citizens had been in contact with infected people. These apps could be extended, for example, to general electronic vaccination registers, to create awareness for health-issues, to virtual consultations for diagnosis, treatment, and communication, or to support

administrative tasks like reimbursement applications. Since health-related data is highly sensitive, information security aspects need to be closely considered. The immense penetration of these apps also raises the potential of using it for other public services and matters. This option, however, needs to be viewed with caution, since linking sensitive health data to other governmental service data would in all probability be seen as a breach of trust – see also Chapter 2.2.4.

Use Case Brief	7. Identification and authentication of farmers and optimization of agricultural resource usage in Bangladesh
Strategic Context and Challenge	Agriculture contributes 12 percent of Bangladesh overall GDP. The government of Bangladesh is committed to continuing agricultural development in order to meet the growing population's food needs, provide income and employment for rural residents, and protect the environment.
Solution	<p>The mission of the Department of Agricultural Extension (DAE) is to provide efficient and effective needs-based extension services to all categories of farmers in order to optimize resource use and promote sustainable agricultural and socioeconomic development. In order to achieve this, DAE, with the help of the a2i Programme of the Government of Bangladesh developed an Interactive Voice Response (IVR) system for farmer's assistance that can be availed by dialing 3331. Bangladesh has 8.6 million registered farmers, authenticated by the use of mobile phone numbers.</p>  <p>By simply dialing 3331, farmers receive direct assistance from one of the 15,000 Sub Assistant Field Officers. The database of the system is mapped to directly connect farmers to a field officer of the respective. Unanswered calls are automatically re-routed to next level supervisors. The system also generates regular reporting on the field activities. In addition to this, Bangladesh aims to establish 15,000 village level service points to assist nationwide farmers. Here they will get cold storage support, financial inclusion support, supply chain support, produce transportation support, and connect directly with consumers through an assisted e-commerce platform. A Big Data platform is underway to take off originating data from 3331.</p>
Results and Benefits	The platform, which is powered by mobile number authentication, links farmers directly to field agriculture officers and significantly reduces time, cost, and visits required to receive a service.
Learnings	Better outcomes can be obtained when using an assisted model supported by data analytics and digital m-web based support modules.
Relevance	Most relevant for countries with a basic or advanced digital development

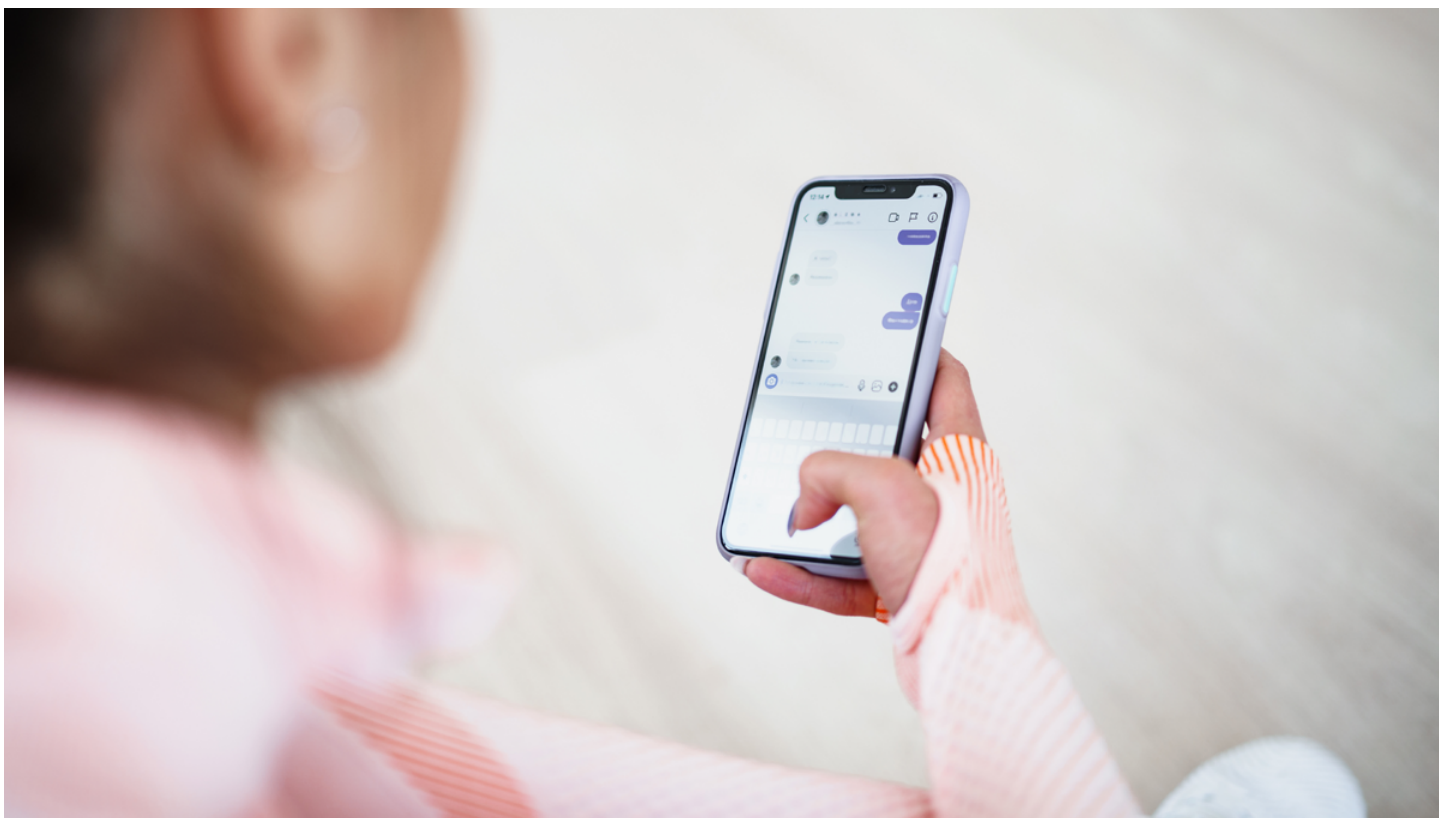
**There are many more relevant areas for mobile solutions in government-related areas.** Relevant areas directly or indirectly related to government are health, agriculture, education, crisis prevention and recovery, environment, and

energy, as shown in many publications (for example, UNDP 2012) and Use Case Brief 7 above, which presents a detailed example including identification in agriculture.

## Sector-Specific Use Cases in a Development Context

Health	<b>Fight against Dengue</b>	Fighting dengue by providing sanitary workers with smartphones and monitoring geo-tagged activities of spraying swamps in Pakistan.
	<b>Supply of Clean Water</b>	Proactively identifying defective water hand pumps and monitoring the repair status via SMS in India and Uganda.
	<b>Targeted Health Care Information</b>	Addressing health challenges via SMS including awareness about clean drinking water, birth control, maternal health, stunted growth, food supply, emergencies, and other primary health care services.
	<b>Pregnancy Care Video Training</b>	Training female community health workers and families with videos on childbirth, care of newborns, and breastfeeding in Somalia ( <a href="http://www.globalhealthmedia.org">www.globalhealthmedia.org</a> ).
	<b>Continuing Professional Development</b>	Closing gaps in clinical knowledge among primary care physicians geographically dispersed across the country with a mobile ready learning management system in the Kyrgyz Republic.
	<b>Pregnancy Health Tracking</b>	Making sure that pregnant women get regular treatment, recognizing warning signs, and helping them to reach health centers in critical situations in Rwanda (RapidPro).
Agriculture	<b>Market Pricing Support Dengue</b>	Empowering farmers to make more informed market pricing decisions and ultimately more successful farming in India, China, Malaysia, Uganda, and Rwanda (eSoko - <a href="http://www.esoko.gov.rw">www.esoko.gov.rw</a> ).
	<b>Farmer Video Training</b>	Training farmers in sustainable agriculture and nutrition practices in India and Ethiopia ( <a href="http://www.digitalgreen.org">www.digitalgreen.org</a> ).
	<b>Harvest Coordination</b>	Raising sugar production by coordinating farmers with sugar mills via SMS in Bangladesh (ePurjee).
	<b>Targeted Danger Alerts</b>	Broadcasting early alerts on drought, food shortages, pests, and weather-related calamities in Ethiopia and Uganda.
	<b>Animal Health Monitoring</b>	Helping shepherds and farmers to monitor the health of their animals and optimize production systems using regenerative practices via SMS in Kenya ( <a href="http://icow.co.ke">icow.co.ke</a> ).
Education	<b>Digital Learning in Disconnected Areas</b>	Providing eLearning courses to rural areas without broadband network and power supply in Rwanda, Togo, and Benin (atingi in a box, <a href="http://www.atingi.org">www.atingi.org</a> ).
	<b>Distribution of Reading Material</b>	Making books available to people without access to libraries and reading stories to children from mobile phones in Nigeria, Uganda, Zimbabwe, and Pakistan ( <a href="http://www.worldreader.org">www.worldreader.org</a> ).
	Multi-Language Learning on Simple Phones	Participating in education anywhere by accessing class notes, resources, exercises, and quizzes in local languages in South Africa (M-Thuto).
	Education Community Management	Collecting data to mobilize the education community, track distribution of educational material, and monitor attendance in Peru, or to monitor curriculums and student assessment, and receipt of salary in Afghanistan (EduTrac).





### 3.3 Citizen Engagement

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**Citizen Engagement services can in all forms be supported by mobile and are typically oriented to citizens (G2P).** In selected cases, they may also include businesses (G2B) or government employees (G2E). There are many kinds of existing use cases, including informational, feedback, and participatory services.

**Information services can provide governmental news and data of individual relevance for citizens.** Information can be distributed as push- or pull-oriented via Short Message Service (SMS) or similar messaging channels and social media platforms. Messages usually contain static information specifically targeted to the recipient and enable real-time communication to citizens, for example, warnings on potential

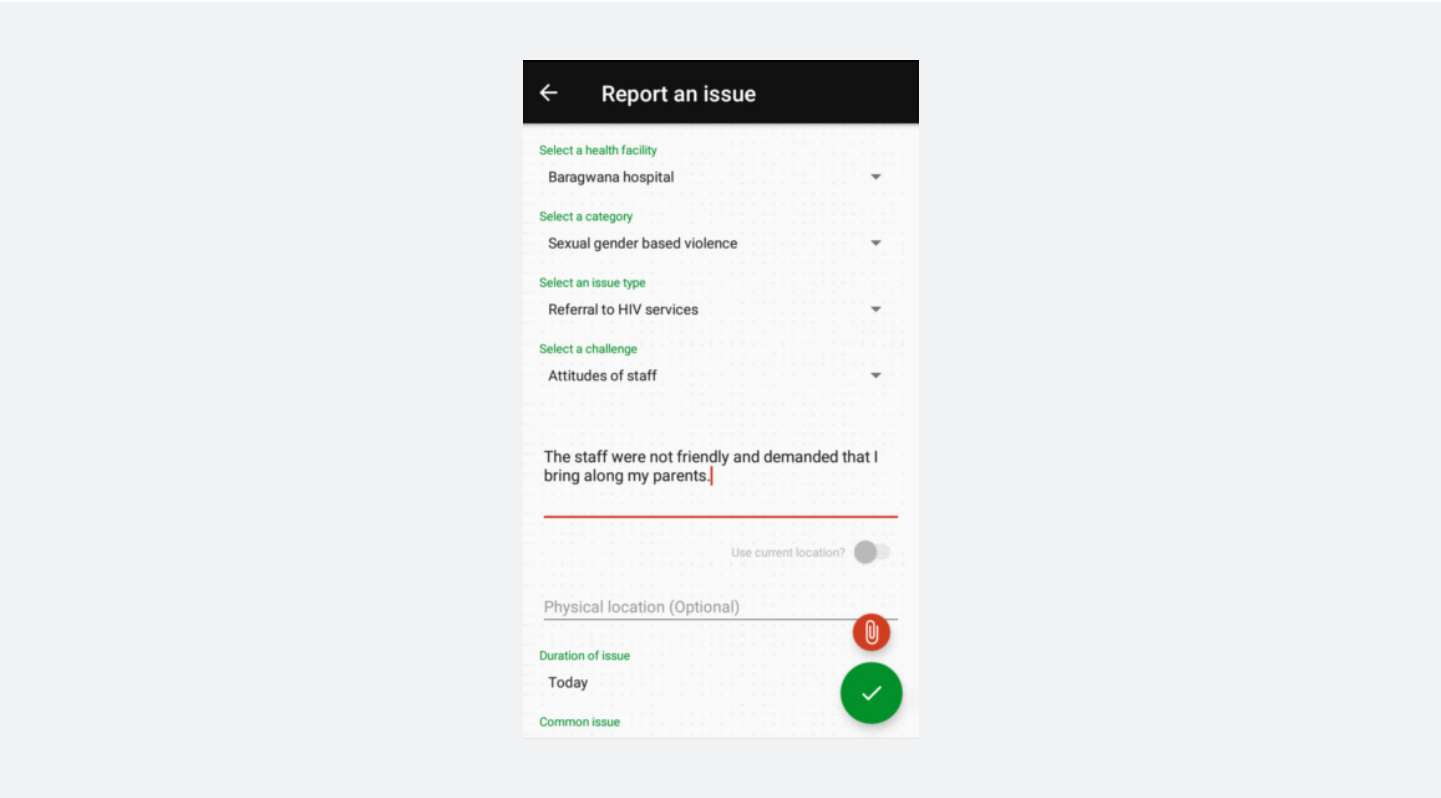
disasters, emergency and terrorism alerts, accidents, emergency locations. By simply calling the number 1294, people in Cambodia can sign up to get early warnings in advance of natural hazards like flooding by a system based on open-source framework RapidPro. Citizens can also receive case-specific information on agency locations, hours, and contact numbers, or reminders on passport renewal and tax declaration. A case study in Madagascar showed that the payments from late-income-tax filers increased from 7.2 percent to 9.8 percent by simply sending them a reminder via SMS. For every dollar spent sending text messages, the tax authority collected an additional 329 dollars in revenues (Peixoto et al. 2019).

**Feedback services enable citizens to get in contact with the government and initiate interactions.** Citizens can use various channels like messaging, voice, social media, dedicated apps, and forms to inform responsible agencies on relevant questions, problems, comments. They can enrich textual information by using a great range of mobile device functionality like GPS, photos, and videos; they can also result in a dialogue between citizens and government officials. A low-threshold messaging help desk can provide assistance for accessing public services. Citizens can also report incidents like crime, accidents, or suspicious activity and public officials can get back to them for further inquiry. By facilitating the means to get in touch with people at risk, solutions can initiate help for individuals, for example, around gender-related violence as implemented in Argentina or the “I am Nirbhaya” initiative in India. Citizen reports can also be useful in the case of disasters. The global not-for-profit and open-source platform, Ushaidi, was used to provide 40,000 reports – including 117 reports of trapped people and 2,730 reports of water shortage – after the 2010 Haiti earthquake.

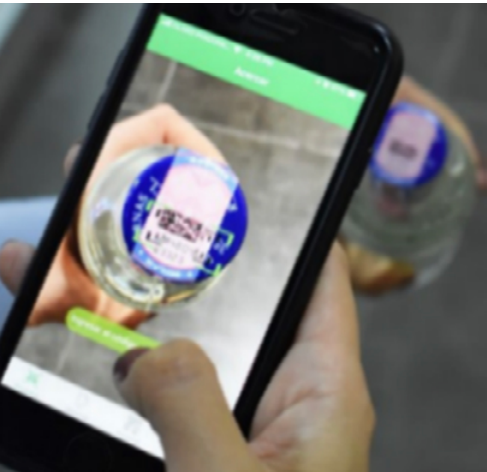
**Mobile phones can be used to report problems, for example, related to public infrastructure (road damages, pollution) and illicit trade of products.** In South Africa, citizen feedback is proactively collected to fix issues in local government like inadequate water pressure. The MobiSAM App (Figure 3.5) is an example of a social accountability and monitoring platform. In Nigeria, citizens can identify nearby public infrastructure projects, upload photos, and add comments. In Ghana, the government proactively reaches out for feedback by text messages and automated calls to improve public service delivery. Solutions can also check if products are imported legally and tax-conform as done by the Dominican Republic, where the REVISAME app empowers citizens to verify the compliance of products and report anomalies to the tax authority as described in Use Case Brief 8. Even without smartphones, simple messaging systems like SMS can be used to collect respective information.

> > >

**FIGURE 3.5 - South African Social Accountability and Monitoring Platform MobiSAM**



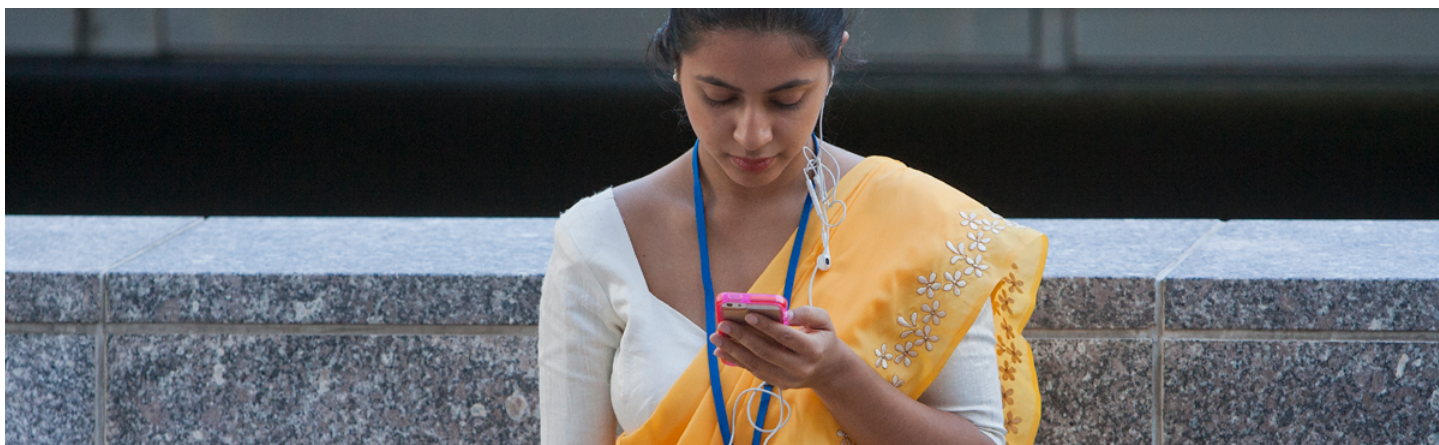
Source: Google Play.

Use Case Brief	8. Verifying compliance of products in in the Dominican Republic	
Strategic Context and Challenge	A high number of illegally produced or imported products – for example, cigarettes and alcohol – harmful to citizen’s health, and for which no taxes were paid, circulate in the markets.	
Solution	<p>A comprehensive authentication tool that allows citizens to verify the legal origin of alcoholic beverages and cigarettes marketed in the Dominican Republic was implemented. It allows tracing the path from origin (production/import) to its destination (consumption). The tax authority (DGII) implemented a traceability system named TRAFICO on excisable products with a digital tax stamp and extended with an App, “Revisame” (“check me”). Citizens can scan the security features of the stamp – special ink, data matrix code, and unique alphanumeric code. In case of non-conformity, citizens are warned that the product may be illegitimate and unsafe to use. Citizens can report any anomaly to the tax authority, with GPS, photos, and text.</p> 	
Results and Benefits	The app currently counts 250,000 downloads and around 1.3 million product scans since 2019. The solution increased the compliance of excisable products circulating in the economy and of trust in the tax authority, protecting citizen’s health, and reducing unfair competition.	
Learnings	A high usage of the app is directly related to the support of information and awareness campaigns. Citizen engagement highly contributes to reduction in circulation of illicit products.	
Relevance	Relevant for countries with basic, advanced, and very advanced digital development.	

**Also, mGov solutions can address complaints regarding officials like violent behavior or bribery.** In Georgia, India, the Philippines, Uganda, and many other countries, governments are promoting the use of SMS to promote social accountability. A study involving 46 African countries has found that higher mobile phone penetration significantly correlates with lower levels of perceived corruption. The government of Pakistan, for example, is proactively collecting feedback on potential incidents, after issuing each of the

estimated 15,000 passports a day (Farooq and Kustor 2021). Between 2012 and 2018 in Pakistan over 25 million citizens have been contacted in a Citizen Feedback Programme. More than 40,000 corrective actions had been taken by the district officials (Associated Press of Pakistan 2018). Evaluation in 2014 has shown that more than 55 percent of citizens saw improvement in service delivery, 71 percent in staff attitude, and 63 percent in timeliness of service delivery (Masud 2014).



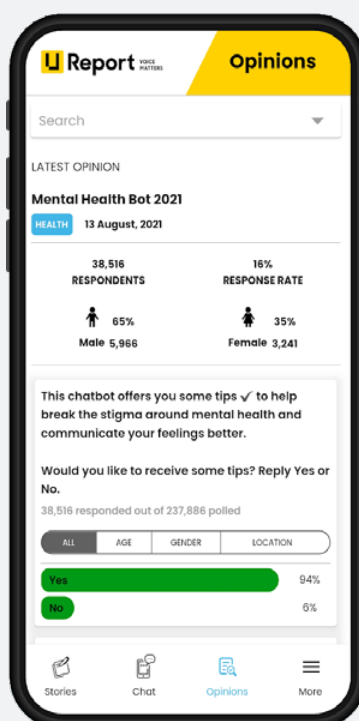


**Citizen participation can also capture citizens' views and improve public service design, policy making, and decisions.** Participation can play a major part in improving democratic processes and policies as well as public projects as seen in Use Case Brief 9. Through mobile, barriers to contribute can be knocked to a minimum. Surveys can provide a multiple perspectives on existing or new initiatives or policies. For example, UNICEF's open-source mobile messaging program U-Report (Figure 3.6), based on the RapidPro-toolset gives young people and their communities a voice on issues that matter to them and reaches over 6 million

reporters in 52 countries. Data collected is analyzed in real-time. Ideas gleaned are then applied to inform development work and amplified to advocate and inform positive change through decision making (UNICEF 2022). Interactive voice response (IVR) can include less literate populations by providing a recorded voice menu of options for callers to access information and provide survey feedback. Experience with IVR in humanitarian contexts was found in Afghanistan, Democratic Republic of the Congo, Haiti, Niger, Rwanda, and Somalia (Bolton 2018).

> > >


**FIGURE 3.6 - UNICEF's Participation App U-Report**



Source: Google Play.

**Beyond collecting opinions, mobile devices have the potential to support official democratic voting processes.** Citizens or election observers can report irregularities as implemented in Nigeria (UNDP 2012). Citizens can register or check their registration status in electoral registers and

location of their polling station via SMS. Governments can use mobile to gather information from polling stations and track the election process as done in India (Bhatti, Zall Kusek, and Verheijen 2015).

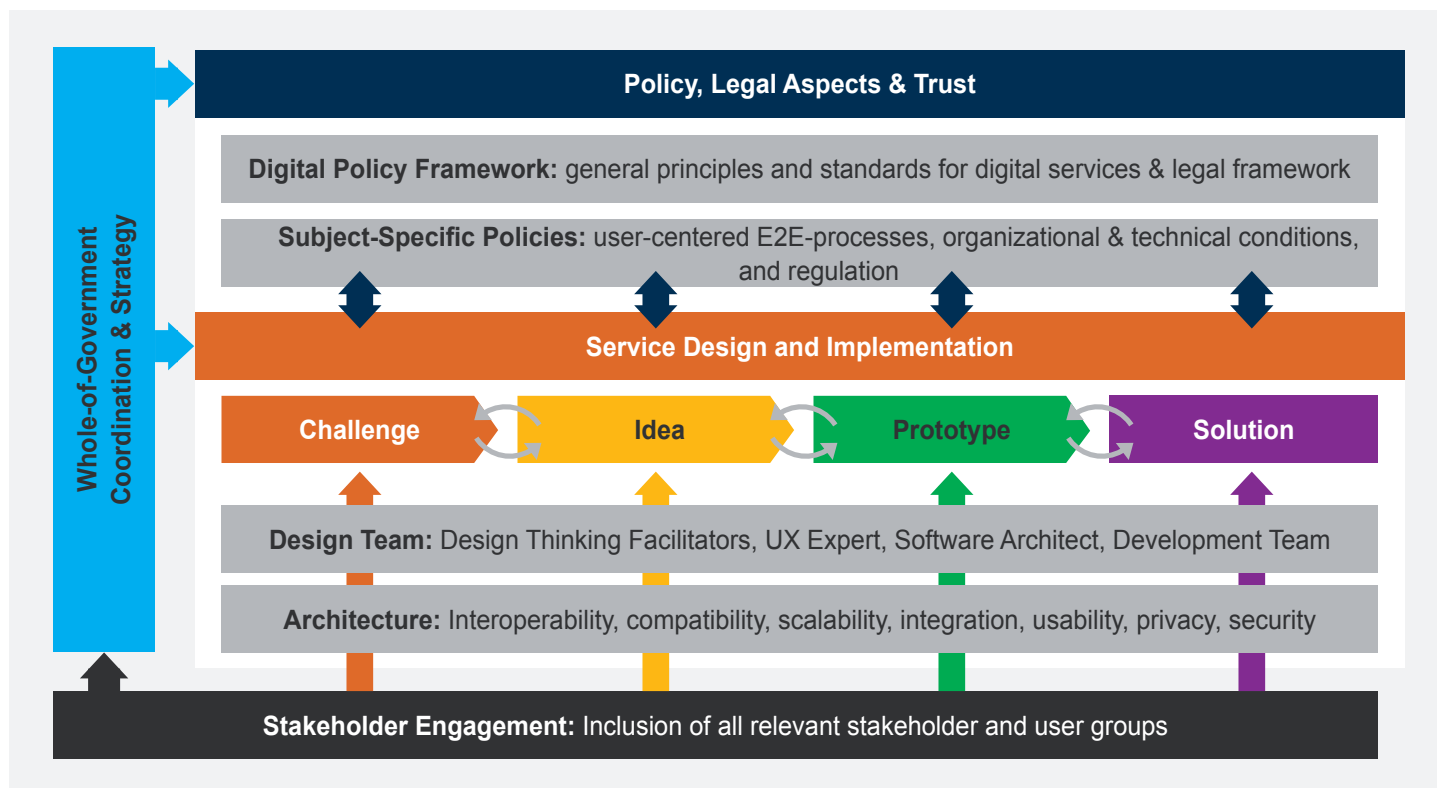
Use Case Brief	9. Monitoring public spending with an AI supported mobile solution in Nigeria	
Strategic Context and Challenge	The most important official channels are made available digitally and for mobile devices. The project aims to close the digital divide and improve participation opportunities for people in more remote areas.	
Solution	<p>The mobile app, DataCrowd, by Data Science Nigeria (DSN), is designed to collect quick and instant survey data, pictures and videos with geographical coordinates to monitor public spending and project progress in sample locations. A pilot based on the app covered 77 locations in the state and collected citizens' feedback. It does not only help to collect feedback, but to automatically extract most relevant information with AI-based mechanisms. DataCrowd can summarize text and sentences, such as citizens' feedback through mobile phones, and instantly shows the keywords and their relevance. Artificial intelligence (AI) mechanisms also serve to reject submissions made outside of a geofenced location, classify and match images, and analyze sentiments and opinions.</p>	
Results and Benefits	After initial positive results, the project is planned to scale up to cover three more states and about 350 locations.	
Learnings	Other digital technologies like AI can help to enrich mobile government solutions and shift its functionality to another level.	
Relevance	Relevant for countries with basic, advanced, and very advanced digital development.	



## Holistic User-Centered Approach

**A systematic, user-oriented, holistic approach enables efficient and sustainable mobile Government.** This chapter outlines such a framework to establish an mGov ecosystem as well as practical guidance to establish particular solutions. Figure 4.1 below gives an overview of the most relevant aspects. The foundation for sustainable mGov is a whole-of government coordination and digital transformation strategy – see Chapter 4.1. With this mandate, a dedicated agency responsible for digital transformation can issue a general digital policy framework with general requirements and standards. Subject-specific policies need to consider these and aim to facilitate user-centered end-to-end solutions (Chapter 4.2). Based on the most relevant social, citizen-oriented or administrative challenges, common concepts of human-centered design foster the design and implementation of sustainable mobile government. A design team can identify ideas to solve challenges with relevant stakeholders, develop concepts, prototypes and pilots, test them with users and finally roll out the solutions (Chapter 4.3).

**FIGURE 4.1 - Overview on Key Elements and A Systematic Approach to Introduce Efficient and Sustainable mGov**



Source: Authors.

## 4.1 Whole-of-Government Coordination and Strategy

Beside the opportunity to implement low-effort singular solutions with great impact, overarching coordination and strategy-setting efforts are the basis for sustainable mGov. An effective whole-of-government strategy embraces establishing digital foundations such as high-quality shared platforms, a decent mobile network infrastructure, affordable mobile phone subscriptions and devices, and basic digital skills. Efforts to establish and implement whole-of-government strategies might be a long-term initiative, but singular solutions can yet act as a starting point.

### 4.1.1 Cross-Agency Coordination

Overarching coordination boards or councils and a central digital agency enable cross-agency coordination for sustainable digital and mobile government. By reducing the fragmentation of administrative institutions and their activities, efficiency can be drastically increased in all dimensions of digital government, be they strategic, procedural, organizational, architectural, or technical. In Austria, for example, the umbrella brand for this cooperation is Platform

Digital Austria – “Plattform Digitales Österreich” (PDÖ) – established in 2005 to ensure cooperation between the federal government, states, cities, municipalities, and the economy. It represents Federal Government’s coordination and strategy committee for digitalization and eGovernment in Austria, with representatives of all relevant institutions (Ministry of Finance, Austria 2022). The governmental digitalization efforts of Austria are coordinated by a “Chief Digital Officer Taskforce” for strategic alignment between ministries at a federal level. To ensure cooperation between the federal government and state municipalities, a “Koop-BLSG committee” has also been established. Operative activities are horizontally and vertically aligned between chief information officers (CIOs) on federal, provincial and municipality level. The position of Chief Digital Officer was created in each agency to coordinate the agency-wide digitalization efforts. A central unit under the Ministry of Finance coordinates such alignments, prepares and issues a whole-of-government legal framework, and manages the implementation of cross-agency processes, architectures, and solutions.



A central competence center for digitalization, the Federal Computing Center (Bundesrechenzentrum, BRZ), drives the force of digital transformation in public administration. Formerly part of the Ministry of Finance, it is outsourced as a limited company fully owned by the government and is today one of Austria's major IT companies and the market-leading technology partner in the public sector. It delivers services to all federal ministries, supports the design of digital solutions and develops, implements, and operates IT applications and eGovernment solutions. In the UK, it is the Government Digital Service (GDS) under the Cabinet Office, and in Armenia, the e-Governance Infrastructure implementation unit EKENG works under the Prime Minister's Office. South Korea's Presidential Committee on the Fourth Industrial Revolution (PCFIR) provides another example of a convening platform for coordinating important policy matters on science and technology. In Armenia, a similar board has been established under the office of the Deputy Prime Minister, who is designated as the CIO of the government.

**A whole-of-government digital strategy that enables mGov sets leading principles and standards across all agencies.** Digital government transformation action plans should feature the overarching alignment of institutions, organizations, people, technology, data, and resources (UNDESA 2020). Although this may be challenging, coordinating across agencies is critical as it will reduce duplicative efforts. This

might be overwhelming in large federal countries, but even minimum standards can raise efficiency, lower costs, and improve interoperability. Citizens will be the ones who will have the most to gain with a more cohesive final product.

### 4.1.2 Strategy Development

**Developing and implementing a comprehensive strategy for digital government transformation will promote effective mGov.** The United Nations Department of Economic and Social Affairs (UNDESA) provides a thorough ecosystem approach for digital government transformation and advises to (1) carry out a context and situation analysis; (2) create a future vision; (3) develop a digital government transformation strategy and roadmap; and (4) implement, monitor, and evaluate services (UNDESA 2020).

**The local context, situation, and challenges of a country and its population need to be considered.** The immediate situation and context of each country is of essential relevance when selecting challenges that are to be addressed by mGov initiatives. Social, organizational, legislative and technological conditions are to be considered in all phases of planning and implementation. For a context and situation analysis, the World Bank has developed a comprehensive framework that contains Nine Pillars of Digital Government Readiness Assessment (World Bank 2020) – Figure 4.2.



**FIGURE 4.2 - Nine Pillars of Digital Government Readiness Assessment**

Source: World Bank, 2020.

**The GovTech Global Partnership of the World Bank has developed an approach to design and deliver a citizen-centric services reform program.** Stage 1 of the four-stage model is Rationalization, which includes planning the service reform. Stage 2 is Reengineering, which promotes efficiency through streamlining processes, re-engineering business processes, and eliminating unnecessary documents and data

requirements. Stage 3 is Digitization, focusing on the technical aspects of service delivery, including automation, integration, and interoperability. Stage 4 is Delivery, which focuses on inclusivity and quality, and includes the delivery mechanisms, user interface, quality and delivery standards, and continuous improvement (World Bank 2022).



**Many countries now set a mobile first strategy to the core of their digital transformation vision.** A broad process to define an overall vision for digital governments includes representatives of all relevant stakeholders like public agencies, citizens, and social organizations. Most people are now carrying out activities around all aspects in their lives with mobile phones. Thus, mGov will with high probability play a key part in a digital government transformation vision, mission, and strategy. Prioritizing front-end mobile channels for service application has many advantages. It protects users from direct interaction with the bureaucracy. It would also make the turnaround time between service request and service provision digital and thus easier to measure and monitor. This will enhance transparency and improve accountability for nonadherence with service standards which would, in turn exert pressure to accelerate backend automation. Many governments around the world, like in Bangladesh, Peru, and the United Arab Emirates, drive a mobile first strategy. European Union member countries embraced the paradigm shift from eGovernment to mGov based on the Berlin Declaration 2020, initiated during the Austrian Presidency of the EU Council, aiming to encourage inclusion and provide seamless, transparent, accessible, and user-friendly digital government services (European Union 2020). Guidelines to enforce mGov have, for example, been issued by Dubai and India, including guiding principles on usability, content, security, choice of channels, interoperability, and approaches for designing mobile apps (Isagah and Wimmer 2017).

**mGov-related development and rollout strategies can be shaped either bottom-up or top-down.** Large countries with high populations and heterogenous local structures often find it easier and more successful to drive a grassroot strategy, letting local mGov solutions emerge and rolling them out in a wider range when successful. Even smaller nations like Switzerland are following this path due to their federal structure. Bottom-up strategies can benefit from taking specific local challenges into focus as described in chapter 4.3.1, cooperating with local initiatives (Chapter 4.3.2), and from building on resulting success stories to establish more profound mGov. Countries in other contexts favor a top-down approach, providing central mGov solutions and rolling them out to the whole population. Central government one-stop shops and e-wallets have been established as a single digital point of access in many countries – Chapter 3.2 provides examples.

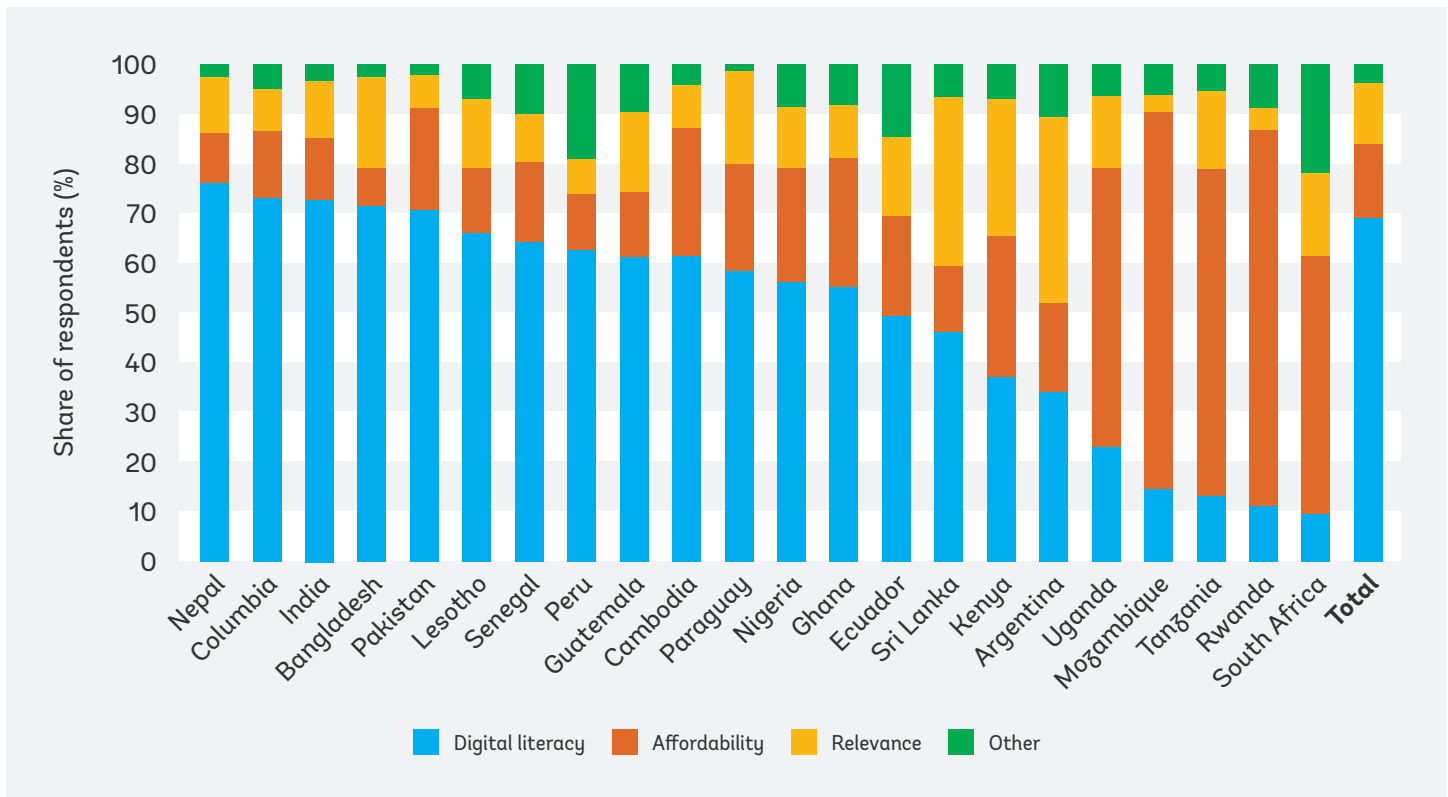
**mGov solutions can add benefit to existing initiatives and digital solutions.** Most successful mobile for development

implementation strategies are more evolutionary than revolutionary. Successful approaches are aligned with existing practices and often include embedding the mobile element into an ongoing development effort rather than creating the mobile service as the development effort itself (OECD & ITU 2011). Building a mobile interface for existing digital solutions can be done quite easily, for example, by providing a responsive web design of existing pages or information services to users via messaging channels like SMS. Providing such quick-win solutions can attract interest and resources for more comprehensive mGov initiatives.

### 4.1.3 Digital Foundations for mGov

**Establishing shared digital services is one essential strategic basis for efficient mGov.** While simple mGov solutions may not need a sophisticated central backend systems, most digital government initiatives can benefit from central high-quality GovTech platforms that facilitate elements like identification, strategic data management, portals, form services, workflow systems, knowledge and file management systems, enterprise buses, information security services, or digital signature solutions. Central databases with digital identifiers like people, places, and entities are the foundation for data-related solutions and the once-only principle. Budget (funding), skilled manpower for user-centered service design, efficient ICT architectures, and mobile service development are needed to assemble such platforms.

**A high-quality mobile network infrastructure is a prerequisite for successful mGov.** To reach as many people as possible, investments in secure and high-speed mobile broadband infrastructure are needed. Recommendations to improve network infrastructure include the development of universal service funds, incentivizing broadband investments and public-private partnerships, lower taxation, providing open access approaches, and free flow of data (ITU & UNESCO 2021). But having an appropriate network is only halfway to effectively reaching citizens. Of the 3.8 billion people not using the internet in 2018, 3.1 billion lived within range of a wireless broadband signal (ITU 2018). Affordability and digital literacy are among issues of high relevance for people to adopt data services (Figure 4.3). To solve this challenge, the Lifeline Program in the United States (Federal Communications Commission (US) 2022) and the Malaysian government have launched subsidies to support the poorest communities in this regard.

**FIGURE 4.3 - Reasons Most Frequently Cited by People for Not Taking up Data Services**

Source: World Bank 2021.

**Only affordable network subscriptions and mobile devices can enable the poor to connect.** Public-private partnerships, special offers and subsidies for certain target groups, or free governmental Wi-Fi access points can help in establishing affordable access to broadband networks. Beside subscriptions, suitable mobile devices are needed to connect. Currently, the options of owning a mobile phone are often basic phones or smartphones. Recent initiatives add another option by promoting smart feature phones. These extend basic feature phones with functionality like Wi-Fi, 4G, GPS, and apps that are usually only available on smartphones. For example, KaiOS-based feature phones tend to be available for a figure of around \$20, which lies well within the range of affordability for those with low incomes in developing countries (GSMA 2019).

**Increasing digital literacy among citizens and officials can boost the usage of mGov.** Nearly 70 percent of people who do not use the internet in low- and middle-income-countries are held back by deficiencies in digital literacy (World Bank 2021). Even if mobile solutions implemented are intuitive and easy-to-use, investing in digital skills of citizens can improve the usage of mobile solutions. Digital skills among officials in the public sector are also a major GovTech enabler and cross-cutting driver for digital transformation (World Bank 2021). ITU's Digital Skills Toolkit provides practical guidance and examples on how to develop and implement a digital skills strategy (ITU 2018).

## 4.2 Policy, Legal Aspects, and Trust

**A whole-of-government digital strategy needs to be operationalized under a general digital policy framework supported by subject specific regulation.** Only if the defined principles and standards are considered at all government levels, can the fruits of mGov be harvested to the full extent. Trust is a key success factor for solutions to be accepted by the targeted users.

### 4.2.1 Digital Policy Framework

**Derived from the principles and standards of a strategy, a cross-organizational legal framework is crucial for secure, successful, and sustainable mGov.** A legal framework should cover all relevant areas for digital government transformation. Key elements are requirements for public registers and data handling as a basis for the once-only principle; data protection and privacy; accessibility standards; electronic identification; trust services such as electronic signatures; electronic communication including proof of delivery; and cybersecurity standards. Long-established and continuously improved legal frameworks of countries like Austria can act as templates (Federal Ministry of Digital and Economic Affairs Austria 2017). Beside such a general framework, there may be the need to adjust related regulation around administrative procedures, public administration documents, and organizational elements.

**Defining the equivalence of electronic communication and transactions with traditional means is a prerequisite to provide public information and transactions on mobile.** Based on the United Nations Convention on the Use of Electronic Communications in International Contracts, many countries have issued Electronic Transaction Acts that define digital communication as equivalent to physical mail communication, online forms to paper forms, and digital invoices and digital payment as legal. Singapore is a successful example of facilitating the use of electronic transactions in the public sector by an omnibus provision in the Electronic Transactions Act (1998) that created the legislative framework for electronic transactions in Singapore, through which government departments and statutory boards can accept electronic filings and electronic documents, without having to amend their respective acts. It also allows public bodies to issue permits and licenses electronically (Infocomm Media Development Authority Singapore 2022). Corresponding regulation provides the basis to provide binding information and electronic transactions for both the public and the private sector.

**The right to digitally interact with public institutions can drive public entities to implement mGov.** Several countries have extended electronic acts providing citizens the right to digital interaction with public bodies. Austria's act states that "everyone has the right of electronic communications with courts and administrative bodies in matters of federal legislation." Many Indian state governments have also passed "Right to Public Services" legislation since 2011. It is of sensitive importance for the matter of social inclusion and trust that this right is designed not as an obligation to use digital solutions, but as one of the traditional ways to access public services.

**A once-only principle supports establishing efficient government processes and mGov solutions.** Users do not need to fill up forms to provide their identify information every time they access a service. Based on identification systems (see Chapter 5.2.1), minimum additional information requirements can save the users from cumbersome form download, fill-up, print, scan, and upload. A user profile built in the app can avoid asking additional information required but not available through an ID system. Citizens no longer have to present paper versions of birth or residence certificates. Instead, public bodies can, with the person's consent or legal authorization, request data from an electronic register. In its most consequent form, public authorities are obliged to draw on available data. They can simplify complex forms or even eliminate them entirely by automating processes – see also Chapter 4.2.3. This saves time for businesses, citizens, and the administration itself. The "Stakeholder Community Once-Only Principle for Citizens" (SCOOP4c) project provides respective recommendations on several levels: political, legal, organizational, semantic, technical, interoperability governance, motivation, citizen-centricity, trust and transparency, data protection and privacy, and data quality (Wimmer 2019).

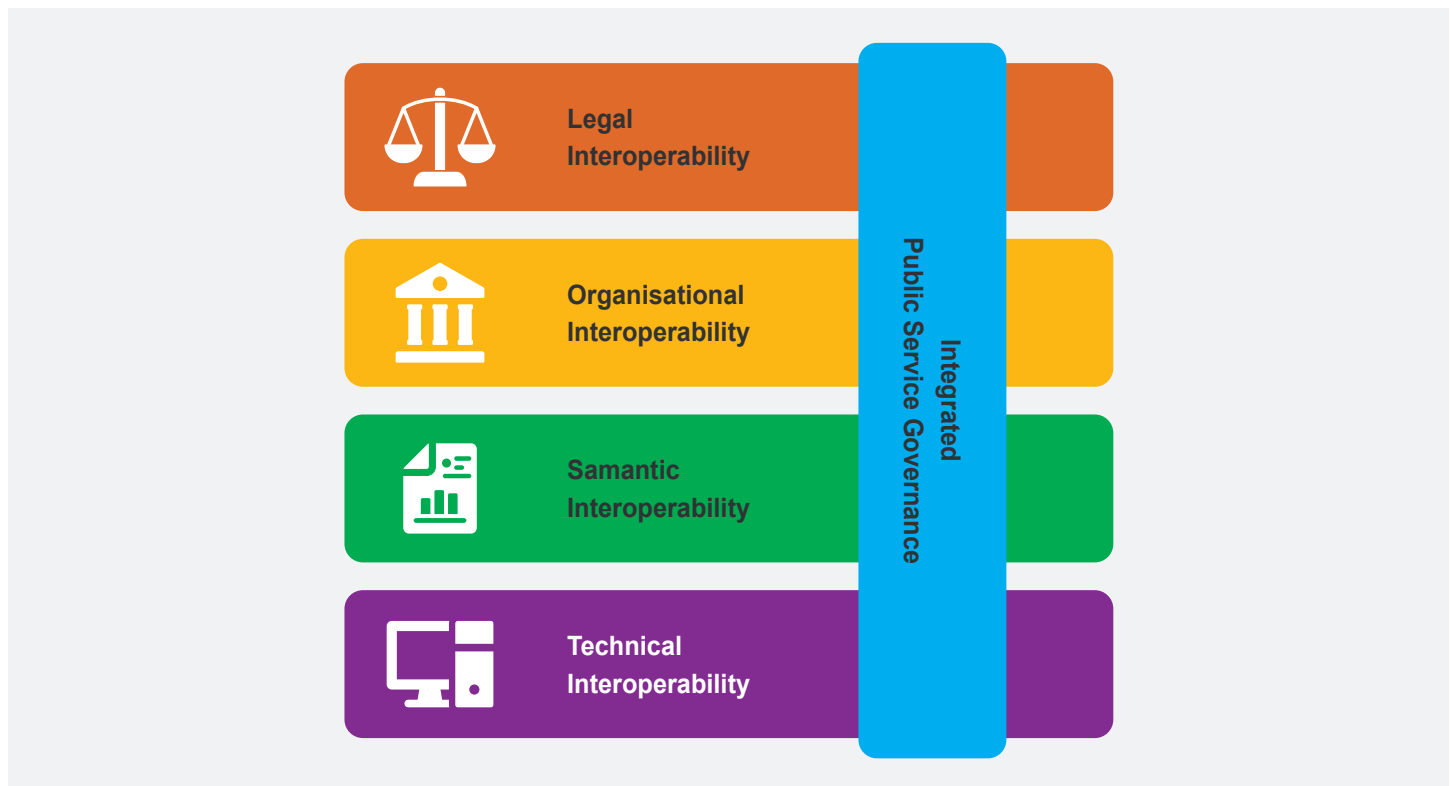
**Defining interoperability requirements can essentially raise efficiency and quality of public services and mGov solutions.** The European Interoperability Framework (EIF) provides 12 principles and concrete recommendations on how to improve the governance of interoperability activities, establish cross-organizational relationships, streamline processes supporting end-to-end digital services, and ensure that both existing and new legislation do not compromise interoperability efforts – see Figure 4.4. On a technical level,

the framework promotes the sharing and reuse of common infrastructures, services, and IT systems. Semantically, it calls upon public administrations to structure their data in commonly agreed formats. Organizationally, it encourages public administrations to simplify their organization, streamline their

processes, and listen to the needs of business and citizens. And on a legal level, it proposes legislation and policies that are clear, coherent, and make good use of digital technologies (European Union 2017).

> > >

**FIGURE 4.4 - Interoperability Governance in the European Interoperability Framework**



Source: European Union, 2017.

**Regulation that facilitates the full potential of mGov solutions is technology agnostic and neutral.** Rather than defining specific technologies, regulation fostering innovation provides basic specifications and define “state-of-the-art” standards, free from blocking factors. It is useful to define minimum requirements, for example, for digital payments, but to avoid forcing certain payment technologies, which would limit technical opportunities and might be outdated in little time—for example, see the European Union Payment Services Directive (European Central Bank 2018).

**Telecommunication Regulators take an important role to promote competition and defines rules of play for telecommunication companies.** Telecom Companies can be an important provider or partner for mGov (see also Chapter 4.3.2). To ensure enabling conditions, strong Telecom Regulators need to be established. Their goal is to avoid market failure, foster effective competition, protect consumer

interests, and increase access to technology and services. The Telecommunications Regulation Handbook published by the World Bank and ITU provides guidance in establishing conducive regulation (Blackman and Srivastava 2011).

**Regulations defining requirements regarding accessibility foster universally accessible mobile services.** Good practice GovTech initiatives aim to provide human-centered services that are simple, transparent, and universally accessible (World Bank 2021). Being treated as a stepchild in many software development projects, binding minimum standards can promote designing mGov for as many people as possible. The World Bank’s Guidebook for Accessible GovTech identifies 13 core capabilities in five areas: Strengthening Institutions, Leadership, and Policy; Budgeting for Accessible GovTech Projects; Procurement of Accessible GovTech Solutions; Implementing a User-Centric Development Cycle; and Maintaining the Engagement and

Building Capacity (World Bank 2022). The Web Content Accessibility Guidelines (WCAG) provide a standard and include requirements and recommendations for mobile web solutions as well as native apps (W3C 2022).

## 4.2.2 Trust Aspects

**Considering regulatory requirements to foster trust is of specific importance for the success of mobile government.** Mobile phones are highly personal devices that contain sensitive information on location, behavior, and health, shared in social media platforms, private messages, or apps. This data can be abused in criminal activities and for collective or individual monitoring. Therefore, many people are sensitive about using their mobile phones for interactions with the government. Studies show that more than a third of fourteen critical factors influencing the adoption of digital government solutions are trust-oriented: Perceived Trust, Perceived Awareness, Perceived Security, Perceived Privacy, and Perceived Uncertainty (Shareef, et al. 2011). The principles of data minimization and privacy by design are important to build trustful mGov (also see Chapter 5.2.2). Another important factor to foster trust is transparency, for instance by providing current and reliable informing about actions and decisions taken by the government (Eibl, Lampoltshammer and Temple 2022). An increased level of trust does not only lead to higher user acceptance; it also contributes to the overall loyalty of citizens towards public services.

**It must be noted that trust is of varying relevance from country to country and relative to the social background of people.** Many European citizens, for example, tend to have a high attention to data protection, as portrayed by the restrictive level of the General Data Protection Regulation (GDPR). It includes principles regarding rights of the data subject, duties of data controllers or processors, liability, and penalties, among others. Similar standards have been adopted in many countries, including Brazil, Chile, and Nigeria. However, citizens in these countries or other regions of the world tend to give data protection less attention and see security-related tradeoffs to usability as a burden. Designers of solutions need to consider these different user perspectives. To foster trust in the government and its services, it is strongly advised to follow a high level of data protection standards.

**A well-adjusted level of standards for identification and authentication will foster trust and acceptance.** As inspiration for a comprehensive digital trust framework, the eIDAS (electronic Identification, Authentication and Trust Services) regulation lays out aspects that are of major relevance. It sets standards for trust services around

electronic transactions like electronic signatures, electronic seals, electronic time stamps, delivery of electronic registered letters, website authentication and validation, and storage services (European Union 2014). Furthermore, it contains comprehensive regulation on secure digital identification, a basic requirement for transactional mGov solutions. Not all countries have the digital foundations to quickly introduce such systems. Therefore, at the start, simpler means of identification could be used – for example, mobile phone, social security, or tax identification numbers. The World Bank's Identification for Development (ID4D) initiative provides practical guidelines to implement identification in developing countries – see Chapter 5.2.1.

**Besides identification, a holistic security architecture is an important prerequisite for trust.** Cybersecurity legislation that is translated into pragmatic guidelines enables practitioners to benefit from operational experience that has been shown to work – see Chapter 5.1.4.

## 4.2.3 Subject-Specific Policies

**Policies and processes designed hand in hand with mGov solutions ensure intuitive and efficient interactions.** mGov aims to enable citizens and public officials to carry out formal procedures with as little effort as possible. Thus, the goal of its initiatives should not primarily be to develop mobile applications but to create efficient and user-friendly public services. Digitizing a physical form and providing it via a mobile app can improve access for citizens with little effort. Beyond that, mGov initiatives can be a root to fundamentally re-think interactions and processes. Questioning the necessity of specific data or whether data is better received from existing sources (once-only principle) can simplify citizen interaction and enhance public service delivery. Solutions may, and today most likely will, include mobile phone interaction, but may also result in no interaction at all.

**Integrating the input of policy makers in the design of mGov solutions will raise the potential for success of mGov initiatives.** Designing end-to-end-processes and solutions together with stakeholders, especially those responsible for policy, fosters efficient public services with a minimum of touchpoints. Policy development should therefore be an integral part in the design of solutions. By seeing mGov as more than just digital initiatives and analyzing existing processes and policies, it can act as a driver for public process and policy reform. Moreover, reviewing all legislation regarding its digital readiness and removing obstacles that prevent digital solutions can essentially raise the potential of mGov.





## 4.3 Service Design and Implementation

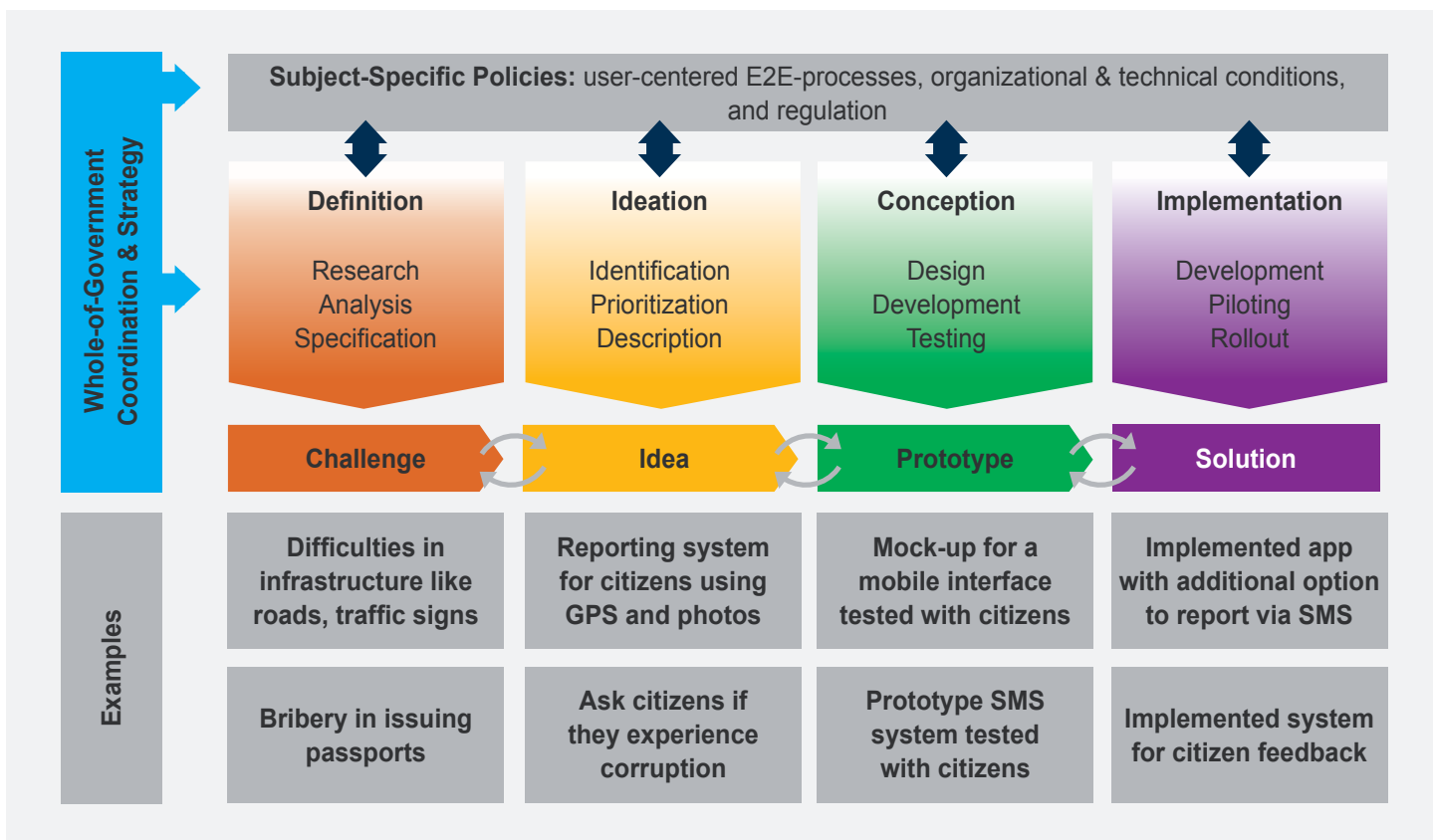
**A systematic user-centered approach allows development of well-accepted and lasting mGov solutions.** Principles can be applied to larger as well as smaller whole-of-government mGov initiatives. An evolutionary development in several cycles can help developing countries particularly to take first steps. In a first initiative to promote identification solutions, for example, scanned uploads of ID and documents could accelerate deployment, while the next iteration could include integration with ID systems, and enhance additional features for seamless user experience.

### 4.3.1 Approach for User-Centered Service Design

**Established frameworks for digital government transformation, innovation, and human-centered design support the valuable design of any kind of solution.** The following steps, captured in Figure 4.5 below, outline relevant elements of standard approaches crucial for mGov initiatives.

1. **Having a *tangible challenge* as focus is a good starting point for service design.** Challenges can be of any relevant type—social, economic, or administrative. They can often be derived directly from a digital transformation strategy or should at least be linked to such a strategy, if one already exists. Having selected a prioritized challenge, a first step to design an mGov solution is to closely analyze, understand, and define the underlying problem, to research on good practices in other countries or industries, and to identify relevant stakeholders and users as well as their needs.
2. **Having understood the challenge at its heart, *ideas for potential solutions* can be identified.** To identify as many diverse ideas as possible, a set of creative methods can be used. At this stage, ideas do not necessarily have to be mobile-related, but nowadays often are. The most suitable ideas for a solution can be selected along relevant criteria. The selected ideas can then be described and, if suitable, already at this stage visualized – for example, by sketching a paper prototype for mobile phone screens and the interaction with the user.
3. **Having selected one or several ideas for an mGov service, a *concept and early prototype* can then be designed.** As mentioned in previous chapters, service design should not merely focus on digital solutions, but rather have the public service as a whole in mind. Based on a concept, low-effort screen visualizations, mock-ups, or click-dummies can rapidly demonstrate touchpoints with users and get direct feedback on the suitability to solve the challenge. The idea and concept can then either be discarded without having invested too much effort or refined in iterative cycles until the solution fits user needs as well as stakeholder requirements. Solutions can evolve to functional prototypes and even minimum viable products while undergoing these iterations to provide a basis for implementation.
4. **Having incorporated user feedback and established additional elements like a business case, project plan, and a project team, the *operative implementation* can start.** Agile development principles usually fit best to mGov service development, keeping an iterative approach, and constantly testing the solution with end users. Before rolling out the solution to the general public, a pilot phase with a closed user group is advisable. Standard digital service implementation and rollout standards apply. A sound communication strategy is key to achieve a good awareness and penetration of the solution. Providing training and end-user support is often another key success factor. Technological and architectural aspects specifically relevant for mGov are described in Chapter 5.



**FIGURE 4.5 - Approach to Develop mGov Solutions and Examples**

Source: Authors.

### 4.3.2 Stakeholder Engagement

**Stakeholder and user engagement are of key importance for developing successful mobile government solutions.**

Literally being at the fingertip of the user, usability must be given essential attention in all mobile service design projects. User-centered design concepts have been described in many publications, be it by global design firm IDEO in its Field Guide to Human-Centered Design (IDEO 2015) or in a holistic framework for co-creation specifically for the public administration by the EU-funded research project Co-Val, illustrating a variety of use cases for user engagement in action (Røhnebæk, et al. 2021).

**Design Thinking as a systematic human-centered approach can help in solving complex problems within all aspects of life.** Design Thinking has become a core mindset and framework in service design. Its methods can be applied in all steps from challenge definition, to ideation, prototyping, and implementation. They may include sketching territory maps to understand a challenge more closely; describing typical users (personas); surveys, role plays, and user interviews to get to know their needs and pains; workshops with focus groups; creative visioning and brainstorming to find problem-solution

fits; and the design of user journeys, storyboards, or value proposition canvases. Design Thinking methods can help in targeting people with disabilities by including them into the design process and user tests.

**Agile innovation labs can act as a space to connect interdisciplinary teams and quickly develop and test ideas and prototypes.** Agile labs can bring together teams from multiple agencies across subnational jurisdictions with other stakeholders like citizens and businesses to work together on a related user journey. The German government, for example, has set up 30 labs for priority service journeys. The government has grouped 5,900 transactions into 575 distinct services from a user perspective, which, in turn, contribute to 55 user journeys (Daub 2020). In many countries like Australia, Austria, France, Hong Kong, Malaysia, Spain, Thailand, the United Arab Emirates, and state governments in USA similar labs have been set up.

**Relevant stakeholders include a variety of potential groups.** To design mGov solutions for as many people as possible, it is of core importance to include users with various backgrounds – see Chapter 4.3.3. Besides citizens and

government-internal users, relevant stakeholders may include policy makers, social workers, local businesses, teachers, doctors, and police personnel. Especially in rural areas, partnering with social entrepreneurs and civil society actors already on the ground is essential. Without this interaction, the potential for mobile technologies for development will remain just that: potential (UNDP 2012).

**Partnerships with local organizations and businesses can be of great benefit.** Fostering local initiatives can support the development of innovative ideas and solutions. By cooperating with startups or companies that are solidly established in a certain area and region, functionality of various kinds can be identified and integrated. Furthermore, by integrating related contents and services, synergies may be exploited and the reach out for all involved parties may be multiplied. The involvement of the local start-up ecosystem or social organizations in the design of solutions can additionally provide inspiration for new ideas and momentum to further develop innovative mGov solutions – see Chapter 3.2 for examples. When cooperating with private partners, the rules of collaboration should be clearly defined in a contract or memorandum of understanding. Aspects like intellectual property, compliance to procurement rules, source code and data ownership need to be defined.

**In addition to governments, the telecommunications industry can be important providers or partners in the provision of government-related services.** Telecom companies often are pioneers in providing digital solutions for citizens, be it from own motivation or as contractors of the public administration. The international telecom provider Telenor, for example, together with UNICEF implemented a child registration and mobile payment app for Pakistan and Myanmar (see also Chapter 2.1.1). Similar solutions can be found by MTN in Rwanda and by Orange in Burkina Faso. To ensure interoperability of such solutions, establish a minimum standard for data protection and cybersecurity, and avoid competitive advantages, Telecom regulators should define respective playing rules – see Chapter 4.2.1.

**Many countries today successfully apply user-centered design principles and include stakeholders in service design.** Brazil has established a design system that defines minimum principles and guidelines for the development of digital solutions and has included citizens in the development of many mobile offerings. The United Arab Emirates likewise has extensively applied human-centered design principles. The following example describes how stakeholder engagement and design thinking methods were applied when establishing Austria's "Digitales Amt" – see also use case in Chapter 3.2.

Example: User-Centered Design Approach in Designing the Mobile App “Digitales Amt” in Austria	
Challenge	Facing several new technology trends and altered user behavior in digital space, to develop a vision for future digital services the following design question was articulated: “How should interactions between civil society and public administration look like in times of digital transformation?” To address this question, citizens of various ages and social background – students, entrepreneurs, parents, retirees, etc. – were included in an initial workshop. Experience in interactions with the government, from birth to death, were gathered and illustrated in a “territory map.” The main needs and desires regarding such interactions were collated.
Ideation	Taking into account citizen’s feedback, a vision was defined: a personalized, proactive, cross-agency digital and mobile service, in which citizens can complete their agency-related matters most intuitively, formless, and with as few interactions as possible. A user journey for two specific use cases – birth of a child and change of residence – was defined. Based on this, ideas for optimization were gathered in stakeholder workshops. A first paper prototype was then created and tested with citizens.
Prototyping	Building on the user journey and paper prototype, a first simple click-dummy for the selected use cases was created. In several iterative cycles, a functional prototype was implemented, gathering user feedback in “citizen conferences” at various stages.
Implementation	The solution was implemented in several iterations, again constantly including user feedback. The mobile app, “Digitales Amt,” and the web-based “oesterreich.gv.at” went live in 2019 as the new government one-stop shop for citizens.

4.3.3 User Experience

**A good usability and user experience (UX) is a prerequisite for successful mGov solutions.** A system’s success depends greatly on the user’s perspective of the benefits and ease of use. This naturally extends to the adoption of mGov services. Among the most important success factors for mGov solutions are perceived usefulness, perceived ease of use, and effort expectancy (Eibl, Lampoltshammer and Temple 2022). Before choosing mobile as a means of implementation, the suitability for mobile phones, for example, regarding data amount and screen size needs to be validated. Besides the focus on the user, established UX design principles and guidelines usually include the consistency of design across the whole service, a hierarchical approach to contents in a tree-like structure, considering context, and accessibility.

**“Design for All” principles help to include as many users as possible, regardless of their background.** Unlike the

private sector, government services usually need to consider the whole population, be it young or old, illiterate or uneducated, at full health or disabled. “Design for All” stands for the general attitude when designing and developing (digital) solutions to make them highly intuitive and accessible without individual customization or assistance.

**UX design needs to consider accessibility for people with disabilities.** While for some people with physical disabilities a small screen might be a barrier, the use of mobile devices provides great opportunities for others. Features like voice communications and IVR can include the visually impaired, and conversational interfaces can address needs of hearing impaired people. Principles to design accessible mobile solutions are provided by the Web Content Accessibility Guidelines (W3C 2022).

4.3.4 Core Team

Typical Roles and Responsibilities in a Core Team	
Product Owner	Acting as an interface to the topic-owning agency, aligning policy requirements, defining solution requirements, overseeing development, and prioritizing the implementation plan
Design Thinking Facilitator	Defining and coordinating the design process, leading stakeholder engagement and workshops, curating the methods used.
Software Architect	Designing architecture, taking into respect the digital policy framework, standards, shared digital services, etc.
Development Lead	Coordinating the development team, acting as an interface to the product owner (scrum master in agile development).
Development Team	Driving product design, user experience design, programming, and testing.
Cybersecurity Expert	Providing specific expertise on security aspects for solutions with critical information or transactions.

**A team with a sound level of skills is needed to implement mGov solutions.** The core team members involved in a project depend on its focus and dimension. Also, the respective team members will vary for each phase of design and implementation. Teams are most usefully structured along principles for agile teams.

**Building a team with a high level of skills can be quite challenging, especially in developing countries.** To quickly start mGov initiatives, cooperation with international or local private organizations might be necessary. But for sustaining the value of mGov initiatives, it is essential to build local skills in government institutions. ITU’s Digital Skills Toolkit covers

common challenges, successful approaches, channels and examples as well as a tool to identify and assess providers and programs that deliver advanced digital skills training. Successful approaches introduce sustainability models that lower upfront costs, build multi-sector teams and taskforces, incentivize participation from the private sector, ensure pathways from training and education programs to the workforce, and specifically align accreditation requirements for training providers. Intensive training programs like coding bootcamps can teach people with no coding experience to be ready for implementation projects in a few months (ITU 2018).

## 4.4 Examples and Lessons Learned from Failed Projects

**Given the great challenges that mGov solutions are supposed to address, it is not surprising that some initiatives fail.** Apps developed to support the fight against the COVID pandemic were very useful and widely used. Many of them were however developed under great time pressure and are useful to illustrate challenges in the implementations. The following box shows examples of such COVID-related and failures of other areas as well as reasons.

Examples and Reasons for Failing Implementations	
<b>High Ambitions and Tight Timelines</b>	UK's contact tracing app was originally announced as a world-beating app in the fight against COVID by the government. To gain more data insights, National Health Service started to implement a model where data is managed centrally. Concerns were ignored and soon, social media posts claimed that the approach was a corporate bid to grab data. The project was classified as a fiasco in the public and the government had to divert to a backup plan and implement a decentralized solution similar to other countries (Ball 2020).
<b>Rushed Implementation, Lacking Tests and User Experience</b>	In the United States, a mobile app for caucus chairs to submit results caused a delay of several days in reporting Iowa's caucus results. According to experts, the app suffered from technical and design flaws and appeared to have been rushed into use. Flaws included critical coding errors, the proper communication of results and difficulty of use for the caucus chairs (Popken 2020).
<b>Missing Trust in Privacy Measures and the Government</b>	The Australian contact tracing app COVIDSafe was abandoned in 2022 and citizens were asked to delete the app from their devices. The Australian Health Minister announced that only two positive COVID-cases and 17 close contacts were identified through the app, which were not found by manual contact tracers at a cost of 21 million AUD (13 million USD). Surveys showed that the main reasons for not downloading the app were lack of trust in the safety of the app (24%), lack of trust to the government with data (25%), and fear of being tracked (15%) - (Statista 2022).
<b>Lacking Provider Contract and Agreement on Data Ownership</b>	The introduction of Malaysian contact tracing app MySejahtera was accompanied by a procurement debacle. A formal contract between the government and the private implementation partner was lacking as well as a non-disclosure agreement on the data collected via the app. The procurement process was classified as not well-handled and resulted in an investigation by the Public Accounts Committee (Focus Malaysia 2022).
<b>Weak Information Security Measures</b>	The Indonesian app, eHAC, was mandatory for all travelers entering the country in order to track their COVID-status. It was subject to a major data breach caused by an unsecured database and the lack of using secure protocols. The data breach potentially affected records of around 1.3 million users, including records from hospitals and Indonesian officials using the app (Rahadiana 2021).
<b>Lacking Load Tests and Robustness</b>	A South Australian app to warn people about emergencies was axed after major failures experienced during catastrophic bushfire. The system of a private implementation partner several times fell over and failed to provide updates on bushfire information. A new mobile solution was implemented under the control of emergency services (itnews.com.au 2018).



# Technology, Architecture, and Security Requirements

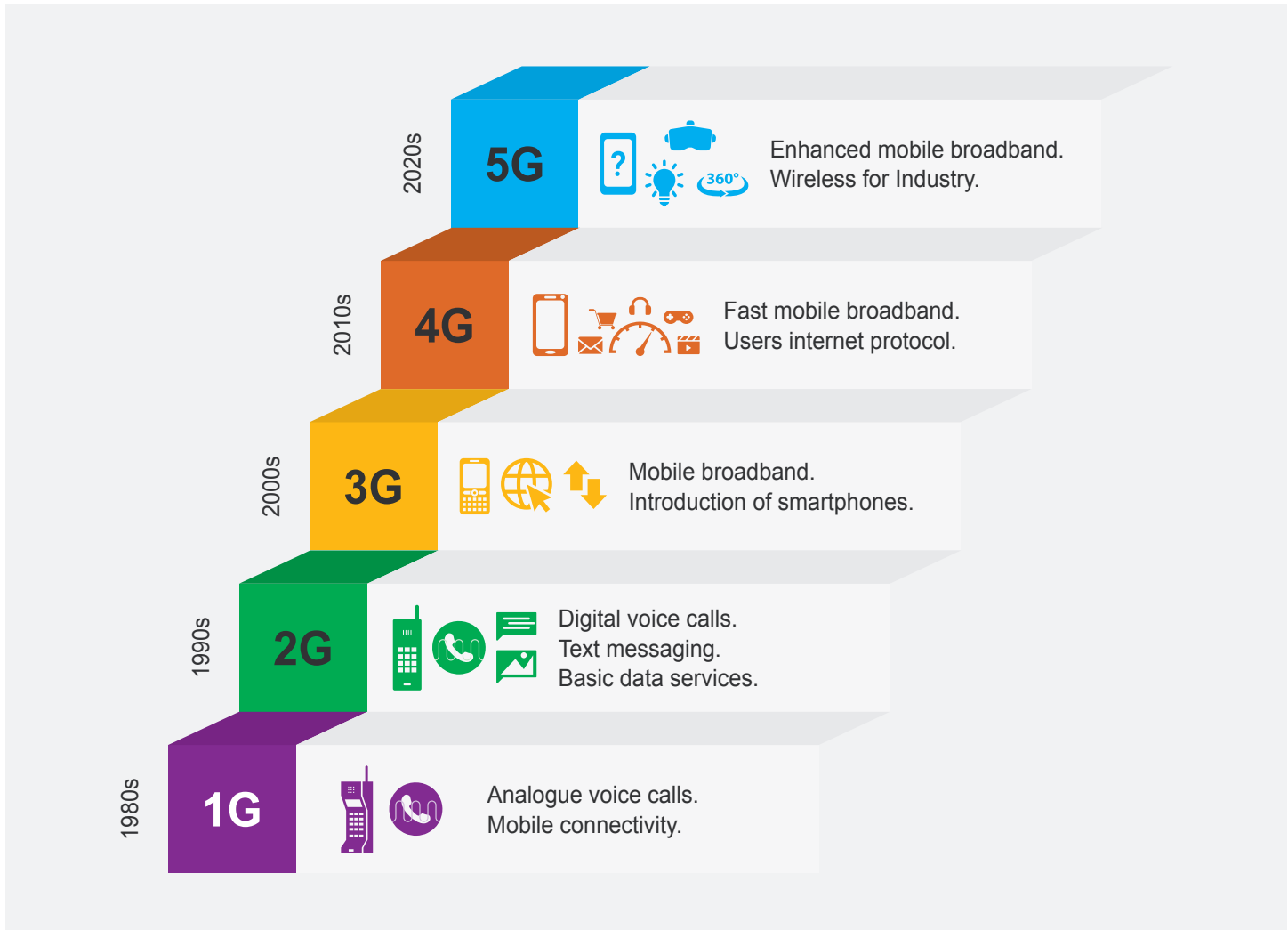
**Most general architectural principles and implementation guidelines for digital government also apply to mobile government solutions.** This chapter discusses aspects of specific importance.

## 5.1 Technology and Architecture

**Mobile services are a dynamic field with quickly emerging technologies.** Features sustain and remain backward compatible for a limited period of time. This creates opportunities for governments that cannot immediately follow each technology cycle.

### 5.1.1 Multichannel Communication

**Mobile communication showed an immense progress in the last decade, providing a wide range of communication channels.** Original channels of mobile phones were voice, text or data services like SMS or Unstructured Supplementary Service Data (USSD). Some attempts for multimedia and interactive data services like Wireless Application Protocol (WAP) got overrun by a shift to full-fledged internet capabilities, complemented by features suitable for highly personal devices like push notifications. Moreover, the basic communication protocols have undergone evolutions – from GSM/2G to UMTS/3G, 4G, and 5G, with increasing performance in aspects such as bandwidth or latency (Figure 5.1). New technologies like 5G, for example, have the potential to facilitate high-end graphical and real-time, virtual, augmented and mixed reality applications.

**FIGURE 5.1 - Evolution of Wireless Communications**

Source: IEEE, 2019.

**While such heterogeneity of communication means may be seen as a challenge, mobile networks and devices remain backward compatible on their core features.** A high-end smartphone is still capable of voice communication and SMS, irrespective of the network it is currently connected to. Services that are developed based on the technology generation predominant in a country (such as SMS) can thus be assumed to be sustainable and reusable with next generation devices for a while.

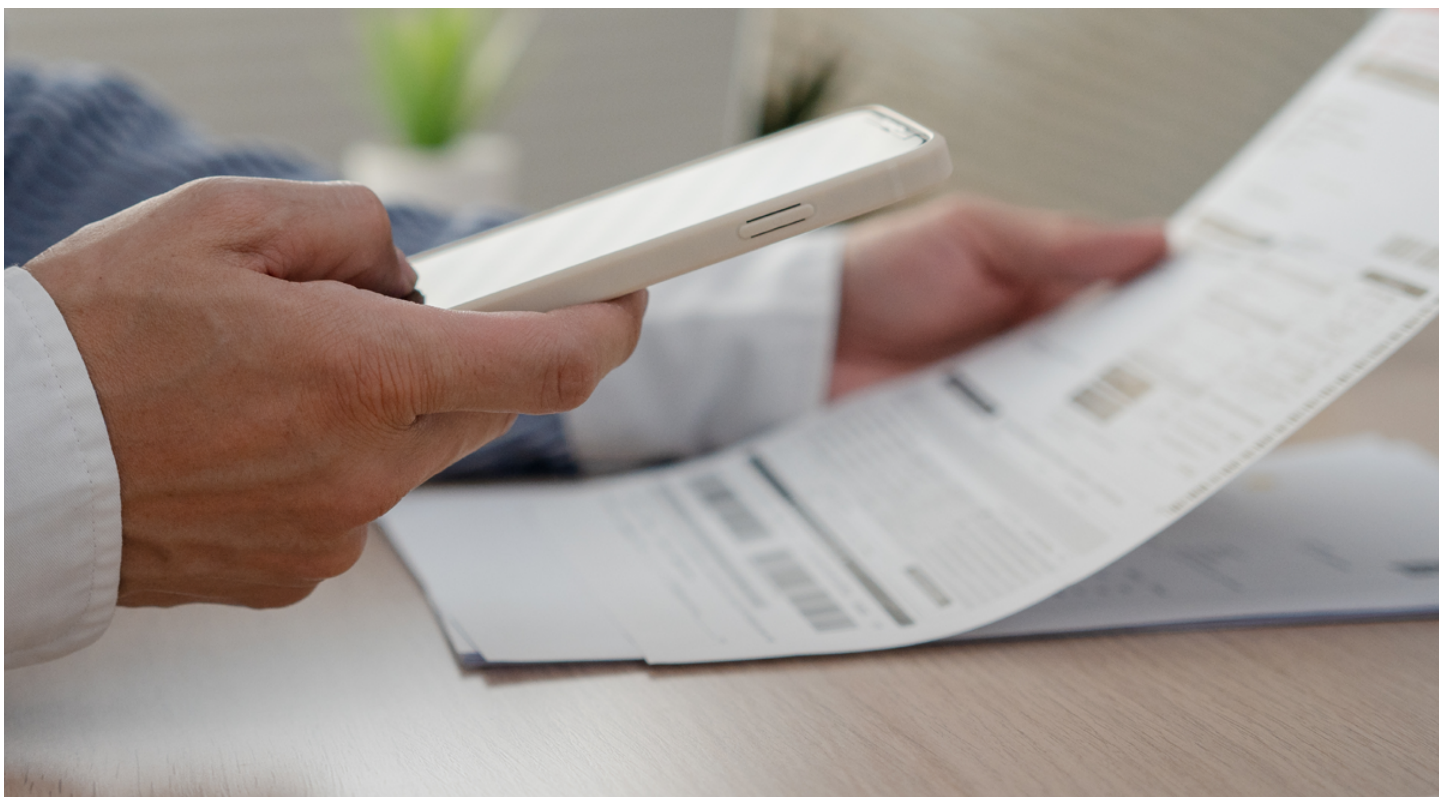
**Mobile government can provide its most sustainable benefit if it considers a multichannel strategy, in any case covering the channels currently most established in a certain target group.** Projects may start with voice or SMS/WAP services in areas with a low smartphone penetration or limited network coverage, bandwidth, or connection stability. Such services can be assumed to prevail for a while, even if user device technologies improve over time and a country

gradually augments these by services relying on current technologies such as web and broadband (4G/5G). Countries with an advanced infrastructure might take such technologies as given and start there.

### 5.1.2 Smartphone Features

**Provided there is availability in the population, smartphones or comparable devices like tablets are the current tool of choice for mGov.** This is due to their broad range of communication capabilities, allowing the user to enter data in various formats, ranging from text to multimedia, and sensors that can facilitate processes. Even if the penetration in many areas is still low, smartphone or smart feature phone availability may likely increase over time – see Chapter 4.1.1. It is advisable to consider a strategy encompassing services that exploit smartphone capabilities, even if not deployed immediately for inclusion or cost considerations.





**Smartphones are powerful computing devices and can be used to store or process data.** Benefits include using the phone's storage to retrieve and carry documents, providing offline functionality, using existing data in auto-filling forms, or using the camera to scan and process information through Optical Character Recognition (OCR) or Quick Response (QR) codes codes). This provides convenience, and also increases service quality, as data quality improves when avoiding manual inputs.

**The processing and security capabilities of smartphones can be used for mobile government. Mobile apps can orchestrate a device's communication capabilities to interact with government services.** Sensors can augment services by the location known to the device or include biometric factors and secure elements to enhance security. But these capabilities cannot be assumed to be ubiquitous, as they might not be available or users disallow permission. Still, using these capabilities with privacy and user preferences in mind can significantly facilitate the outreach process.

**Technology dynamics and platform characteristics need to be considered in mGov strategies and architecture.** Currently, the landscape is dominated by two mobile operating system platforms (iOS and Android), plus depending on the region further variants and vendor systems like HarmonyOS or KaiOS. The low number of dominant platforms is an advantage as it keeps developments manageable. Still, this

can change, as the landscape was quite different a decade ago with other platforms like Blackberry or Windows mobile. Also, the existing platforms show high dynamics with major releases roughly every year. mGov solutions thus need to be prepared to undergo continuous updates. Major platforms force common standards such as OpenID Connect (OIDC) for authentication or Near Field Communication (NFC) for contactless data exchange. They also tend to fence in platform-specific choices like push notification infrastructure to notify users. This comes with the benefit of single or limited technology choices within the platforms, but also limited ways to choose for alternatives.

### 5.1.3 Dumb Phones

**Dumb phones are basic handphones with buttons as the primary mode of user inputs and very little functionality compared to smart phones.** These phones are cheap and can be used primarily for calls and SMS messages. Due to their affordability – typically within \$10 and lower monthly bills due to low data activity – they are more commonly used by the poor and relatively uneducated. In Ghana, Senegal, Nigeria and Kenya, just about one-third of adults own smartphones. Smartphone ownership is lowest in Tanzania (13%). For comparison, 77 percent of Americans reported owning a smartphone in January 2018. Worldwide, sub-Saharan Africa has the lowest rate of smartphone ownership of any geographic region (Silver 2018).

**Despite their limited functionality, dumb phones are an important tool to for service delivery.** They can be used to deliver SMS based information on drought, weather alerts, educational lessons and health information as has been the case in many countries. According to a UNESCO's study of mobile reading conducted in seven developing countries - Ethiopia, Ghana, India, Nigeria, Pakistan, Uganda and Zimbabwe - drawing on the analysis of over 4,000 surveys and corresponding qualitative interviews, the study found some interesting facts: large numbers of people (one third of study participants) read stories to children from mobile phones; females read far more on mobile devices than males (almost six times as much according to the study); both men and women read more cumulatively when they start reading on a mobile device; many neo- and semi-literate people use their mobile phones to search for text that is appropriate to their reading ability (UNESCO 2022). Practitioners should carry out a careful analysis of the targeted populations in terms of their mobile phone ownership to deploy solutions with maximum impact.

### 5.1.4 Form Factor Aspects

**Mobile interfaces to existing digital government solutions allow quick wins but need to consider peculiarities like small screen size and different input types.** Mobile devices can access the web just like conventional PCs. Using responsive design, the web service can automatically tailor itself to the form factor like screen size. Free Android-based applications such as Open Data Kit or Kobo can help create and transmit customized forms (Z. Bhatti, ICTs, Service Delivery, Citizen Engagement, and Governance 2020). This can lead to low-effort quick-wins. However, an eGovernment service should not simply be offered to mobile devices as is. Government applications often need a significant amount of data and evidence. Entering large forms on a PC may already be cumbersome; on a mobile device it can quickly get annoying and frustrating as screens are smaller and entering text is harder.

**Migrating from eGovernment to mGov suggests rethinking digital solutions.** An mGov solution can use types of input other than typing text, like using the camera to scan documents or – even better – avoiding text and data input at all. By using mobile electronic identities that ensure the legitimate person is accessing a service, users can exercise control over their data by consenting that the service owner retrieves data on their behalf. This can facilitate making use of government registers and thereby the once-only principle – see also Chapter 4.2.1.

## 5.1.5 Architectural Considerations

**Holistic mGov architecture considers relevant aspects derived from a whole-of-government strategy.** Potential areas of relevance are interoperability, compatibility, scalability, integration, usability, privacy, and security. Interoperability supports collaboration and resource sharing across systems and use cases. Integration is important, since mGov applications usually consist of several components and need to work with backend systems. Compatibility ensures that the application works with different devices and operating systems. Scalability makes sure that the solution can be expanded to cover large populations. Effective usability is essential as mGov applications directly target the end user holding a mobile device. Privacy is another major success factor for user acceptance; it can best be achieved by following a Privacy by Design principle. Security is partly supported by the mobile operating system, but app architects and developers need to take care of security from the beginning.

**In most settings, the digital public service delivery will be provided through multitude of agency-specific web sites and apps, requiring a long time for consolidation into a central portal.** Quick wins for user-centric design could be achieved by issuing user experience guidelines to be followed by all agencies. These guidelines and associated resources could help the agencies provide a common user experience across these platforms. These guidelines could include requirements for common styles, components and patterns. Styles could provide common layout, typography, colors and images; components could provide common forms, navigation, panels and tables, and patterns could users complete common tasks like filling in forms and creating accounts (GOV.UK). The central digital agency could also promote online communities to exchange experience across ministries for common user-centric design.

**Most architectural aspects are similar to those of private sector mobile initiatives.** Trans-sectoral technical guidelines for mobile applications can thus be followed, be they binding guidelines of relevant platforms, or recommendations and frameworks like Androids Jetpack (Android Open Source Project 2022), Apples SwiftUI (Apple 2022) or the Ionic Framework for hybrid apps (Ionic 2022). Open Source software elements can be a great basis to achieve optimized transparency and cost-effectiveness, and to prevent vendor lock-ins. Low-code or no-code application development can increase agility flexibility and efficiency.

**In countries with various dialects, multilingual interfaces can help to reach significantly more people.** App contents and data can be either translated manually or automatically. The latter does save resources by using translation engines. Automatic translation might however not be available for certain languages. Also, liability questions must be considered when providing official and legal information. Manual translation can be cost-intensive. In both cases, technical guidelines for backend databases and interfaces have to be considered. Major app platforms provide guidelines as mentioned in the previous paragraph.

**To ensure interoperability and integration, efficient mGov implementations look out for existing building blocks and support harmonization in an architectural layer.** Architects should avoid reinventing the wheel for each service. This includes using a consistent approach to ensure interoperability and integration of existing basic building blocks like core registries, electronic identity, e-payment, and a multitude of backend registries and core systems of individual agencies. Many countries face the grassroot development of many singular applications – for example, 265 government-related apps in Brazil. When consolidating these solutions, cross-functional services may be created and integrated.

**Architectural decisions need to follow strategic considerations and be closely evaluated.** Decisions include the choice between web applications or mobile apps (see below), between a monolithic app or a modular system of building blocks or open interfaces, and between a closed source or an open-source approach. While all choices have pros and cons, modular and open systems promise flexibility and can create an ecosystem where stakeholders beyond the government like academia or private sector can contribute. Thus, the government can take a role in cross-fertilizing innovation through open interfaces or allowing developers to reuse components. A modular system of building blocks also assists in keeping pace with technological progress and dynamics. Modularity and open interfaces allow replacement of elements that get outdated.

**One major decision is the choice between the implementation of web applications and native apps.** The former may reuse digital web services already deployed by a country, thus promising a swifter migration path. The latter, however, allows better tailoring of services to mobile device capabilities, enabling richer service. A complementary discussion is whether to introduce a single mGov app, sectorial apps, or application specific apps. The former may grow to higher complexity but promises a consistent look and feel across different services. The latter may lead

to some fragmentation and diverse adaption speeds if new app generations get introduced. A balanced approach should be adopted – proliferation of digital touch points should be minimized for better and more consistent user experience. However, it requires sustained coordination effort across agencies which is not easy in many settings. A broad spectrum of approaches is noted across the world – Brazil has 265 apps, but Italy has only one app supporting services provided by 7100 public entities. A lower number of touch points is more user friendly.

**Depending on the specific use case and context, offline scenarios can be of benefit.** What distinguishes mGov from PC-oriented solutions is that the users carry the mobile device with them. In rural areas of developing countries especially, a connection to a network may not be possible. Providing offline functionality can overcome this shortage and additionally increase privacy and trust, not needing to share mobile data at all times. Users can carry out transactions offline and transmit data once they are connecting to a network. Disadvantages of offline solutions however include the lack of fresh data and thereby missing out chances to reuse data and apply the once-only principle.

**Strategies to transfer data to a new phone need to be considered.** A further specificity of mobile devices is that they get replaced relatively often or can get lost or stolen. A strategy for portability is suggested for user data that is important to the user. Portability should support resilience so that state and functionality can easily get restored if the device gets replaced, lost, or stolen.

## 5.2 Information Security

**Trustful mGov relies on a high level of information security.** The importance of trust has been closely highlighted in Chapters 2.2.4 and 4.2.2. All major principles around information security in digital government apply to mGov solutions as well. Specific aspects for mGov include personalization, authentication, and proof of possession. Weaknesses in older networks and devices have to be carefully evaluated.

### 5.2.1 Identification and Authentication

**Mobile phones are usually personal devices that can be used for identification and authentication.** Unless used by a whole family or community, a mobile phone can be assumed as tied to its user. Whether a low-end dump phone or a high-end smartphone, this allows for means of proof of possession, for example, as a basis for multi-factor authentication. The



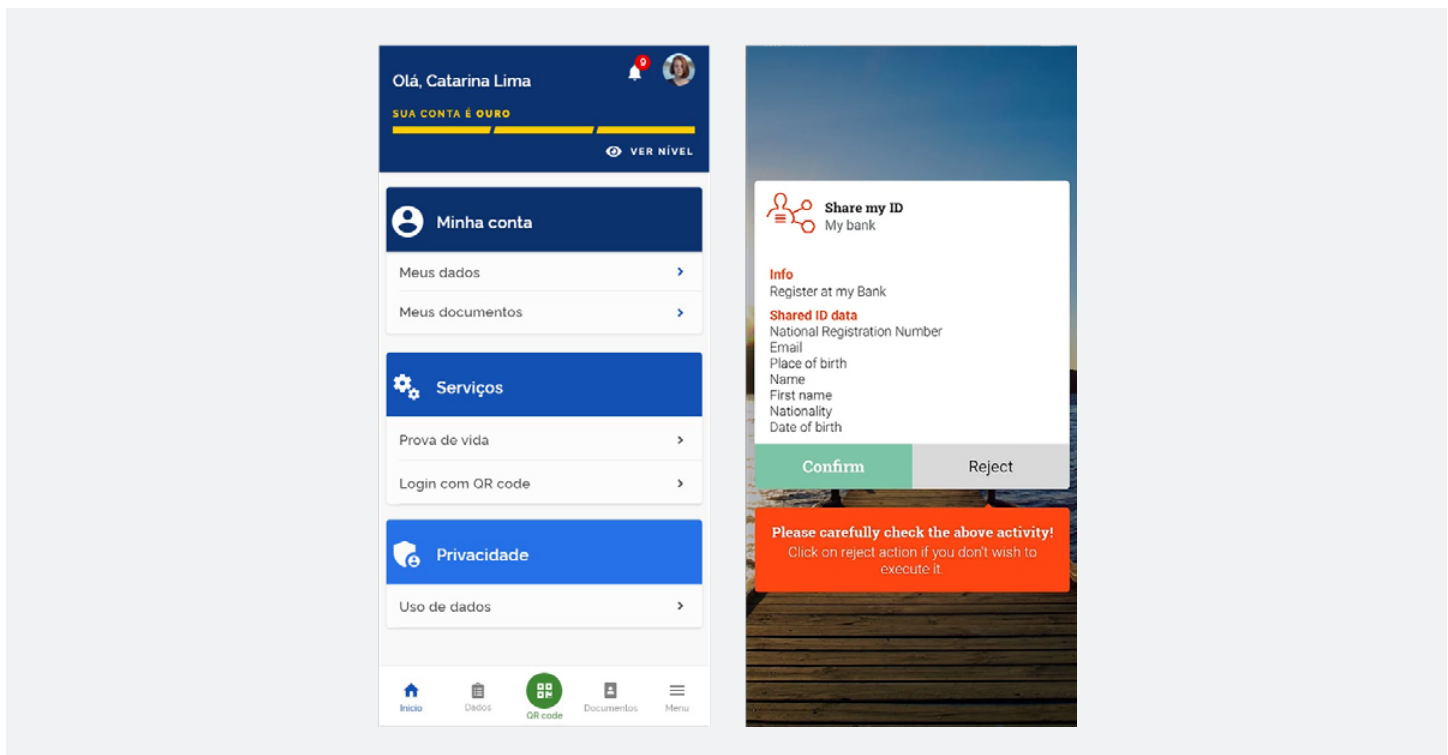
level of security varies for the device and mobile network generation. SMS or signaling protocols do have some vulnerabilities, but they can still increase security compared to conventional password-based authentication. Banks started to introduce SMS to authorize transactions in the late 1990s; these have been replaced by apps with advanced security functions. Initiatives in countries that are lacking high-end means can start with technologies like SMS and gradually evolve to advanced methods and employing hardware secure elements of modern smartphones.

**The World Bank's Identification for Development (ID4D) Initiative provides a guide to implement inclusive and trusted identification systems in developing countries.** It defines ten principles based on the three pillars of inclusion, design, and governance to implement digital identification for sustainable development. It provides a structured planning roadmap with tools to evaluate the existing ID ecosystem as well as legal, regulatory and policy frameworks, and models to evaluate costs and cost savings. It also gives guidance on potential Mobile ID implementations with five main options: (1) smartphone apps with a virtual version of existing identity credentials—for example, ID cards; (2) Public Key Infrastructure (PKI) enabled SIM cards that allow owners to authenticate themselves on the mobile device; (3) server-side PKI with authentication via remote hardware security module; (4) Fast Identity Online-enabled (FIDO) devices for multifactor authentication; and (5) authentication via a mobile

network operator service based on registered information and/or transactions (World Bank 2019).

**Modern smartphones provide a set of useful security features for advanced implementations.** A modern smartphone or tablet computer has security capabilities like app sandboxing, hardware secure elements or biometric sensors, that are often superior to what is available in conventional PCs. This allows the use of smartphones as personal security devices (Figure 5.2). Successful mGov initiatives introduce such advanced security capabilities as seen in many European Countries like Belgium and Greece. Moldova has recently advanced its system for mobile identification, authentication, and signature by leveraging advanced security capabilities with cryptography advancements on servers – see Use Case Brief in Chapter 3.1. In a partnership with the World Bank's ID4D initiative, Brazil has implemented secure and legally valid digital identification, today counting 138 million single accounts, 250 million authentications and 2 million electronic signatures per month, and providing access to more than 3,600 digital services. The eIDAS framework provides guidelines to establish a high level of secure authentication and sets standards to implement a digital identity that can be used in both public and private sectors. The framework defines nine principles for digital identification: user awareness, user choice, privacy, interoperability and security, trust, convenience, user consent and control, proportionality, counterpart knowledge, and global scalability (European Union 2014)



**FIGURE 5.2 - Secure Identification in Brazil and Belgium**

Source: Google Play, Authors.

## 5.2.2 Dealing with Risks and Diversity in Security Features

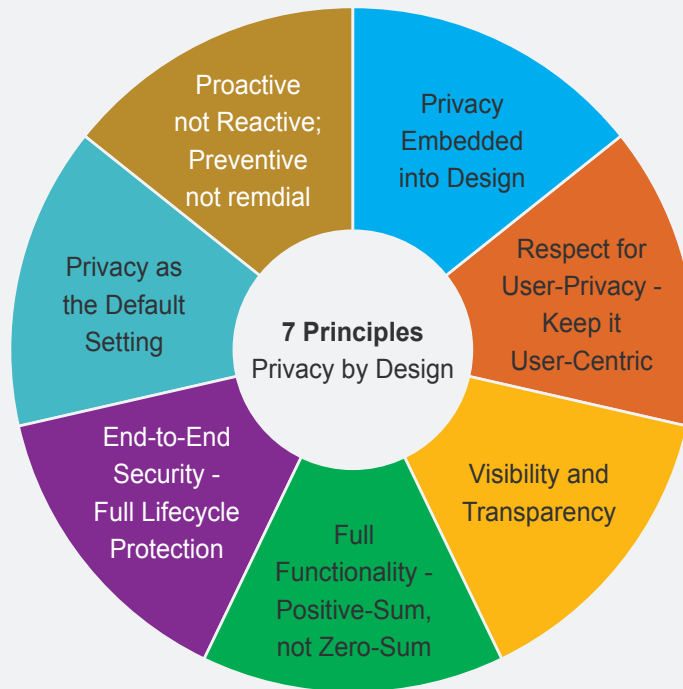
**All these opportunities do not come without risk and can be a threat to digital sovereignty.** Mobile networks and mobile devices emerged with security not being a priority. While originally risks mainly concerned call billing fraud, today aspects like monitoring, data leaks, and cybercrime are of immense relevance. Mobile services can also create dependencies that are worth considering regarding digital sovereignty. Technical possibilities to intercept communication or suppress services rise and critical dependencies can occur with the mobile network operator, the platform providers, or their cloud services.

**Since using the information of mobile devices may be perceived as privacy invasive, security measures are of key importance.** Even if not developed with an intent to be invasive, using location or biometric sensors may be perceived as such. Architects and developers thus need to follow information security standards appropriate to the sensitivity of the solution. Solutions that include critical information or transactions need to be developed and operated in alignment with mobile security experts knowing about risks of platforms and technologies. The growing usage of mobile devices in sensitive and value-creating services makes it more attractive for attacks such as malware, SMS fraud, or smishing.

Attackers benefit from the fact that vendors no longer provide updates for devices relatively soon after product phase-out. A comprehensive information security risk assessment therefore needs to be part of all mGov service design initiatives.

### **Principles like data minimization and Privacy by Design can help in establishing an appreciable level of security.**

The data minimization principle, according to Article 5 of the EU General Data Protection Regulation (GDPR), means that personal data that is collected shall be adequate, relevant, and limited to what is necessary in relation to the purposes for which they are processed. It is of specific relevance for mobile government, since usage of mobile phones creates a bulk of privacy-relevant data that can be misused. The Privacy by Design principle (Figure 5.3) includes that information security efforts are proactive and preventative to anticipate privacy invasive events. Privacy is seen as default, ensuring that personal data are automatically protected without the need for an individual to actively contribute. Measures should be integrated into the design and architecture of systems and practices. Privacy by Design seeks to create a win-win situation for all of an organization's legitimate objectives. It ensures strong security measures throughout the entire lifecycle of the data involved. It also seeks visibility and transparency for all stakeholders, and the interest of the user is at the center of initiatives following Privacy by Design (A. Cavoukian 2011)

**FIGURE 5.3 - Seven Principles of Privacy by Design**

Source: Cavoukian, 2010.

**Mobile device security only evolved over time and a strong security focus and priority on security capabilities are rather recent.** For example, hardware secure elements for a strong protection of core assets like cryptographic key on the mobile device was introduced less than a decade ago. Advanced techniques like device or key attestation (allowing an assertion to prove capabilities of the mobile device to remote services) are very recent. Considering the high level of risks in older devices and network infrastructure, developing countries particularly need to consider these risks.

**Weaknesses in the mobile network infrastructure tend to prevail with limited means to mitigate.** Weak ciphers allow interception of over the air traffic, and weaknesses in the signaling protocols allow rerouting of traffic. Such weaknesses often only get eliminated with new versions of the overall infrastructure—for example, by new network generations like

5G with stronger security focus. Systematic weaknesses may persist and lead to downgrade effects for a while, as older mobile phones need to continue working in the network.

**When designing solutions, governments therefore need to take into consideration devices with low security.** There usually is and will be a pyramid having very few high-end devices with state-of-the-art security at the top, a middle part that provides a decent level of security, and a broad base of older mobile generations that have significant vulnerabilities. Potential functionality for citizens needs to be weighed against the risk exposure that increases with the sensitivity of data and the gain for a fraudulent opponent. Thus, it is advisable to begin with implementing simple and low risk solutions that benefit as many users as possible. Policy guidelines should contain at least minimal security requirements, customized to the associated risk, even if some potential users are ruled out.





## Recommendations for Specific Levels of Development

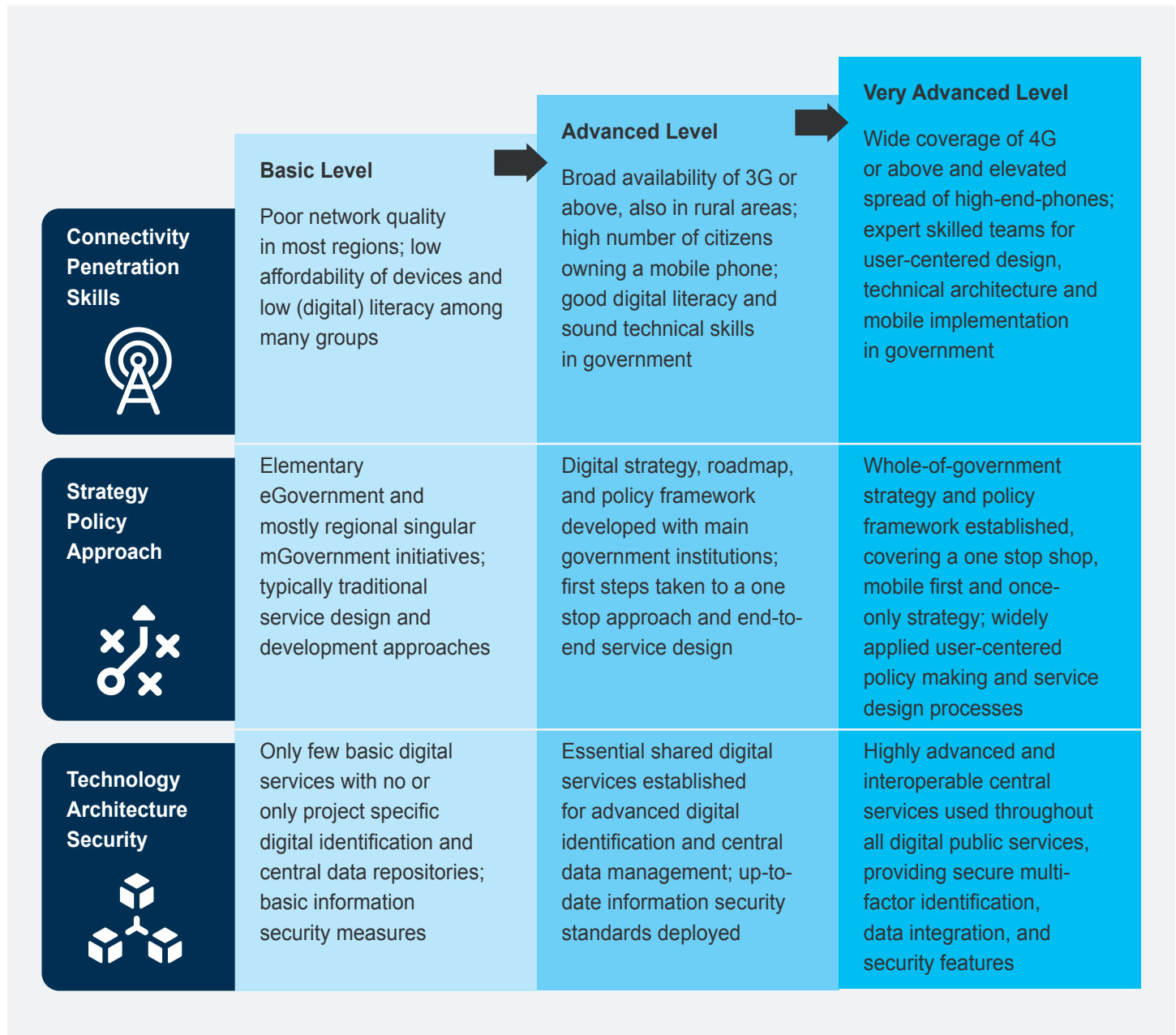
**As illustrated in the preceding chapters, mobile Government is a multifaceted field and initiatives need to be designed specifically to each individual situation.** Whether in a developing or a developed context, circumstances may vary highly from country to country, region to region or even from project to project in one region. A thorough analysis of the specific situation along various dimensions and aspects is therefore necessary when engaging in mGov, be it in the form of a comprehensive strategic process or in a particular project. This chapter highlights recommendations presented in previous chapters and places them in relation to typical situations related to development levels.

The most relevant factors for successful mGov can usually be influenced by the government, but some might be immutable at least in the short- to medium term. Figure 6.1 below shows a rough overview of relevant aspects

and their potential shape along three different development levels. The classification is for modeling purposes and specific situations will differ.

> > >

**FIGURE 6.1 - Overview of Typical Circumstances for Various Development Levels**

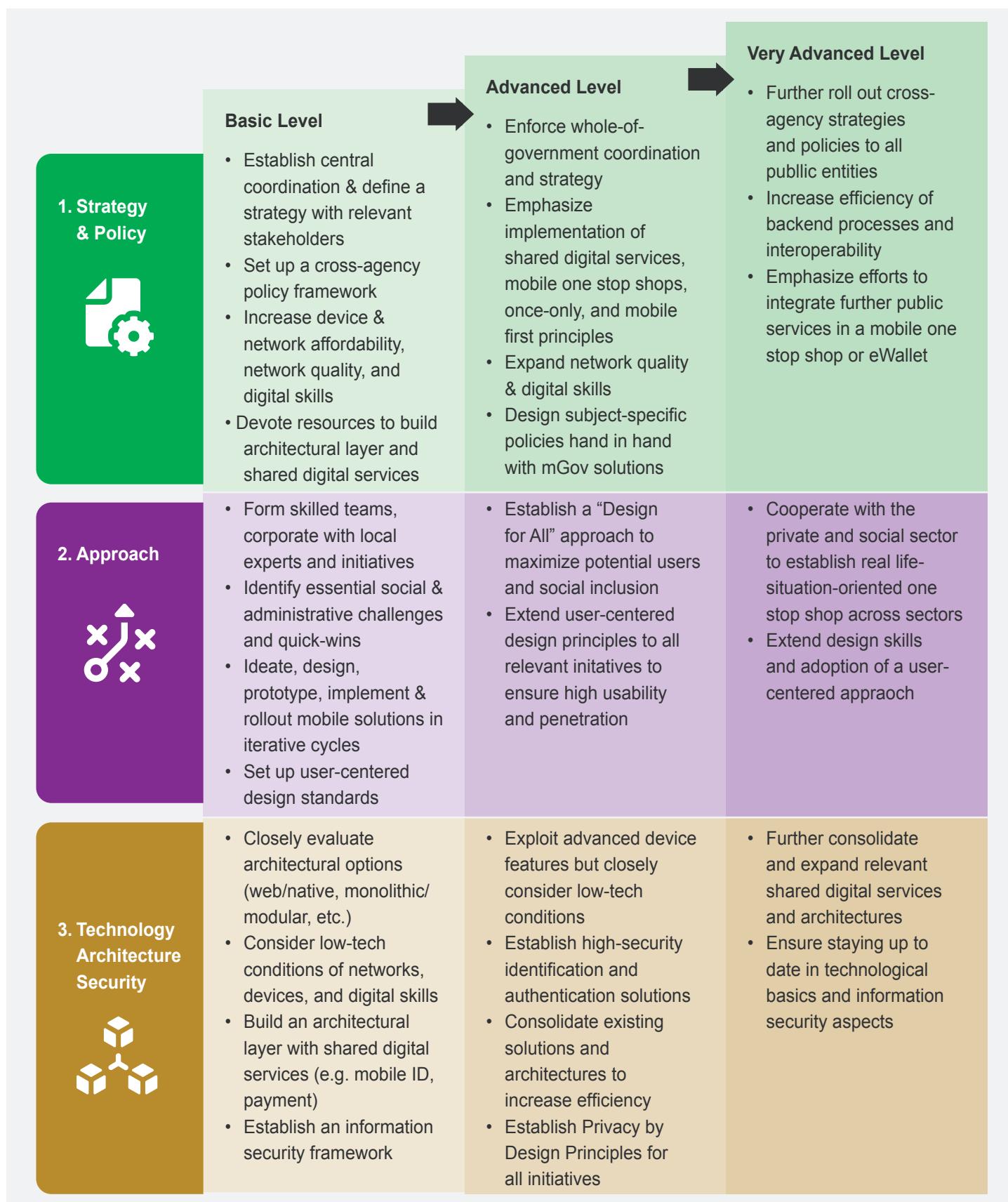


Source: Authors.

Figure 6.2 below presents an overview of the specific recommendations that are described in detail in the chapters that follow.

> > >

**FIGURE 6.2 - Overview of Recommendations for Various Development Levels**



Source: Authors.





## 6.1 Basic Development Level

Although developing countries often face immense challenges establishing digital foundations, mGov can provide fast as well as comprehensive opportunities in many ways. Developing countries can with relatively little effort achieve a great impact with simple, low-tech mGov solutions. To raise benefits, strategies can include initiatives to build high-quality mobile networks and skills among citizens as well as government employees. While it can take years before such activities show impact, instant mGov solutions based on existing initiatives and dealing with major or urgent challenges can show great short-term benefit and act as sparks for whole-of-government initiatives going beyond.

Countries with a basic level of digital development can take actions in all areas presented in this note regarding strategy, policy, approach, technology, architecture, or information security. Initiatives may have a short-, mid-, or long-term focus and require minimum or large effort. Table 1 summarizes the most relevant recommendations specific to countries with a basic level of development and indicates a time frame for implementation. Since situations usually differ essentially between countries, measures need to be closely adjusted to the respective situation.

> > >

**TABLE 6.1 - General Recommendations for mGov Initiatives in Countries with Basic Conditions**

 ... 1-6 months,   ... 6-12 months,    , 12+ months,










































1. Strategy and Policy	Time
<b>1.1 Central Coordination:</b> Establish central coordination and competence centers for digital affairs to bundle expertise and cohesively drive digital transformation and mobile government initiatives.	  
<b>1.2 Strategy:</b> Develop a digital transformation vision, strategy, and roadmap together with the most relevant stakeholders of major public institutions, taking into respect the country's context and measures to facilitate mGov initiatives.	 
<b>1.3 Cross-Agency Policy Framework:</b> Design, implement and roll out a policy framework for all public institutions based on the defined strategy for trustful, efficient, and sustainable mGov initiatives.	  
<b>1.4 Affordability:</b> Increase affordability of network subscriptions and mobile phones to reach as many people as possible and increase social inclusion with mGov solutions.	  
<b>1.5 Network and Digital Skills:</b> Invest in country-wide mobile broadband initiatives and foster initiatives to increase digital skills among citizens and government employees to increase penetration of mGov.	  
<b>1.6 Shared Digital Services:</b> Devote dedicated resources to establish digital foundations such as central data repositories to raise efficiency of all digital solutions and harvest the full potential of mGov.	  
<b>1.7 Identification:</b> Evaluate the potential of approaches for digital identification, define a short, medium, and long-term strategy to provide citizens with appropriate identification and implement measures.	 
<b>1.8 Mobile Payment:</b> Assess and deploy mobile payment solutions to provide fast and efficient welfare to people that are in need the most.	  

Table 6.1 continued

2. Approach	Time
<b>2.1 Skilled Teams:</b> Build teams with profound skills in user-centered design, user experience, architecture, and agile implementation of mobile solutions to design and develop efficient and attractive mGov.	 
<b>2.2 Cooperation:</b> Collaborate with local experts or initiatives to use synergies, be it startups or social workers, digital or personal and use outstanding skills.	
<b>2.3 Quick-wins:</b> Identify existing digital solutions and ongoing initiatives and extend them with a mobile-oriented interface to yield quick-wins. Start small and local and expand to further regions or areas.	
<b>2.4 Challenges:</b> Identify and define essential social or administrative challenges and select the ones with the greatest potential impact for mGov initiatives (for potential areas of action see below)	
<b>2.5 Service Design:</b> Ideate, design, prototype and implement solutions in iterative cycles to solve the identified challenges together with users, closely considering specific context and stakeholder needs.	 
<b>2.6 Rollout and Communication:</b> Test the solution in a pilot with a closed user group before rollout and make sure to create awareness for implemented solutions by communicating via various channels.	 
<b>2.7 Design Standards:</b> Establish cross-organizational standards for user-centered design to develop ideas and prototypes with stakeholders and users.	 
<b>3. Technology, Architecture, and Security</b>	
<b>3.1 Technical Design:</b> Closely evaluate mobile architectural options like web or native apps, monolithic apps vs. the advantages of a modular systems, and open or closed source strategy.	
<b>3.2 Low-Tech Conditions:</b> Consider bad network quality, low-end phones and low skills when designing mobile government solutions to reach as many people as possible, focusing on the channel that is most used by the most relevant target groups (e.g., SMS or voice).	
<b>3.3 Architecture:</b> Design and implement an architectural layer with a focus on digital identity and central data management, shared across all digital solutions and organizations.	  
<b>3.4 Information Security:</b> Establish an information security framework that sets minimum standards for all digital solutions by the government, taking into respect specific local needs and conditions as well potential weak security features in network infrastructures and devices.	  

The most relevant use cases for countries with a basic development level might be among the following – for details see Chapter 3.

- **Develop mobile interfaces** to existing digital government services to quickly increase reach out.
- **Provide proxy identification** through mobile phone subscriptions to facilitate services like registration and welfare payments.
- **Provide money** to people entitled to welfare or food stamps via their mobile phone accounts.
- **Provide information** to citizens via simple mobile phone channels – for example, proactively as reminders on due taxes, in the case of emergencies or around potential social benefits.
- **Enable simple interactions** or transactions with citizens via channels like SMS, voice calls, USSD, or e-mail to supersede travel and physical contact with public agencies.
- **Collect information and feedback by citizens and field staff** on public infrastructure, institutions, services, or

policies using simple mobile phone channels as well as extended capabilities, for example, via photos.







- **Support field staff with mobile phone capabilities** like voice, photo, and video recordings for simple and efficient documentation purposes.

## 6.2 Advanced Development Level

Countries that have developed an advanced level can focus on further establishing and rolling out a whole-of-government strategy and policy, containing a mobile first and once-only strategy. They can usually rely on fair connectivity and (digital) literacy, a basic cross-agency strategy and policy framework as well as shared digital services for identity and data management that can be used for mGov. They can invest in further advancing their digital identification solutions and consolidate singular existing digital government solutions to a user-centered one-stop mobile government platform or e-wallet solution. Most recommendations that are valid for developing countries are also applicable for advanced countries. Additional recommendations are summarized in Table 2 below.

> > >

TABLE 6.2 - Additional Recommendations for Countries with Advanced Conditions

 ... 1-6 months,   ... 6-12 months,    , 12+ months,












1. Strategy and Policy	Time
1.1 Coordination: Enforce a whole-of-government coordination, digital strategy, roadmap, and policy framework on all horizontal and vertical administrative levels to expand the efficiency of digital services.	  
1.2 Strategy: Emphasize efforts to implement shared digital services and advanced digital identification, one-stop shop or e-wallet initiatives, a once-only principle as well as a mobile first strategy to follow the shift from eGovernment to mGov.	  
1.3 Network and Digital Skills: Expand high-quality broadband access and constantly advance digital skills to keep up pace with current technological developments and reach people beyond digital aficionados.	  
1.4 Subject-Specific Policies: Include stakeholders in the design of policies, hand in hand with mobile government solutions, considering an end-to-end-process view to provide user friendly public services.	 



Table 6.2 continued

2. Approach	Time
<b>2.1 Universal Design:</b> Establish a “Design for All” approach in all projects to target all relevant user groups, enlarging the coverage of mobile government solutions to people with limited (digital) literacy or physical capabilities.	 
<b>2.2 User-Centered Design:</b> Extend user-centered design principles to all relevant initiatives, ensuring high usability and penetration.	  
<b>3. Technology, Architecture, and Security</b>	
<b>3.1 Advanced Features:</b> Exploit potential smartphone or smart feature phone capabilities like providing location, camera, biometrics, and security features without assuming these to be ubiquitous.	
<b>3.2 Low-tech Conditions:</b> Continue considering low-end phones to reach the high number of people with older devices or operating systems.	
<b>3.3 Digital Identification:</b> Look out for up-to-date standards regarding digital identification and establish high-security solutions with full authentication for individuals.	  
<b>3.4 Architecture:</b> Consolidate existing digital government and mGov solutions, whether by providing a unified technical layer with shared digital services, or by implementing a central government one-stop shop or e-wallet solution as a single access point for citizens, businesses, and government employees.	  
<b>3.5 Information Security:</b> Closely consider information security standards, carry out comprehensive information security risk assessments for all mGov initiatives and apply principles like data minimization and Privacy by Design at the right balance between security and usability.	 

In addition to potential solutions in countries with a basic development level, the most relevant use cases might be the following (for details see Chapter 3):

- **Provide binding transactional services** for citizens based on identification and authentication like registrations, applications, or tax declaration.
- **Provide individual information** to citizens around their specific situation like reminders for tax declaration or passport renewal.
- **Extend the use of citizen feedback** regarding public infrastructure and use crowd-sourcing methods to get information on potential fraud or incidents as well as opinions in policy making processes.
- **Provide mobile apps for public staff** to access knowledge bases and simplify government-internal processes.



## 6.3 Very Advanced Development Level

**Countries in a very advanced situation have established most preconditions described in earlier chapters and are able to reap the full potential of mobile government.**

In a dynamic area like mobile, it is important to keep being up to date in all facets presented in this note. In complex systems like public administrations, even highly developed countries face potential for further consolidation, whether by further rolling out whole-of-government strategies and policy frameworks throughout all institutions, by expanding skills in user-centric approaches, optimizing user experience in all digital services or by increasing interoperability and efficiency of cross-agency digital services, among others.

**A great potential for governments with such sound foundations can be to enrich digital solutions with related services around life situations.** By cooperating with the private sector and social organizations, a real one-stop shop experience can be created that does not only cover governmental affairs, but all matters relevant to a person in a

certain situation. This can lead to impactful win-win-situations for governments, citizens, and related organizations alike.

**Potential use cases are the following (for details see Chapter 3):**

- **Provide official documents in mobile e-wallets** and include identity cards or driver's license direct on mobile phones, replacing physical ID cards.
- **Use anonymized mobile data** to optimize public sector processes, for field staff or in policy design, using historic, real-time, and predictive analytics.
- **Use virtual reality features** on mobile phones to seamlessly support field staff in their daily work.
- **Use secure messaging systems** between public officials for asynchronous communication and decision making.

# 6.4 Sample Approach

Local context and technical conditions are essential for any approach to designing and implementing mobile Government solutions. The following fictional example illustrates such a potential approach in a fictional situation of

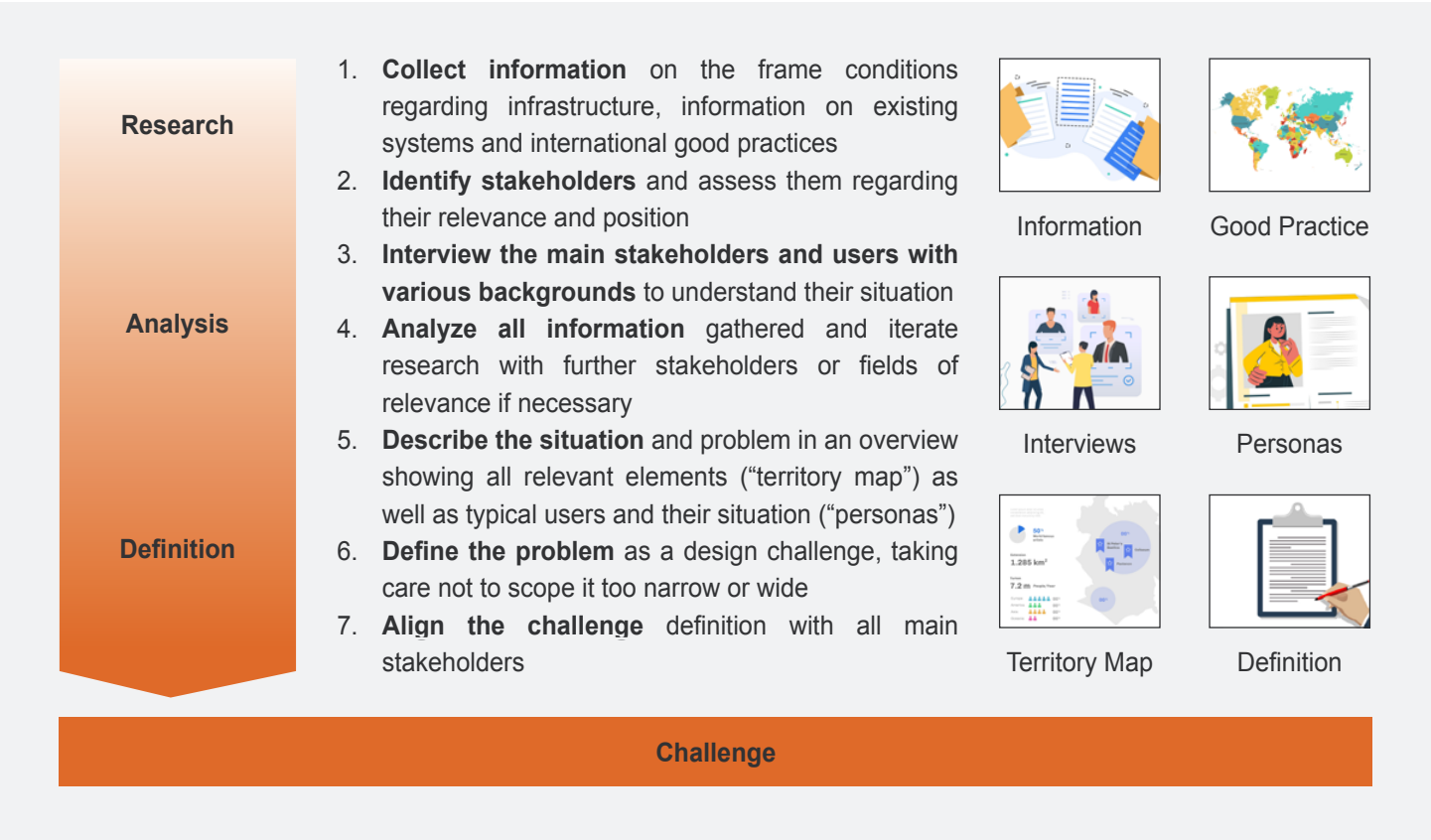
a country with a basic development level. It serves as a rough guide that illustrates how the recommendations of this How-to Note can be put into practice.

## SITUATION

Be it caused by wars, disasters, or other exceptional circumstances like a pandemic, governments often face the need to quickly support impecunious people with financial relief to deal with these situations. A developing country with 50 million citizens wants to prepare for such potential future crisis. Its government expects to face a phase of enormous inflation. Prices for energy and food could rise fast, putting many people of low but also medium income situations, where they can not afford the least. Particularly women with children could rapidly find themselves in a miserable situation, not being able to afford enough to eat. The government aims to take measures to get prepared for such or similar situations.

The first essential, often underexposed step in such a situation (and any other), is to get a close understanding the problem and to define the respective challenge, as shown in Figure 6.3 below.

> > >  
**FIGURE 6.3 - Sample Approach of Define a Challenge**



Source: Authors.

Having collected data, in the described situation one might find out that main agglomerations are covered well with basic network quality, but reliable broadband is rare. Many people may own a simple phone, but the poorest do lack such opportunities. Those owning a phone generally have fair knowledge about simple channels like SMS and voice. One might also find out that many people, especially children, are not registered with the government. A basic digital government portal, where the government provides forms and information, is well established. However, digital identity to carry out transactions does not yet exist.

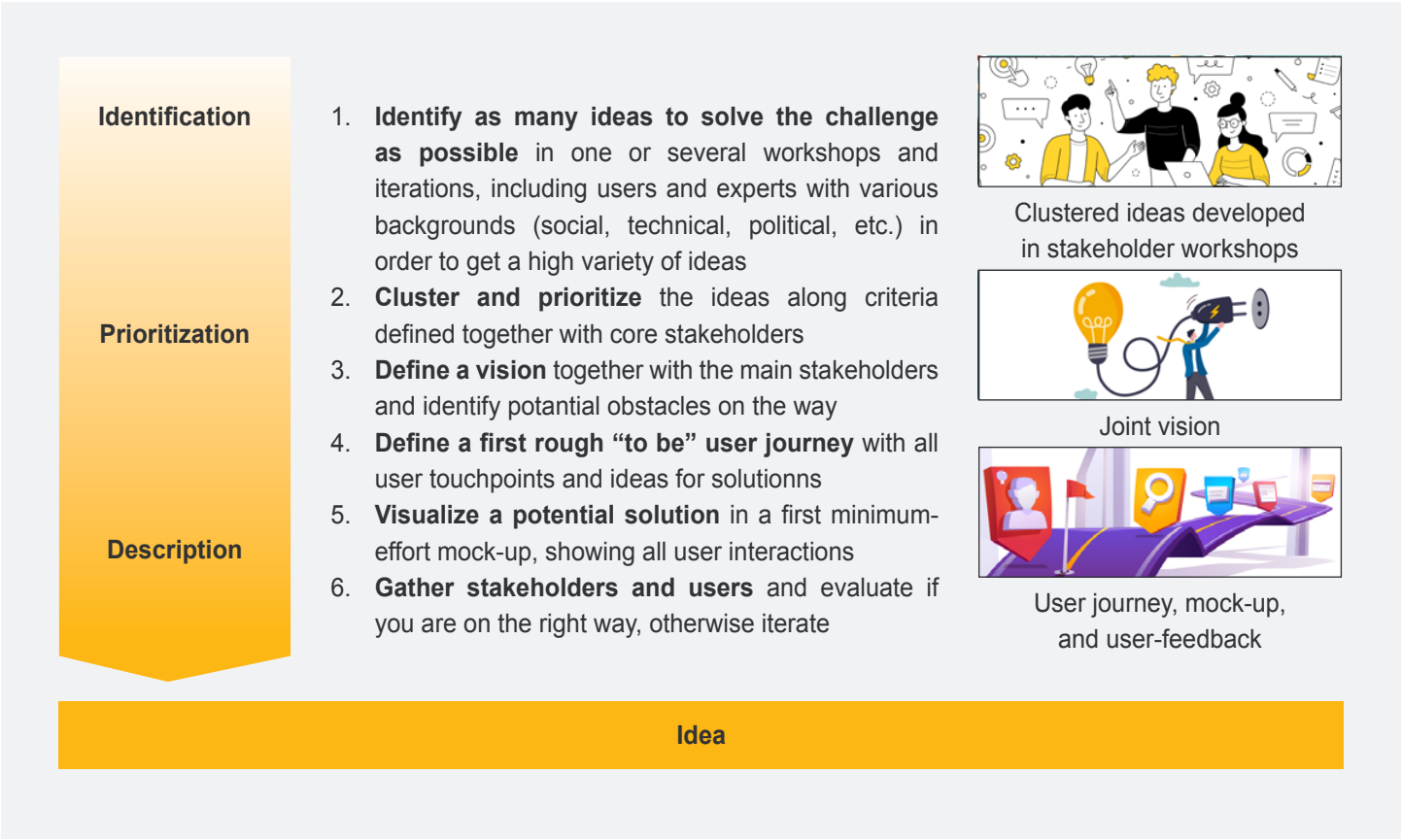
The team involved in this phase is often still small, with a public official as challenge owner and a group of design thinking experts at its core. The stakeholders may be several federal ministries, municipalities, social organizations, and citizens. It is essential to interview a good cross-section of citizens with a variation of backgrounds. This means not only working with people with high digital affinity in cities, but also going to

the field and talking to people who are most relevant for the respective challenge. Interviews with representatives or social organizations might be a good means to get enough relevant information. This can be the basis to identify and describe typical users (“personas”) that will be at the center of service design in all further steps to achieve user-centered solutions. Naturally, the number of interviews can be restricted for time and budget reasons.

Depending on the insights collected in this phase, the design challenge can vary and should be well defined and aligned. It is often formulated as a “How might we ...” question, which should not be too broad or too narrow. Depending on the time available, it can be developed in several iterations. The targeted impact should always be kept in mind and the definition should be tested by thinking of some potential solutions. This phase should not be undervalued since it provides core information critical for all further phases and is the foundation for the next step: Ideation, presented below in Figure 6.4.

> > >

FIGURE 6.4 - Sample Approach to Identify, Select, and Describe Ideas



Source: Authors.

Based on the defined design challenge, a brainstorming for ideas can be carried out. Usually, a good way to find as many diverse ideas as possible is to organize workshops with a heterogenous crowd of people, applying a well-selected set of creative brainstorming methods. Ideas for the described situation could include to establish a register of identities based on simple factors like tax, social security, or phone numbers; to predefine criteria to enable the government to achieve a good hit rate to people really in need; or to establish a platform to quickly provide cash or vouchers to those who are. After the first brainstorming, related ideas can be clustered in groups and prioritized along criteria ideally defined together with main stakeholders.

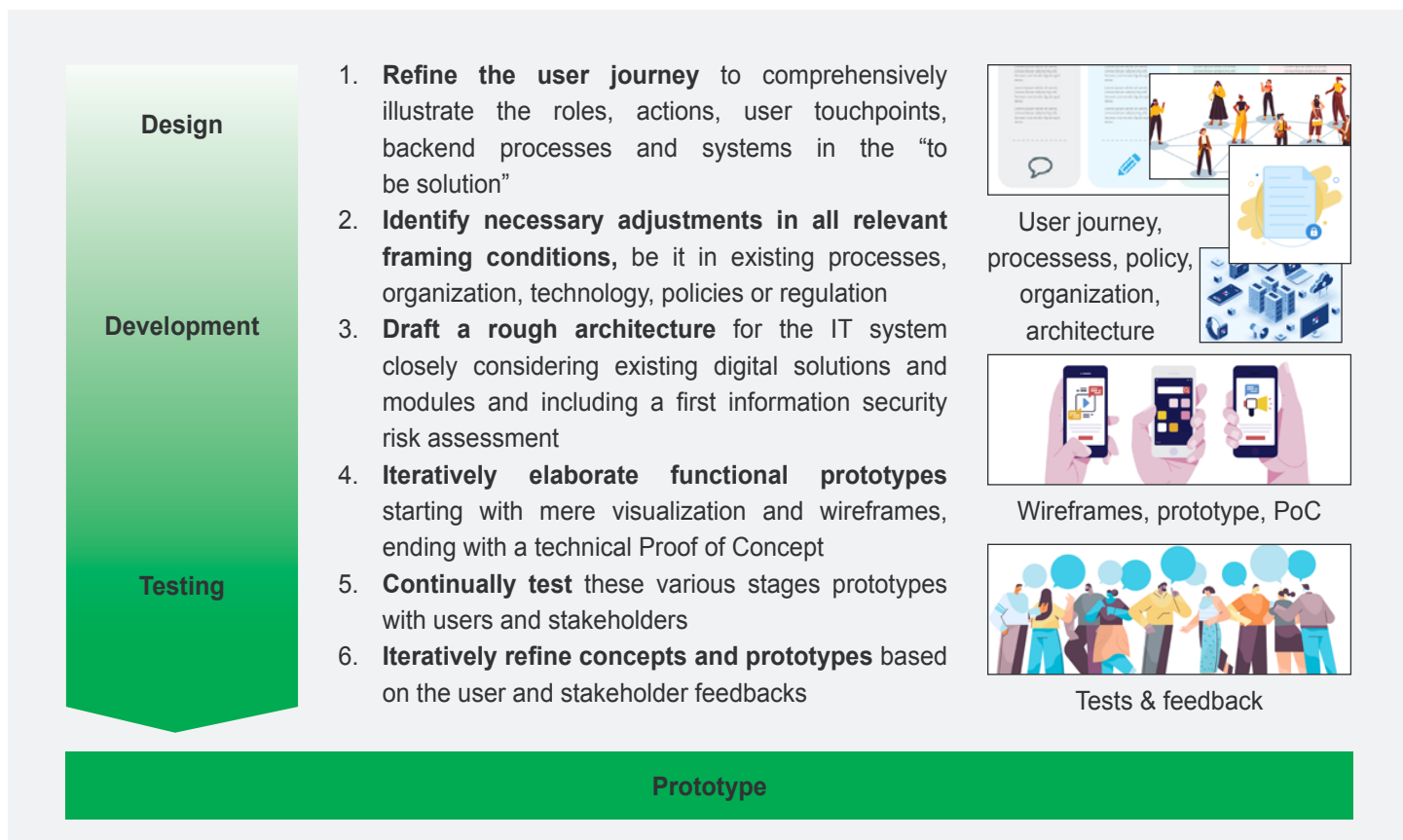
Having the ideas in mind, a vision could then be defined to get a common understanding of the long-term goal. Obstacles that might occur when trying to reach this goal could be identified. This may be, for example, that the people in need do not even have simple identification like a social security

number, do not own a phone, or only have access to a simple phone. Ideation cycles to overcome these obstacles may be developed as necessary, considering technologies like mobile and other means to reach people who are not connected at all. This may include integrating simple channels like voice and SMS or by including local representatives.

In the next step, a first version of a user journey can illustrate the main touchpoints with a solutions as well as framing conditions, problems, and ideas for solutions. A first mock-up can show the most important interactions with users without investing too much effort. Feedback can be gathered by showing first rough mobile screen designs to users. In this manner, weaknesses in concept, potential dead-end streets or solutions that do not fit the user needs can be identified at a very early stage without losing too much time, and new or adjusted ideas and proposals can be developed in further iterations.

> > >

**FIGURE 6.5 - Sample Approach to Design, Develop, and Test a Concept and Prototype**



Source: Authors.



Once a good proposal that is widely accepted by stakeholders and fits user needs is finalized, it is time to receive further budget and resources to prepare the next steps. In addition to the illustrative user journey and mock-ups, a business model canvas might be of good use, encompassing all relevant facts like resources, channels, costs, and potential revenues. Having approval for next steps and based on the existing rough elements of the ideation phase, a more detailed concept and a functional prototype can then be developed – see Figure 6.5 above.

A user journey can give a comprehensive big picture and end-to-end process-oriented overview on all aspects relevant to a solution. The user journey of the given example might encompass phases such as identification, application, verification, and transaction. On a more detailed level, the activities, roles, backend processes, relevant regulation, IT systems, and other requirements can be mapped. When designing a user journey, it is essential to include all relevant stakeholders, especially policy makers and responsible managers, to ensure that framing conditions like government processes, organization and roles, regulations, and the technical solution are designed accordingly. The original

core team at this stage also needs to be expanded with each step, to include software architects, developers, and security experts.

Activities necessary to establish a solution do not only encompass activities of the user journey; the major effort might be to set up underlying policies, processes, and technical platforms. Besides the procedural and regulatory measures, at least a rough IT architecture has to be drafted that conforms to existing policy frameworks and core government systems. In iterative cycles, and depending on the specific situation, wireframes, a prototype, and a proof-of-concept or a minimum viable product for implementation can be developed. Solutions may not only include the mobile phone implementations directed to users but backend systems, which may in many cases require the major effort. Often such extensive activities are carried out after transition to the implementation phase, but this limits the prototyping phase to a wireframe or simple prototype only. Once a concept or prototype shows that a solution will significantly contribute to reaching the goal of effectively addressing the challenge, an implementation project can be prepared. Figure 6.6 below shows an approach for implementation.

> > >

**FIGURE 6.6 - Sample Approach to Implement an mGov Solution**



Source: Authors.



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# **Annex 1.** **Working Group Members**

The following members of a Mobile Government Working Group initiated by the World Bank GovTech initiative contributed their expertise:

- **Austria** - **Peter Kustor** (Co-Chair, Director of the Department International and Legal Affairs, Ministry of Finance); **Daniel Medimorec** (Co-Chair, Department of International and Legal Affairs, Ministry of Finance)
- **Brazil** - **Ciro Pitangueira de Avelino** (Co-Chair, Advisor, Secretariat of Digital Government, Ministry of Economy, **Felipe Cruz** (Co-Chair, General-Coordinator for Content Management and Digital Channels, Secretariat of Digital Government, Ministry of Economy)
- **Bangladesh** - **Anir Chowdhury** (Policy Advisor, Aspire to Innovate (a2i) Programme, Cabinet Division/ICT Division, UNDP Bangladesh)
- **Belgium** - **Frank Leyman** (Head of International Relations, Digital Transformation Office)
- **Estonia** - **Raimo Reiman** (Estonia, Business Architect, Information System Authority)
- **Greece** - **Nikos Vasilakis** (Head of Strategy Dept, GRNET S.A); **Yiannis Giannarakis** (Greece, Coordinator - GR digiGOV-innoHUB, GRNET S.A)
- **Indonesia** - **Cahyono Tribirowo** (Assistant Deputy of Policy Formulation and Coordination of e-Government Implementation, Ministry of Administrative and Bureaucratic Reform); **Joko Parmiyanto** (MEDC Senior IT Officer/Coordinator of Statistics Information System Integration Functio, Indonesia Statistics Agency)
- **Italy** - **Lorenzo Fredianelli** (Chief Business Development & Strategy Officer, PagoPA); **Cristiano Zagari** (Head of International & EU Affairs, PagoPA)
- **Japan** - **Toshiyuki Zamma** (Head of International Strategy, Digital Agency)
- **Korea** - **Sungjoo Son** (Director, Ministry of the Interior and Safety)
- **Moldova** - **Sergiu Bedros** (Chief Digital Officer, e-Governance Agency); **Artur Reaboi** (Chief Enterprise Architect, e-Governance Agency)
- **Morocco** - **Hajar Khyati** (Head of the Department of Development and Operability, Agency for Digital Development)
- **Mozambique** - **Sérgio Mapsanganhe** (Deputy, Director General, INAGE - National Institut on eGovernment); **Amâncio Ubisse** (Technical Specialist INTIC (National Institute of Information and Communication Technology)
- **Panama** - **José Lee** (Deputy Administrator General National Authority for Government Innovation); **Alberto Delgado** (Systems and Computer Methods Analyst, National Authority for Government Innovation)
- **Peru** - **Marushka Chocobar Reyes** (Secretary, Secretary of Government and Digital Transformation); **Paola Gálvez** (Strategic Adviser, Tech Policy & Regulation, Secretary of Government and Digital Transformation); **Jose Clastornik** (Government Consultant, Secretary of Government and Digital Transformation)
- **Portugal** - **Paulo Vale** (Project Manager, Agency for Administrative Modernization); **Cláudia Gonçalves Barroso** (Head of Unit, International Relations, Agency for Administrative Modernization); **Catarina Almeida** (International Relations Officer, Agency for Administrative Modernization (AMA))
- **Qatar** - **Yousuf Yacoub Al-Sahlawi** (Planning Researcher - Ministry of Transport and Communications); **Aljazay Saleh AL-Sulaiti** (E-Government Portal Acting Director, Ministry of Transport and Communications)
- **Switzerland** - **Carlos Orjales** (Program manager, SECO); Jérôme Duperrut (Officer, SICPA)
- **Tunisia** - **Khaled Sellami** (Director General of the e-government Unit, Presidency of the Government of Tunisia); **Sana Oueslati** (Director, Presidency of the Government of Tunisia)
- **UAE** - **Dr. Tariq al Hawi** (Director Digital Adoption and Enablement, Telecommunications and Digital Government Regulatory Authority); **Suleman Bakhsh** (Director Digital Policies, Telecommunications and Digital Government Regulatory Authority)
- **Ukraine** - **Mstyslav Banik** (Director of eServices Development Directorate, Ministry of Digital Transformation)
- **Uruguay** - **Karime Ruibal** (Citizens Services Director, Electronic Government and Information and Knowledge Society Agency (AGESIC))



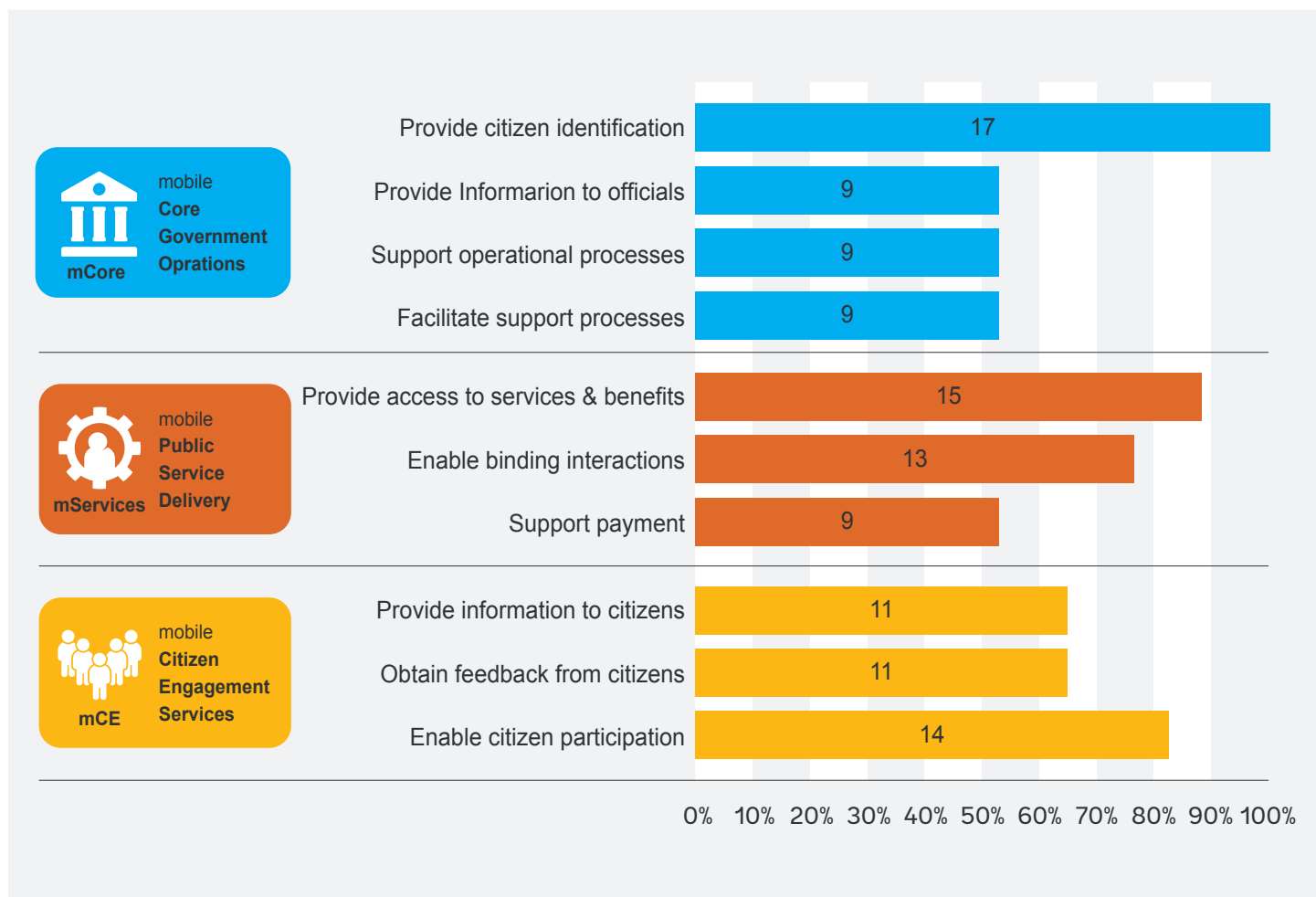


## **Annex 2. Working Group Survey**

A survey among the members of the mGov Working Group initiated by the World Bank, showed the following results provided by 17 representatives of 13 countries.

> > >

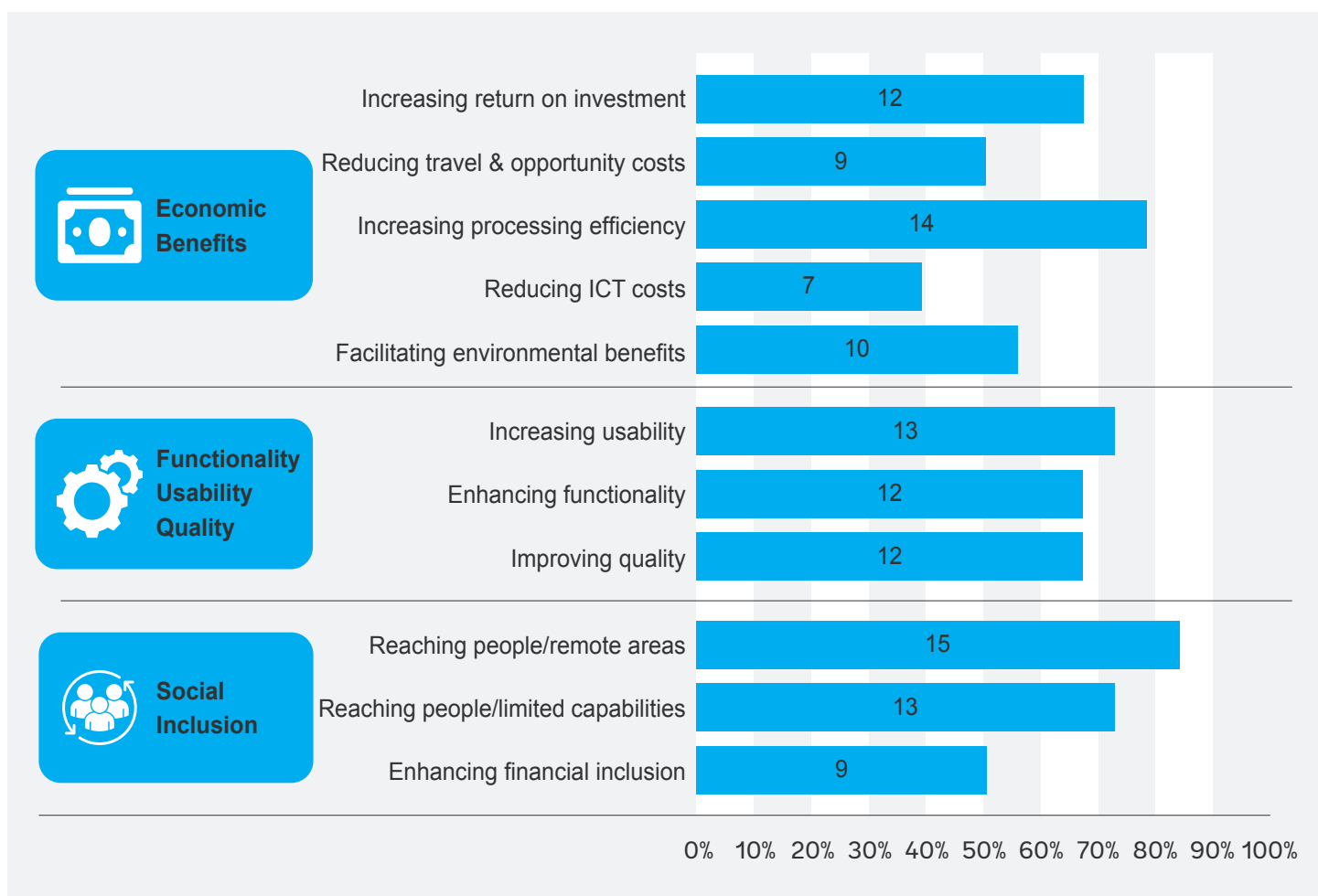
**FIGURE A 2.1 - Types of mGov Solutions with the Greatest Potential for Developing Countries**



Source: Authors.

Further potential solutions of relevance outlined by the survey participants:

- Identity Proof.
- National Wallet Service, eWallet, linked to commerce.
- Interactive mobile service for public service and empowering government services for citizen.
- Provide online one-stop service based on interoperability .
- Enable citizens to verify the legal and tax-paid status of goods circulating in the economy and/or verify the legality of official documents.
- Health at risk reports (911).
- Health tracking, education (distance learning), citizen knowledge management.

**FIGURE A2.2 - Most Relevant Benefits for mGov in Developing Countries**

Source: Authors.

Other potential benefits outlined by the survey participants:

- Ensuring the transparency of public services and improving the internal functioning of the administration.
- Inclusion and accessibility for all citizen services using mobile service.
- Provide citizen data in a single record in the government's digital services system.
- Reducing digital divide within the country and rising trust in public administration.

- Informed based information making.
- mGov can reduce the size of the informal economy and ensure a level-playing field between economic operators, as mGov can allow for the status of goods to be verified anywhere, with non-compliant products being reported to the authorities.
- Better access to essential services (health, education, agriculture, ...).





Biggest challenges when introducing mobile Government in developing countries:

- **Strategy:** lack of a whole-of-government strategy, skills, affordability, connectivity
  - Infrastructure: mobile network coverage, connectivity, free Wi-Fi network availability, affordability of devices with new features.
  - Ownership by authorities.
  - Resources: IT infrastructure and budgeting, qualified human resources.
  - User Literacy.
  - Policy: lack of a general digital policy, trust, or backend process efficiency.
  - Regulations.
  - Paradigm shift in government apparatus.
  - Legal and political system.
  - Trust: feeling of safety for citizens.
- **Approach:** lack of holistic approach or skills to increase usability & accessibility
  - Holistic Approach: Iterative nature of process, fragmented approach and implementations in different bodies.
  - Usability & Accessibility: Prefer to use mobile device instead of traditional methods, penetration.
- **Technology:** Lack of digital foundations like eID; technological dynamics, information security
  - Digital identity and banking.
  - Security.
  - Skills: Software development knowledge, Understanding of secure technologies.

The background features a dark blue gradient with a complex network of white lines and icons. Icons include a lightbulb, a person, a smartphone, a padlock, a cloud, and a mail envelope. At the bottom, there is a wireframe globe composed of a network of dots and lines.

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## **Annex 3. World Bank mGov Working Group Country Overview**



The following country overviews around mobile Government were recorded in the Working Group meeting on May 10, 2022.

## Austria

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From the Austrian point of view, we do have a comprehensive e-government portal which is citizen-centric and based on life situations, so the information has also integrated search options to other platforms. We do have chatbot integration for inclusive usage and everything is optimized for mobile devices. So, we can use services primarily on mobile devices, and all of that is also accessible by an app that we provide free of charge, of course. This app does not only integrate that information but also our mobile ID of Austria with remote qualified signature, so this is not only for information, but also for communication or transaction. We can perform the complete cycle by mobile device and our app. That app also provides security features using the secure elements on the smartphone, which allows for secure single device usage and single-sign-on to other services and app-to-app connections.

## Brazil

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Brazil established the main approach of citizen-centered digital government and improved specific actions to unify and boost digital channels. We have 81 percent of the population with regular access to the internet, and ninety-nine percent of the primary access by mobile devices. Brazil has boosted government digital transformation since 2019 with the current version of its digital government strategy. Important to highlight the implementation of a quality framework of digital interaction and one specific action to centralize all federal government channels, especially mobile applications in the Play Store and Apple Store. This action provides us with the statistics of the solutions for decision-making and provides security for the users against the shadow apps that are trying to capture data from the citizens. With a portfolio of 265 apps in the stores from all the agencies of the government, our challenge is to be more rational, integrating the solutions based on the user journey. Besides the average rate of the quality of the apps is high, no more than five apps have more than 20 million active users. Following this rational approach, we already have achieved advances in public policies: the app for work and employment, with a multichannel approach reaching over 38 million users; we provide all social security services in a digital mobile solution with 20 million users and answering more than

40 percent of requests automatically; services for drivers and transit credentials are available in a mobile solution where it is even possible to transfer a vehicle property digitally; during the fight against the pandemic 60 million Brazilians received financial assistance through a solution that has a digital bank account and related functionalities; a network-based solution that integrates all the municipality and states provides health information and services, such as the vaccination certificate; and finally is also available the GOV.BR app, which concentrates all the features of the digital ID and already has 20 million active users.

## Peru

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In terms of the Peruvian approach and experience with mGov, the Secretariat of Government Transformation is the central government body that steers the strategic directions and oversees a delivery of Citizen Center data services in Peru. Our country is a strong supporter of citizen-centric design and the principles as stated in the government regulations ensure that service delivery is accessible, user-friendly, efficient, and effective. Moreover, according to the law, data services must be designed and deployed to be accessed through a mobile device. The unique digital platform for citizen orientation, gov.pe, has a responsive design with an adaptive set up focus on the usability of the services on different devices. On the other hand, we actively promote the use of apps for the specific aims such as digital identification, online payments, health and a statistical information just to make some examples. The use of digital signature and authentication is encouraged. The mechanism to use this is a signature in the cloud and it has been legally enabled since the beginning of 2021. Currently there's 35 that make it possible for you for citizens to use it. Second, digital technology adoptions, in particular mobile payment, accelerated during the pandemic. Since 2022, financial aid has been distributed to audiences; for example, the government provided economic aid to 1.2 million citizens as part of the COVID-19 relief efforts through mobile money accounts. Seventy-five percent of the population is still using e-wallets. In that sense Mobile Solutions has improved access to financial services and serve as a means for the poorest population sectors to integrate their economies activity. Third, the health center is also part of the Peruvian approach. The Ministry of Health in the presidency of the Council of Ministers developed the contact tracing app, "Peru in your hands," to alert citizens about the possibility that they may have shared direct contact with someone affected by COVID-19. And Geo-Peru, which is the unique platform available to mobile devices, serves for integration of a special or geo-referenced statistics

and harmonize with data for public administration, allowing for data analysis and decision-making on territorial level.

## Bangladesh

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Mobile is obviously taking a lot more central role. Several development partners are deeply involved in this—World Bank, UNDP, and many other development partners. In Bangladesh, we have about 65 percent penetration of internet, but 93 percent of this is actually through mobile phone, just like many other developing countries. In terms of service delivery through digital transformation in the last 13 years we have converted about 80-85 percent of services, about 2,000 services to digital service. Many of them are available over the internet, and many are on mobile government platforms. We have four modalities to deliver services: one is through the internet; the second is what we call “Digital Centers,” about a thousand or so assistance centers across the entire country where citizens can go and access Digital Services, where they don’t have direct access from homes or offices. These Digital Centers serve about 5 to 6 million people every month. The other two are part of mobile government. The most important right now is myGov, which was launched about two years ago by the Prime Minister. That’s an aggregation of about 1,600 plus services in one platform across many different ministries and departments. And the fourth modality, which is also mobile, is a helpline where people call to get access to health care services, emergency food, or access to different types of services like a passport and land records and so on and so forth.

So, these are the modalities of delivery service. In the last 13-14 years we have actually done the measurement of how much improvement we have done in the lives of citizens. Through a measurement system that we call TCV (time, cost, and visit). We’ve reduced about 12 billion workdays; about 16 billion dollars and 7.4 billion visits have been eliminated. That’s how we actually measure improvement in service delivery in digitization, and mobile is becoming a lot more predominant. There are systems that do decision support within the government; that’s also on mobile. During COVID-19, we resolved about 16 million decisions within the government using mobile platforms. So, we have a mobile first strategy and. Recently, in the last one year, we’re also looking at many different technologies, such as blockchain, artificial intelligence, drones, and Big Data that are embedded in the mobile platforms. We have rapid a digitization platform, that is also on the mobile, and we have developed innovation teams in every ministry and every department, so we have several hundred innovation teams led by Chief Innovation officers in

every ministry. And we are trying to develop capacity within our civil service with the program, Civil Service 2041 – envisioning the next 20 years or so of what the Civil Service would look like, and mobile strategy mobile-first strategy were possible are actually at the centers of the capacity development program.

## Belgium

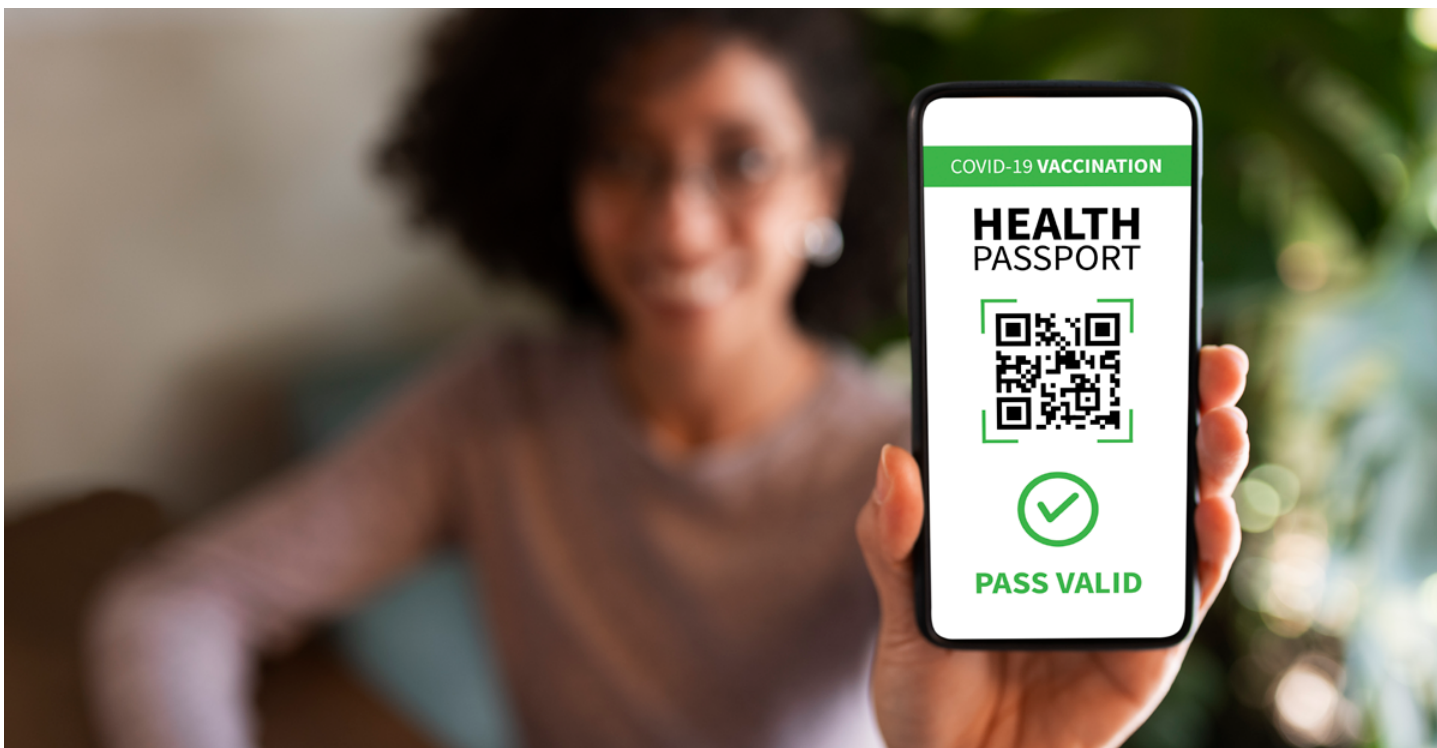
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We launched the Belgian eID at national scale 20 years ago. This was immediately done at the national scale. At that time also, we decided that we would offer services in a hardware agnostic format. Twenty years ago, mobile was still very limited, but over the years we saw mobile arriving as a tool. It got a huge boost with the launch of the mobile authentication service called ITSME which was very citizen-centric, easy-to-use, and very safe - and that generated a boost in mobile usage. If I go 20 years further, today we are now focusing on putting everything in priority on mobile platforms. We are building what we call a mobile wallet, which is the one-stop shop of government services on the mobile platform, where basically we can merge everything which we built so far. Of course, all authentication services are there; you can sign documents, you can have access to what we call an e-safe, which is some kind of a Secure Storage for all your certificates, and you can exchange them. There is a link with our e-box, which is the way we communicate between the citizens and government. We will have an e-counter in there for all your own life procedures and finally we also make a link to a thing we call “my data,” which is actually a platform where we give a full open view of what the public sector is keeping as data and for which purpose, so we also play the open book philosophy there. All this is done together with other European colleagues; what we try to do is build these wallets in an interoperable way at EU scale, which makes it even more interesting.

## Estonia

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In Estonia, people can do all their procedures and interactions with the government online, but we’re still not quite satisfied, because we have quite a bit of legacy components, that do serve us well, but looking forward to artificial intelligence (AI) and pro-active services, we have a lot to rebuild. Right now, our focus is mostly on automation, using AI and providing services proactively without people even having to apply for something. But if we have the data and information, the government will just make you the offer; we already have a couple of services online that work on that principle.



## Greece

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In the past two-and-a-half years of COVID-19, we leapfrogged in many areas in public services, and we introduced some special mobile services related to COVID-19, such as the COVID pass. And we're working intensively in transferring most of the public services under the mobile first concept. We provided a mobile app in which users can use about 1,300 digital service. We had first attempted to include a wallet from our mobiles, specifically for COVID-19 as a first MVP. Right now, we're working on general use and a driver's license. Since last summer, a mobile app on health has been established.

## Indonesia

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In Indonesia there are many islands, so mobile technology can facilitate accessibility. The problem is about the lack of integration, so we need to have an integration process. Right now, 73.7 percent of our population can access the internet and almost 95 percent use mobile phones, so it's quite a huge opportunity for us to utilize mobile government to deliver government services. But it's not only delivering services; we hope that we can use the kind of data generated by the mobile government for statistics. Maybe later, we can access big data from this – for example, tourism statistics.

## Italy

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Our mission is to build and to create infrastructure for digital solutions. We are very involved in European governance and also built a pilot about digital identity as my colleagues from Belgium and Greece said. We are also involved in digital wallet, and other items like license, payments. We would like to leverage and spread digital services through digital payments.

## Japan

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Top priority are services to citizens and trust.

## Moldova

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Regarding mobile strategy, until recently the majority of our services were web applications with responsive design that are usable from a mobile, and even some progressive web apps. But native mobile apps were not part of our plans until recently. From last year, we started to launch a mobile identity. So, we are about to launch in around two months a hybrid mobile identity with qualified signature, where a part of private key is generated on the mobile phone under complete control



of the user and the other part is generated on the cloud-based HSM solution, which is kind of similar to Smart ID from Estonia. Initially, the registration will be available by visiting an office in the country or in our embassies abroad, or by signing the registration request using another qualified signature. We have around 200,000 users, which is about more than 10 percent of the population. We also plan to implement remote registration that would include passport verification via NFC, and AI services such as face and text recognitions, which you probably saw implemented in some parts of the world, but not as qualified signatures. We plan to do it as qualified signatures, aligned to EU eIDAS regulation.

## Morocco

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The vision of digital developments in Morocco aims to transform interaction with the government through end-to-end digitalization of prioritized business processes and improve user satisfaction with the services provided by the administration. The satisfaction rate is more than 80 per-cent. The digital transformation of the administration is a crucial challenge for Morocco. The aim is to accelerate the change in public services to make them more secure, transparent, and efficient. Morocco is taking three main initiatives through this acceleration process. The first initiative concerns the establishment of general interoperability framework for government administrations. The second initiative is to create a digital factory to develop a structure to accelerate the development of digital services. The third initiative is to digitize the public services and to raise the satisfaction rate.

## Mozambique

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In Mozambique, in terms of mobile and related to COVID-19 there was a lot of work that we did, mainly to help the Ministry of Health to cope with the demands. But also, in the Ministry of Science and Technology, we had a number of initiatives, mainly at the higher education sector to continue with the activities in terms of the learning process. For example, we are running an initiative where we have a lot of storage space, and we reserve some of this space for applications of higher education sectors. Some of these we have implemented ourselves. Also, we had a very interesting proposal to help students. I'm talking about a zero-rate initiative, where we have negotiated with telecommunication companies about pricing only for educational purposes. One of them offered a

zero-rate pricing, and the other lowered the prices to access these online platforms. This was very important, because when the pandemic came, the majority of us weren't prepared and we had to make sure that students got materials. Another example of our activities is our e-document-platform for the government, and the other one is the e-government portal for citizens, where are a number of government services. Also, we establish a government network – secure VPN network. Up to now, 1,000 institutions have connected to the central, provincial, and district level. The cyber security division ensures a high standard of security. A Shared Resources division manages the government data center. A new service is a network that connects all public and private education and research institutions.

## Panama

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Since 2019, we have been working on the centralization of efforts for the end-to-end provision of government agency services. We created a law in 2020 for formalizing the efforts of all agencies, so we have a common framework to unify services and offerings to citizens and companies, and also people working for the government. At the moment, we have a unique portal that is the window for everyone to government services. Now we are also working on an effort to provide mobile experience for the users. During the COVID-19 pandemic, we had great success for appointments for vaccinations and tracking of vaccination schemes. We have great success of coverage with mobile technologies.

## Switzerland

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Switzerland is not really leading in digital transformation for a number of reasons, perhaps here it is also interesting to learn about what did not work really well. We have several apps that actually are very useful, used by our citizens. But basically, we are still struggling to build trust among citizens. Switzerland is a very decentralized country – almost each region has its own laws and regulations and institutions, so we cannot implement a top-down implementation plan. We have to work with a bottom-up approach. Each canton and municipality building its own apps, and then if it's a success, other cantons and municipalities will copy. The second particularity: in Switzerland we have a very direct democracy, we have to vote almost every month; we have to go and vote for any change in the legislation, and recently we suffered a major

failure in proposing our citizens adopt our digitalization plans. Last year, we had a 70 percent rejection of our digital ID. It's always interesting to learn about citizen-centric digitalization, but when we ask citizens, 70 percent do not want a digital ID or digital voting. It is quite difficult for us, so we need to work on trust of citizens on digitalization, because there is a lot of mistrust about the use of the data that the public sector has. When dealing with large IT firms, we have the feeling that we, government, and institutions lose control on data. So, we work on explaining chances and risks to citizens.

## Tunisia

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Tunisia is working on the implementation of its digital transformation strategy 2025, especially in cooperation with the Ministry of Technology. Mobile penetration is very important in Tunisia and the government is aware of this potential. The Tunisian government is working on how to use this potential and how to improve service delivery. There are many services that were offered via mobile in Tunisia, especially during the COVID-19 crisis, and in many fields, especially education services, social security, and finance. The main objective of the government is to accomplish social and financial digital inclusion and to reach all Tunisian people. So mobile government can help reaching this target, but the main challenges are how to reach this people, how to improve connectivity, how to improve the network of mobile government.

## United Arab Emirates

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If I want to focus on something that the UAE government is approaching in digital transformation, I will say it is digital consumer strategy and policies. Recently we have devoted our whole digital transformation teams and their different digital agencies towards the digital consumer, to build services around the consumer, not designing the services ourselves, as Government, but co- designing and co-creating them with the consumers. We had several pillars in our approach and we made sure that we enforce these to any new service redesign and any existing services that are already there. So, we launched a one-stop shop for the whole government services. We have around 3,000 services and we're aiming to reduce that number of services onto one platform which provides bundles of services. So recently, we were able to launch our most used bundle in the UAE, which is a newborn baby. Usually, when you have a newborn in the UAE you have to visit around seven government entities which totals comes to a 36-hour journey, with commuting and waiting time and application. After a 100-day accelerator, which brought together the government the related stakeholders, we were able to launch the service where the hospital will ask you only for the name of the newborn baby, and that's it. Everything will be initiated from the hospital and every application will be sent to the agencies. We cut down a lot of steps that are not required, a lot of documents that need to be submitted, that are not required. And we never ask to submit a document that is already submitted. We have a once-asked-policy, and within a matter of one week you will get the baby's passport, birth certificate, and family book, all together in a basket as a gift for the newborn baby.

